Pro-Poor
Livestock
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Livestock Policies for Poverty Alleviation: Theory and Practical Evidence from Africa, Asia and Latin America

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A Living from Livestock

PPLPI Working Paper No. 27

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PREFACE

This is the 27th of a series of Working Papers prepared for the Pro-Poor Livestock Policy Initiative (PPLPI). The purpose of these papers is to explore issues related to livestock development in the context of poverty alleviation.

Livestock is vital to the economies of many developing countries. Animals are a source of food, more specifically protein for human diets, income, employment and possibly foreign exchange. For low income producers, livestock can serve as a store of wealth, provide draught power and organic fertiliser for crop production and a means of transport. Consumption of livestock and livestock products in developing countries, though starting from a low base, is growing rapidly.

This paper argues that, given a functional macroeconomic and institutional framework, livestock policies would be pro-poor if they included: (i) policies 'establishing the basics for livestock production', including secure and adequate access to basic production inputs, such as land and water, as well as risk coping mechanisms for natural disasters and price shocks; (ii) policies 'kick-starting domestic livestock markets', such as a pro-poor functioning of the credit market, animal health and extension services delivery, and adequate access to output markets for smallholders; and (iii) policies 'supporting and expanding livestock markets', encompassing research for improving feeds and livestock breeds, food quality control and trade-supporting policies.

We hope this paper will provide useful information to its readers and any feedback is welcome by the author, PPLPI and the Livestock Information, Sector Analysis and Policy Branch (AGAL) of the Food and Agriculture Organization (FAO).

Disclaimer

Author

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Keywords

Livestock Development, Pro-poor Policies, Africa, Asia, Latin America

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EXECUTIVE SUMMARY

Introduction

Increasing population, growth in GDP per capita and urbanization are boosting the demand for food of animal origin in developing countries. This structural break in the livestock market has been labelled the 'Livestock Revolution' (Delgado et al., 1999). It provides tremendous opportunities to poverty reduction, an estimated 42 percent of the poor worldwide being dependent on livestock as part of their livelihood (Thornton et al., 2002). As market imperfections loom large in rural areas, however, decision makers should design and implement the appropriate policies to make the poor fully exploit gains from livestock demand. This paper examines the recent pro-poor thrusts of macro and sector development policies in eighteen developing countries to identify whether governments are tapping into the pro-poor opportunities offered by the livestock revolution. The countries examined are Ethiopia, Kenya, Sudan, Tanzania and Uganda in East Africa; Burkina Faso, Mali and Sudan in West Africa; Bangladesh, India and Nepal in South Asia; Cambodia, Laos, Thailand and Vietnam in Southeast Asia; and Bolivia, Ecuador and Peru in Latin America.

A pro-poor livestock policy framework

Asymmetric information and intrinsically imperfect and missing markets lock the poor into portfolios of activities of low returns, preventing them from positively reacting to price signals and allocating their scarce resources efficiently, even in those countries with a comparative advantage in livestock production (e.g. de Janvry and Sadoulet, 2005). Following much disillusionment with the liberalization thrust in terms of poverty reduction, governments recognized this status of affairs and at the end of the 1990s posed poverty reduction and pro-poor growth at the centre of their development strategies. A framework for comparative pro-poor livestock policy analysis is presented to assess whether this shift in the political agendas is expected to benefit the poor livestock holders, filling a gap in the socio-economic literature which has essentially investigated macroeconomic, industrial and agricultural sector policies.

Taking into account the specificities of livestock production and the broad literature on poverty traps (e.g. Dorward at al., 2004a, 2004b), it is argued that, given a functional macroeconomic and institutional framework, livestock policies would be more pro-poor if they included strategies for: (i) 'establishing the basics for livestock production'; (ii) 'kick-starting domestic livestock markets'; and (iii) 'supporting and expanding livestock markets'. Policies that 'establish the basics' refer to those public actions that allow poor livestock producers to have secure and adequate access to basic production inputs, such as land, feed and water for animals, as well as risk coping mechanisms for natural disasters and price shocks. Secure access to production inputs and stable income are necessary but not sufficient conditions for small producers to respond to price signals efficiently, because of widespread imperfections in intertemporal and input and output markets. Polices to 'kick start domestic markets' are therefore required to allow the poor to exploit market opportunities. These include all actions intended to promote a pro-poor functioning of the credit market, an efficient and pro-poor system of animal health and extension services delivery, and adequate access to output markets for smallholders. Finally, policies to 'support and expand livestock markets' are those long-term public actions that encourage and support the sustainable production of high quality commodities; they encompass research for improving feeds and livestock breeds, environmental protection, food quality control, certification and grading, which are necessary components for products to be competitive in international markets and to avoid smallholders be crowded out by foreign competitors.

The livestock revolution bypassing the poor

Preliminary ILRI data mapping livestock and poverty highlight that a large share of the poor raise livestock in the case-study countries: roughly 60 percent in East and West Africa, around 40 percent in South and Southeast Asia and about 28 percent in Latin America (Thornton et al., 2002). National governments, however, have so far not taken advantages of the poverty-reducing opportunities of livestock development. Time series analysis comparing 1984-2004 trends in the demand for vis-à-vis indigenous supply of beef, milk, poultry, eggs, pigmeat and meat from sheep and goats show that, on average, local meat/milk production has largely not satisfied increased national demand. In 1994-2003 only in 18 over 108 of the cases analyzed livestock production met with the prospected increase in local demand, with milk and poultry accounting for over 55 percent of successful cases; quite the opposite, in 24 percent of the cases per-capita production declined during 1994-2003, with population growing faster than meat/milk production; finally, for most livestock commodities average annual growth rate fell in 1994-2003 compared to 1984-1993, with a concomitant worsening of the livestock trade balance. The demand-driven livestock revolution, therefore, appears not to have translated into incentives for local meat/milk producers; meaning that in the last twenty years decision makers have not designed and/or implemented successful policies reducing frictions and imperfections in rural markets to the benefits of poor livestock producers.

Unbalanced pro-poor livestock policies

The current shift in policy making, which has placed poverty reduction at the centre of the development agenda, is not expected to change the above trends significantly. First, most national policy documents fail to appreciate the role of livestock in poverty reduction; in particular, they treat livestock production and poverty reduction disjointedly, and implicitly assume that the overall objective for the sub-sector is increased meat/milk production, rather than mitigating against poverty through livestock production. Production-increasing policies, however, do not necessarily benefit the poor livestock keepers who are an extremely heterogeneous group and often, being extremely poor, maximize a survival rather than a production function. Second, while ongoing macroeconomic and institutional policies, which follow the mainstream economic theory, are likely to sustain a conducive market environment, agricultural and livestock sector policies are not adequately addressing the most binding constraints affecting livestock holders. Policies 'establishing the basics' are given secondary relevance as issues such as access to land and water, which are recurrently identified among the main constraints for livestock keepers both in crop-livestock and pastoral production systems, are treated en-passant; most policy documents also fail to detail ex-ante and/or ex-post intervention strategies to insure smallholders against natural disasters. Conversely, national policy documents emphasize the importance of strategies to 'kick-start domestic markets', with a focus on input over output markets: significant reforms are ongoing in the financial sector and in animal health and extension services delivery, while the issues of marketing and market information are marginally addressed. Finally, limited attention is given to policies expected to expand and support livestock production by the poor in the long run. Research activities have been reformed, either through centralizing or decentralizing research institutes, and countries are increasingly open to global markets and willing to satisfy international sanitary standards. These reforms, however, appear to respond to macroeconomic concerns rather than aiming at reducing poverty levels.

Redressing livestock policies

The present macroeconomic and institutional policies appear to be pro-poor, and should provide opportunities for livestock keepers to escape out of poverty. On the other hand, agricultural and livestock sub-sector policies are somewhat unbalanced

and do not address some of the binding constraints preventing the poor from taking advantages of growing livestock demand. In particular, agricultural and livestock sector policies are biased towards 'kick-starting livestock domestic markets' and 'expanding livestock markets' vis-à-vis policies 'establishing the basics for livestock production'. Yet, in several circumstances lack of secure access to land, feed and water significantly reduces the effectiveness of input and output market policies, with livestock holders overproducing food for insurance, being slow in technology adoption, and accumulating rather than investing savings. It is argued that to make smallholder producers deriving benefits from an increasingly market-friendly environment, governments should better target the causal links between livestock development and poverty reduction, having the livestock-producing household rather than a production function as the policy entry point into the sector. This would imply focusing not only on market policies but also on strategies reducing vulnerability and transaction costs to markets for smallholders. Only then will input and output market, production-enhancing and trade-supporting policies be effectively self-sustainable and pro-poor.

1. INTRODUCTION

Increasing population, income growth and urbanization in developing countries are boosting the demand for food of animal origin at unprecedented level. According to FAO food balance sheets, in the developing world per-capita cereal consumption diminished from 164 to 158 kg/year between 1982 to 2002; conversely, per-capita meat consumption increased from 14.9 to 28.5 kg/year and milk consumption from 24.8 to 45.6 lit/year (FAOSTAT, 2004). De Haan et al. (2001) reported that aggregate meat demand will grow from 209 million tons in 1997 to 327 million tons by 2020, and milk consumption from 422 to 648 million tons. Delgado et al. (1999), who extensively analyzed this structural shift in food demand, labeled this trend the 'Livestock Revolution'.

The poor could gain from the livestock revolution (e.g. Brown, 2003). Preliminary estimates indicate that, of the 1.3 billion poor worldwide, around 42 percent (555 million) depend on livestock as part of their livelihood: about 41 million are pastoralists mainly located in arid and semi-arid areas; 46 million are landless livestock keepers; roughly 103 million are small farmers in irrigated zones; and 365 million are small landholders in rainfed areas (Thornton et al., 2002). However, (i) past livestock development strategies and projects were not adequately poverty focused and rarely improved the livelihoods of the poor (LID, 1999); (ii) recent national and supra-national policies, which have been primarily driven by the liberalization thrust, have often not benefited the poor livestock producers suffering from incomplete and imperfect markets (IFAD, 2004); (iii) smallholder producers are disadvantaged both in the national and international political arenas as, being poor, poorly educated and dispersed, face high opportunity costs of collective actions (Binswanger and Deininger, 1997; Leonard, 2004).

This paper examines the recent pro-poor shift of macro and sector development policies by governments in eighteen countries in Africa, Asia and Latin America to figure out whether they are tapping into the pro-poor opportunities offered by the livestock revolution. It does not intend to comprehensively review and comment existing policies; it rather attempts to detect and record broad policy trends, similarities and differences between geographical regions and countries and, if possible, identify policy gaps and inconsistencies. The policy documents referred to, either directly or indirectly, are listed in table A1. More detailed policy documents are certainly available and may contradict some of the country-specific statements made below, but are not expected to invalidate the key conclusions of the paper, which are general in nature.

The paper is as follows. The next section outlines a theoretical framework for cross-country pro-poor livestock policy analysis, filling a gap in the socio-economic literature which has essentially investigated macroeconomic, industrial and agricultural sector policies. Section three compares the potential contribution of livestock to poverty reduction and reviews the performance of the sector in Ethiopia, Kenya, Sudan, Tanzania and Uganda in East Africa; Burkina Faso, Mali and Sudan in West Africa; Bangladesh, India and Nepal in South Asia; Cambodia, Laos, Thailand and Vietnam in Southeast Asia; and Bolivia, Ecuador and Peru in Latin America. It shows that livestock development could be a way out of poverty for many rural households and that, in the last two decades, indigenous meat production has been largely unable to satisfy the local demand for food of animal origin and, in several circumstances, even to keep pace with population growth. The ensuing question is whether these trends will be reversed. Section four to six assess the place of livestock in the current policy agendas, and review existing macroeconomic, institutional and sector policies affecting its performance. It is found that policies are consistent across geographical regions and agro-ecological zones and largely neglect the livestock sector. In particular, current policies decouple livestock production from the household economy, marginally address the basic constraints affecting smallholder livestock

producers, and are excessively biased towards animal health services. Section seven summarizes the main findings, and prospects options to redress current policies and make the livestock revolution a pathway out of poverty.

2. THE LINEAR PRO-POOR LIVESTOCK POLICY PROCESS

One of the most widely used frameworks to analyze development policies is the objectives-constraints-instruments approach, which assumes that governments attempt to solve a stochastic optimization problem by maximizing an objective function subject to constraints implied by the socio-economic structure (Colman and Young, 1989; Ellis, 1992; Norton, 2004). This model can be thought as a linear three-step policy sequence with government: (i) defining the policy objective(s); (ii) selecting the appropriate policy instruments given the existing constraints; (iii) applying the policy instruments (Salvatici and Quieti, 2003; Sutton, 1999).

The linear policy model has been criticized on several grounds. First, it implicitly equates government to a social planner maximizing a social welfare function, an autocratic ruler maximising dynastic wealth or a democracy making the median voter decisive. In the real world, rent seeking behaviours by decision makers and lobbying by interest groups may seriously distort policy-making (Binswanger and Deininger, 1997). Second, information failure and limited physical and human resources prevent a priori assessment of all policy options and outcomes, as well as secondary and tributary effects of government actions. Policy makers are used to consider only a small number of alternative objectives/instruments, tend to prefer options that differ slightly from existing policies (this behaviour is referred to as the incrementalist model) and/or to follow 'development narratives' (theories grown to become conventional wisdom) (Killick, 1989; Sutton, 1999). Third, the dichotomy between policy decisions and implementation mechanism opens up escape routes through which policy-makers can avoid responsibility for failures (Crosby, 1996; Sutter, 1999).

The linear policy model appears thus inadequate to comprehensively appreciate in-country policy processes, which should be better understood as a 'chaos of purposes and accidents' (Sutton, 1999, p.5), through a combination of theories and models from a variety of disciplines. For instance, political economy studies considering the historical background, the institutional architecture and the broad socio-economic composition of interest groups and lobbies give much more insights on policy making than the linear model (e.g. Fairfield, 2004, for Bolivia, and Vu, 2003, for Vietnam). The linear policy process, however, is perhaps the easiest to conceptualize; and its simplicity allows looking at patterns in a cross-section of countries in the attempt to identify policy thrusts and trends. As it refers to an infinite space of objectives/instruments, a discrete classification of policies is crucial to make it meaningful for cross-country comparison.

This paper depends upon the assumption that one of the objectives of policy makers should be reducing poverty through livestock development. This requires two conditions to be satisfied: (i) that a large proportion of poor people hold livestock; (ii) that decision-makers have appreciated the potential contribution of livestock to poverty reduction. It then classifies policies into two broad categories: macroeconomic and institutional policies, which are broad-encompassing by construction, and agricultural and livestock sub-sector policies, which are sector specific. In the socio-economic literature, however, while macro and agricultural sector policies have been examined under multiple respects (e.g. Bullock and Salhofer, 2003; Colman and Young, 1989; Norton, 2004), livestock policies have been either completely overlooked or examined as a mixture of macroeconomic, agricultural and livestock sub-sector interventions, which do not always benefit poor livestock holders.[1] For example, between 1994 and 2003 Mali GDP growth averaged

[1] In his book on *Agricultural Development Policy*, Norton (2004) does not make any reference to livestock policies, which are implicitly considered as an appendage to macroeconomic and crop sector policies. A recent review by Ehui et al. (2003) on ILRI contribution to Livestock Policy Analysis revisits macroeconomic and 'system level' policies that are likely to affect small livestock holders. Macroeconomic policies are monetary, fiscal and trade policies; system level policies refer to production technology; marketing and market access; credit and pricing; nutrition; land tenure; natural resource management. Similar

5.6 percent per year, with improving macroeconomic fundamentals. The country today is a fair competitive economy and scores well in most measures of governance. Yet, Mali is still desperately poor, with over 66 percent of the rural poor holding livestock, despite the country having a comparative advantage in livestock production due to the availability of animal feed, quality pastureland and expanding domestic and export markets (Cobham and Robson, 1997; Kaufmann et al., 2003; Thornton et al., 2002; World Bank, 2004b). This puzzle has no macroeconomic answer; it mainly illustrates that an apparently conducive macro-environment is not sufficient to drive livestock holders out of poverty. And Mali is not an exception: poverty traps loom large in rural Bangladesh, Congo, Ethiopia, Kenya and Madagascar, where the median time in poverty is one or more lifetimes (Barrett and McPeak, 2005). The policy challenge, therefore, is not only to create a conducive macroeconomic and institutional environment, but also to make the growth process pro-poor, and livestock holders deriving benefits from market opportunities and escaping from low-income equilibria.[2]

Taking into account the broad literature on poverty traps (Azariadis and Stachurski, 2005; Dorward et al. 2004a, 2004b), this paper argues that, given a favorable macroeconomic and institutional environment, livestock policies will be pro-poor and sustainable according to a three-step sequence which includes: (i) 'establishing the basics for smallholder livestock production'; (ii) 'kick-starting domestic livestock markets'; (iii) 'maintaining and expanding livestock markets'.

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overlapping themes are examined by the ILRI *Livestock Policy Analysis* training manual (ILRI, 1995), which reviews market, price and trade policies; marketing policies; budget and manpower planning principles; and land tenure policies. More livestock-specific are the analyses by Jarvis (1986) and LID (1999). In a seminal book on *Livestock Development in Latin America*, Jarvis (1986) first reviews the economic theory of and trends in livestock production, and then discusses a number of constraints to the development of the sector: border protection; uncertainty and instability in international markets; control and eradication of animal diseases; research on mixed farming systems and pastures improvement; management and technical assistance; animal and product grading. Finally, LID (1999) *Livestock in Poverty-Focused Development* shows that strategies intended to promote a pro-poor development of the livestock sector have mainly focused on animal disease control; new production resources, including animal on credit and access to improved feed; breed selection; storage and processing of livestock products and by-products; access to market; information on improved production and marketing technologies. It concludes that most of these programs fell short of expectations because they overlooked the institutional components of livestock production.

[2] There are debates about the meaning of pro-poor growth and pro-poor policies. While any growth pattern is expected to reduce absolute poverty (Dollar and Kraay, 2002), its ultimate impact on the poor depends on how inequality is affected. Two agents have an income of US$1 and US$10 respectively; relative inequality is 10 (10/1) and absolute inequality is 9 (10-1). A distributional neutral growth rate of 5% would raise their income to US$1.05 and US$10.5 respectively. The poorer agent is better off indeed, but the rich one continues to be 10 times richer and the absolute income difference has increased from US$ 9 to US$ 9.45 (relative inequality has not changed but absolute inequality has risen). Pro-poor growth, therefore, is said to result if the growth rate of the income of the poor is greater than average growth. For instance, if the income of the poor grows by 10% (to 1.1US$) and that of the rich by 5% (to 10.5US$), both agents will be better off but relative inequality will decrease, as the rich man will be only 9.5 times richer. However, absolute inequality will increase from 9 to 9.4 US$. A more radical criterion for pro-poor growth would require that also absolute inequality declines. This implies that the share of the poor in the income increase is at least as their population share. For example, in the second case, of the total income increase of 0.6US$, at least 31 cents should go to the poor (who are 1/2 of the population) and no more than 29 cents to the rich. Under this scenario, both relative inequality (10.29/1.31 = 7.9) and absolute inequality (10.29 – 1.31 = 8.98) would fall (see Dollar and Kraay, 2002; Lopez, 2004; White and Anderson, 2001). Definitions of pro-poor growth have been translated into definitions of pro-poor policies. Pasha (2002) suggests that pro-poor policies should improve both the absolute and relative conditions of the poor; Jan Vandemoortele (2004, p.6), leader of the UNDP Poverty Group, maintains that 'pro-poor policies imply that the social and economic indicators for the disadvantaged people improve more rapidly that those for the rest of society. It is not sufficient that the indicators for the poor improve; they have to improve at a faster pace than for the non-poor because absolute poverty always has a relative dimension'. The definitions of pro-poor growth and pro-poor policies are certainly appealing, but not really useful in an operational context. On the one hand, they would imply that governments should prefer policies which promote an average growth rate of say 1%, with the income of the poor growing at 2%, over policies that promote an average growth rate of 10% with the income of the poor growing at 8%. On the other hand, they do not facilitate identifying policies that actually lead to pro-poor growth, and policy recommendations often end up to be extremely general, such as investing in agriculture and improving the institutional infrastructure. To avoid misunderstandings, this paper simply assumes that growth is pro-poor if it reduces poverty, regardless of any changes on the inequality fronts, and that policies that mitigate against poverty are pro-poor (see Ravallion and Chen, 2003).

Table 1: *A framework for pro-poor livestock policy analysis*

	Policy objectives		Policy instruments	Rationale
The context for livestock policies	Creating a conducive macro environment		Macroeconomic policies and institutional reforms	Sound macroeconomic fundamentals and high quality institutions are positively associated with economic and social indicators of well-being. Macro-micro linkages to the rural economy are e.g. mediated through the inflation rate, the real exchange rate, fiscal policies and ag non-ag terms of trade.
Establishing the basics for livestock production	Protecting assets and securing access to basic production inputs	Securing access to land, feed and water	Land laws in crop-livestock systems and pastoral areas; forage / feed policies	Inadequate access to land and lack of feed and forage are main developmental constraints for poor livestock producers. The land market is rarely pro-poor as land prices exceed the present discounted value of income streams derived from farming because of the social/collateral value of land. Even with perfect credit markets only those with accumulated savings can acquire land at market price without curtailing their consumption stream. There are growing conflicts among settled farmers and pastoralists.
		Providing insurance and risk coping mechanisms	(Public) ex-ante and / or ex-post risk-coping mechanisms for natural disasters, animal killer diseases, human diseases and price volatility	Variability of returns prevents livestock holders from making efficient use of their resources and leads to overshooting livestock production cycles. Imperfect and asymmetric information and high transaction costs constrain insurance markets.
Kick-starting domestic livestock markets	Increasing production and productivity	Securing access to livestock / animal health services	Public / private distribution/regulation of livestock / animal health services	Animal diseases negatively impact on livestock production; livestock holders are often poor, weakly educated and dispersed and unable to effectively demand livestock services both through the market and through policy, as their opportunity cost of collective action is extremely high.
		Securing access to credit and other inputs	Government intervention / regulation to establish pro-poor financial and input markets	Livestock holders need credit to access production increasing inputs; imperfect and asymmetric information and high transaction costs ration their access to credit and other production inputs as private agents are rarely willing to serve them.
		Securing access to output markets	(Public) investment for and regulation / management of slaughterhouses and milk processing plants; regulation of local livestock markets	Slaughterhouses and processing plants require investments with a high indivisible component which can create frictions/imperfections in the production chain. Livestock are among the most repeatedly taxed agricultural commodities: transit and market access fees are common, especially following the current decentralization thrust.
Sustaining and expanding livestock & product markets	Increasing quality and competitive ness of products	Promoting provision of public goods: animal health, food safety, environment protection	Public regulation / management of disease surveillance; quarantine; quality control; food safety regulations; animal welfare	Some livestock-associated public goods are underprovided by the markets, because of their non-rivalry and non-excludability. These goods are necessary for countries to compete in international markets and poor livestock holders not to be crowded out by foreign competitors.
		Promoting provision of public goods: research	Public regulation / funding of research centres; public management of public research centres	Private research centres are likely to invest in profitable breeds/technologies, and poor livestock holders rarely constitute an attractive market for the private sector.

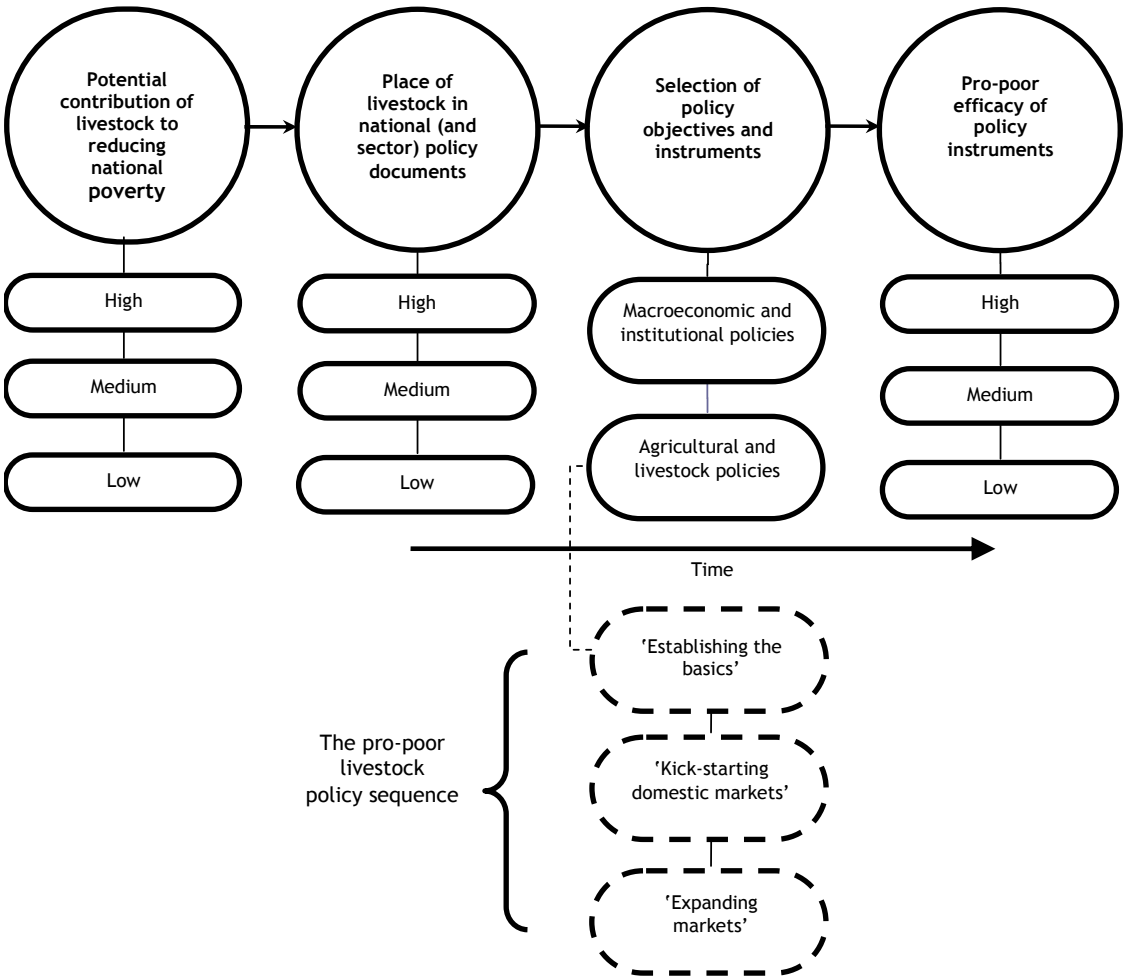
Policies that 'establish the basics' include all public actions that support adequate access to land, feed and water, provide risk coping mechanisms for natural disasters, including 'killer diseases' of livestock, guard against extreme price volatility, and protect human health. Uncertainty and market imperfections, in fact, prevent smallholder producers from having secure access to these inputs, which is a necessary condition for efficient resource allocation. For example, in mixed crop-livestock farming systems, secure access to land allows farmers to use resources (such as family labour) that in many cases are underused and encourages lump-sum investments in physical and human capital, with increasing supply of crops residues and stubbles for animals (e.g. Deininger, 2001; World Bank, 2003b). In pastoral areas, secure right to use different patches of land allows livestock keepers to access fodder and water continuously and reduces risks associated with droughts (e.g. Burke, 2004; Kamara et al., 2004).

Policies to 'kick-start domestic markets' aim at moving the markets away from inefficient equilibria by allowing all economic agents, including the poor, to fully exploit gains from livestock demand. Access to the 'basics', in fact, would not be sufficient for taking livestock keepers out of poverty because of transaction costs/imperfections in financial and input/output markets (e.g. Banjeree and Newman, 1994; Carter and Olinto, 2003). Livestock production is associated with investments with high indivisible components that, coupled with imperfect intertemporal markets and limited access to output markets, force the poor into portfolios with low returns. In Ethiopia, for example, entering into simple livestock trading may require an initial investment of about 20 to 40 percent of per capita annual income, which is a huge amount (Dercon, 2004). In Sudan, over 20 types of taxes and fees are charged for transporting sheep from Darfur to Port Sudan, making it often unprofitable for smallholders to access markets (Aklilu, 2002). The way governments regulate credit markets, the supply of preventive and curative animal health services, drug distribution as well as access to output markets, therefore, is crucial for paving a way for livestock holders to escape poverty.

Policies to 'expand livestock markets' include all those long-term public actions that promote and support production of high quality commodities and encompass (public) research for improving feeds and livestock breeds, environment protection, and food quality control, certification and grading, which are necessary (but not sufficient) requirements for products to be competitive in international markets. All countries, in fact, are imposing stringent requirements on food imports which cover pesticide residues, contaminants, microbiological parameters, pests, diseases and other hygienic variables. Concerns are that these standards may prevent developing countries from benefiting from growing market integration; in Uruguay, for example, following a Foot-and-Mouth disease outbreak in 2000, the value of beef exports fell by 40 percent (World Bank, 2005).

Figure 1 outlines the pro-poor livestock linear policy process, which reflects the structure of this paper.

Figure 1: *The linear pro-poor livestock policy process*



3. THE LIVESTOCK SECTOR AND POVERTY IN AFRICA, ASIA AND LATIN AMERICA

3.1 The potential contribution of livestock to poverty reduction

Livestock policies will be analysed in Ethiopia, Kenya, Sudan, Uganda and Tanzania in East Africa; Burkina Faso, Mali and Senegal in West Africa; Bangladesh, India and Nepal in South Asia; Cambodia, Laos, Thailand and Vietnam in Southeast Asia; and Bolivia, Ecuador and Peru in Latin America.

These countries belong to the low to lower-middle income country group and to the low to medium Human Development Index (HDI) country category.[3] There are substantial variations in level of development and economic structure, with Africa scoring particularly low both in terms of GDP per capita and HDI, and Latin American countries boasting the highest level of economic and human development, followed by the fast-growing economies of Southeast Asia. Agriculture accounts for over 30 percent of GDP in Asia and Africa, with employment in the sector being at 85 percent in West Africa and 65 to 70 percent in Asia and East Africa. Conversely, it contributes 11.3 and 7.3 percent to GDP and employment in the three Andean countries (table A2) (UNDP, 2004; World Bank, 2004b).

The livestock sub-sector accounts for 4 to 12 percent of GDP, and one-third to one-fifth of agricultural value added, with no significant changes in the last two decades. Considerable differences exist between geographical regions. In East and West Africa, especially in Ethiopia, Mali, Sudan and Tanzania, population density is relatively sparse; pasture land makes over 70 percent of the agricultural areas; grass-land based ruminant production systems are prevalent; livestock contribute between 30 to 52 percent to agricultural value added and up to 21.4 percent to GDP. In South and Southeast Asia, rural population density is high; animals are mostly raised on mixed rainfed/irrigated farms, which constitute about 70 to 80 percent of all agricultural land; the livestock sub-sector accounts for 18 to 25 percent of agricultural value added and less than 8 percent of GDP. In the Andean countries, rural population density is low; pastures cover about 80 percent of agricultural land; livestock are produced extensively and contribute 37 and 4 percent to agricultural and national GDP respectively (tables A2, A3) (FAOSTAT, 2004; Otte and Upton, 2005; World Bank, 2004b).

Poverty rates are high in all case-study countries: over 33 percent of the population lives on less than 1 US$ a day, or 38 percent below the national poverty line. In absolute terms, Africa and South Asia harbour the majority of the poor, with over 370 million rural poor living in India, 50 million in Bangladesh and 28 million in Ethiopia. Rural poverty rates are around 35 to 45 percent, main exceptions being Thailand and Vietnam in Southeast Asia (15.5 and 57.2 percent), and Bolivia and Peru in Latin America (79.1 and 64.7 percent) (table A3) (Thornton et al., 2002; World Bank, 2001).

Most of the rural poor raise livestock. Preliminary ILRI estimates indicate that, on average, in the countries examined 46.5 percent of the rural poor own livestock, with over 60 percent in East and West Africa, around 40 percent in South and Southeast Asia, and about 28 percent in Latin America (Thornton et al., 2002). Table A3 displays

[3] The World Bank classifies countries according to per-capita Gross National Income (GNI), which is the sum of value added by all residents producers in the country (i.e. GDP) plus net factor income from abroad. In 2003, countries with a GNI per capita of less than US$ 765 were classified as low-income, and countries with a GNI per capita of between US$ 766 to 3,035 as lower-middle income. The UNDP Human Development Index (HDI) is a summary measure of three basic indicators of human development: life expectancy at birth, adult literacy rate and GDP. UNDP classifies countries into three clusters: high human development (with an HDI of 0.800 or above), medium human development (0.500–0.799) and low human development (less than 0.500).

the established proportions of rural poor keeping livestock per country and regional aggregate suggesting that the pro-poor effectiveness of livestock policies is 'high' if over 50 percent of the rural poor raise livestock, 'medium' if between 25 to 50 percent keep animals, and 'low' if less than 25 percent are livestock holders. This criterion indicates that pro-poor livestock policies are expected to be effective in East and West Africa, where over 50 percent of the rural poor raise livestock, and likely to have a medium to high impact in Asian and Latin American countries, where between 25 to 50 percent of the rural poor are livestock holders.[4]

3.2 The livestock revolution: a missed opportunity

The potential poverty-reducing opportunities of livestock development have not been tapped into by policy makers in developing countries: time series analyses of livestock production for the last two decades indicate that the performance of the sector has been to a large extent unsatisfactory. For 1984-2003 and the two sub-periods 1984-1993 and 1994-2003, for each country and regional aggregate, the following indicators have been calculated for beef, milk, poultry meat, eggs, pigmeat, and meat from sheep and goat: average production, annual growth rate of production, coefficient of variation of annual growth rate, performance, trend in net trade, and rank.[5] Data are from FAOSTAT (2004) and the World Bank Development Indicators Database (World Bank, 2004b).

Average production is calculated taking into account changes in inventory, formal and informal slaughter and international trade for any given year and computing the arithmetic mean for 1984-2003, 1984-1993 and 1994-2003. All figures are converted to carcass weight to account for variations in productivity.

[4]A deeper exploratory analysis of ILRI data allows identifying priority areas of interventions according to agro-ecological zones. Livestock contribution to household income varies substantially within different production systems, being about 70 to 80 percent in pastoral areas, 10 to 20 percent in mixed rainfed production systems, around 25 to 35 percent in irrigated zones, and 1 to 2 percent in urban and peri-urban areas (proportions estimated as livestock value added over agricultural GDP in predominantly pastoral/mixed rainfed/mixed irrigated countries (FAOSTAT, 2004). Results are consistent with household survey analyses, e.g. Bekure, 1983; Maltsoglou and Taniguchi, 2004; Roxas et al., 1997). Table A3 shows the income-weighted distribution of poor livestock holders per agro-ecological zones, assuming that livestock contribution to household income is 75 percent in pastoral areas, 15 percent in rainfed production systems, 20 percent in irrigated farms, and 1.5 percent in urban and peri-urban areas. It indicates that interventions targeted at smallholders in mixed-rainfed and pastoral production systems are the most promising in terms of poverty reduction in Africa and Latin America. Pro-poor livestock policies in Asia should focus on mixed-rainfed and, to a lesser extent, on mixed-irrigated production systems, where the majority of population lives.

[5] See Goletti et al. (2001) for a similar analysis.

Table 2: *Estimating total production from livestock*

	Total production for period	
equals	End of period inventory	
minus	Beginning of period	
equals	Change in inventory	(accounts for herd liquidation/rebuilding)
plus	Slaughter	
plus	Informal slaughter	(includes home consumption)
plus	Exports	
minus	Imports	

Growth rate is computed as a semi-logarithmic function, $\ln(y_t) = \alpha + \beta t + \upsilon$, where *y* represents a livestock commodity, *t* denotes time and the trend in growth is calculated as $\exp(\beta) - 1$.

Variability of growth is assessed by computing the coefficient of variation of the percentage change of the year to year growth rate, namely by dividing the standard deviation of $(y_t - y_{t-1}) / y_{t-1}$ by the period mean.

Performance of livestock production is assessed against population and GDP per capita growth. Ceteris paribus, that is with constant real prices and unvarying preferences, the demand for livestock products (d) increases according to $\Delta d = \Delta p + \eta \Delta g$, where Δd is the percentage change in meat/milk demand, Δp is population growth rate, Δg is the growth in real per capita income, and η is the income elasticity of the demand for livestock products. For low-income countries, the estimated meat/milk demand elasticities with respect to changes in income are varied but mostly around one, meaning that a percent increase in per capita GDP should increase livestock products demand by around the same percentage. Elasticities are lower at higher income level (e.g. FAO, 1974; Rey et al., 1992; Kumar, 1998). Performance is assessed looking at the difference between indigenous livestock production and $\Delta p + \eta \Delta g$ under four elasticity scenarios: $\eta = 0$; $\eta = 0.5$; $\eta = 0.75$ and $\eta = 1$. The simple difference between percentage changes in population and meat/milk production ($\eta = 0$) gives an indication of whether livestock production has kept the pace of population growth; a more realistic situation is represented by $\eta = 1$. Looking at $\eta = 0.5$ and $\eta = 0.75$ facilitates differentiating countries according to their capacity to satisfy prospected changes in meat/milk demand. The performance is assessed as 'high' if the difference between growth in total production from livestock, on the one hand, and growth in population and the η-weighted per capita income, on the other hand, is greater than or equal to 0.5; 'medium', if it is included between 0.5 and -0.5; and 'low', if it is equal to or less than -0.5. This classification is of course arbitrary and susceptible to criticisms, but is an attempt to compare the performance of the livestock sector in a cross-section of countries with the available data.

Trend in trade is computed by looking at the slope of a linear trend fitted for the balance of trade for each livestock commodity for the period 1994-2003. A positive sign (+) indicates that exports (Mt) grew faster than imports (Mt); a negative sing (-) indicates that imports grew faster than exports. Even though livestock typically account for a modest share of all agricultural trade, trend in net trade can be thought as a robustness test for the performance indicators: it is expected that countries with low (high) performance should record a negative (positive) trend in the trade balance as local livestock production has not been (has been) able to meet national demand.

Rank is computed by looking at the performance of each country relative to the other countries under the $\eta = 1$ scenario.

Over the period 1984-2003, it is not possible to identify clear common trends for livestock products, countries or regional aggregates (tables A4-A9 and tables 3-8). There are however a number of regularities:

- Aggregate data indicate that between 1984-1993 and 1994-2003 average livestock production increased in all countries, by a minimum of 25 percent for beef to a maximum of over 110 percent for poultry meat.
- In terms of growth rate, poultry and pigmeat production performed better than other livestock commodities (poultry grew at 6.2 percent per year); with meat from large and small ruminants recording the lowest growth rates (annual beef production grew at 2.9 percent).
- Variability of growth rates has been high for poultry and pigmeat, and particularly low for eggs and milk.
- On average, for all livestock commodities annual growth rate fell in 1994-2003 compared to 1984-1993.
- Over the 1994-2003 period, in 17 percent of the cases analyzed (18/108), production satisfied growing local demand for food of animal origin, with milk and poultry accounting for over 55 percent of successful cases.
- In 24 percent of the cases (26/108), per capita production declined during 1994-2003, with population growing faster than meat/milk production. The performances of beef, eggs and sheep and goat meat have been the worst.
- In over 73 percent of the cases (79/108) the coefficient of the trend in net trade is of the expected sign under the $\eta = 1$ scenario, i.e. when local demand is assumed to be satisfied by indigenous livestock production.
- Latin American case study countries performed better than the other regional aggregates, with East and West Africa study countries recording the worst performance.
- Peru is the best performer in 1994-2003. Production of milk, poultry, eggs and sheep and goats met the prospected increase in demand.
- Senegal is the worst performer. Per-capita production of beef, milk, poultry and eggs declined over the 1994-2003 period.

Table 3: *Estimated performance of beef production, 1994-2003*

	η = 0	η = 0.5	η = 0.75	η = 1	Rank
Ethiopia	high	low	low	low	9
Kenya	high	medium	medium	medium	3
Sudan	high	medium	low	low	7
Tanzania	low	low	low	low	10
Uganda	medium	low	low	low	14
Average	**medium**	**low**	**low**	**low**	**3**
Burkina Faso	high	medium	low	low	5
Mali	low	low	low	low	17
Senegal	low	low	low	low	15
Average	**medium**	**low**	**low**	**low**	**2**
Bangladesh	medium	low	low	low	11
India	low	low	low	low	16
Nepal	low	low	low	low	13
Average	**low**	**low**	**low**	**low**	**5**
Cambodia	high	medium	low	low	8
Laos	high	high	medium	low	4
Thailand	low	low	low	low	18
Viet Nam	high	low	low	low	12
Average	**high**	**low**	**low**	**low**	**4**
Bolivia	medium	low	low	low	6
Ecuador	high	high	high	high	1
Peru	high	high	high	medium	2
Average	**high**	**high**	**medium**	**medium**	**1**
Total	**high**	**low**	**low**	**low**	

Table 4: *Estimated performance of milk production, 1994-2003*

	η = 0	η = 0.5	η = 0.75	η = 1	Rank
Ethiopia	high	high	high	high	2
Kenya	high	high	high	high	3
Sudan	medium	low	low	low	14
Tanzania	high	medium	low	low	9
Uganda	high	low	low	low	12
Average	**high**	**medium**	**low**	**low**	**3**
Burkina Faso	high	high	low	medium	8
Mali	high	low	low	low	13
Senegal	low	low	low	low	17
Average	**medium**	**low**	**low**	**low**	**2**
Bangladesh	low	low	low	low	15
India	high	medium	low	low	11
Nepal	high	low	low	low	10
Average	**high**	**low**	**low**	**low**	**5**
Cambodia	low	low	low	low	18
Laos	low	low	low	low	16
Thailand	high	high	high	high	1
Viet Nam	high	high	high	high	4
Average	**high**	**high**	**low**	**low**	**4**
Bolivia	high	high	low	medium	7
Ecuador	high	high	medium	medium	6
Peru	high	high	medium	high	5
Average	**high**	**high**	**medium**	**medium**	**1**
Total	**high**	**medium**	**low**	**low**	

Table 5: *Estimated performance of poultry production, 1994-2003*

	η = 0	η = 0.5	η = 0.75	η = 1	Rank
Ethiopia	high	medium	low	low	10
Kenya	low	low	low	low	9
Sudan	medium	low	low	low	14
Tanzania	high	medium	low	low	8
Uganda	high	low	low	low	13
Average	**high**	**medium**	**medium**	**medium**	**3**
Burkina Faso	high	low	low	low	11
Mali	medium	low	low	low	16
Senegal	low	low	low	low	18
Average	**high**	**high**	**medium**	**low**	**4**
Bangladesh	low	low	low	low	17
India	high	high	high	high	1
Nepal	high	high	high	medium	6
Average	**high**	**high**	**high**	**high**	**2**
Cambodia	medium	low	low	low	15
Laos	high	medium	low	low	12
Thailand	high	high	high	high	5
Viet Nam	high	high	high	high	4
Average	**high**	**medium**	**low**	**low**	**3**
Bolivia	high	high	medium	medium	7
Ecuador	high	high	high	high	2
Peru	high	high	high	high	3
Average	**high**	**high**	**high**	**high**	**1**
Total	**high**	**high**	**high**	**medium**	

Table 6: *Estimated performance of egg production, 1994-2003*

	η = 0	η = 0.5	η = 0.75	η = 1	Rank
Ethiopia	high	low	low	low	7
Kenya	high	high	high	medium	3
Sudan	medium	low	low	low	11
Tanzania	low	low	low	low	16
Uganda	medium	low	low	low	12
Average	**medium**	**low**	**low**	**low**	**3**
Burkina Faso	low	low	low	low	15
Mali	low	low	low	low	17
Senegal	low	low	low	low	13
Average	**low**	**low**	**low**	**low**	**4**
Bangladesh	high	low	low	low	9
India	high	medium	low	low	8
Nepal	high	medium	low	low	5
Average	**high**	**medium**	**low**	**low**	**1**
Cambodia	medium	low	low	low	14
Laos	high	high	high	high	1
Thailand	medium	low	low	low	10
Viet Nam	high	high	low	low	6
Average	**high**	**high**	**medium**	**low**	**2**
Bolivia	low	low	low	low	18
Ecuador	high	medium	medium	low	4
Peru	high	high	high	high	2
Average	**low**	**low**	**low**	**low**	**4**
Total	**medium**	**low**	**low**	**low**	

Table 7: *Estimated performance of pigmeat production, 1994-2003*

	η = 0	η = 0.5	η = 0.75	η = 1	Rank
Ethiopia	medium	low	low	low	10
Kenya	high	high	high	high	3
Sudan	n.a.	n.a.	n.a.	n.a.	n.a.
Tanzania	high	low	low	low	9
Uganda	medium	low	low	low	13
Average	**high**	**low**	**low**	**low**	**3**
Burkina Faso	high	medium	low	low	8
Mali	low	low	low	low	16
Senegal	high	high	high	high	1
Average	**high**	**high**	**medium**	**low**	**2**
Bangladesh	n.a.	n.a.	n.a.	n.a.	n.a.
India	low	low	low	low	15
Nepal	high	high	medium	low	6
Average	**medium**	**low**	**low**	**low**	**5**
Cambodia	high	low	low	low	12
Laos	medium	low	low	low	14
Thailand	high	high	medium	medium	5
Viet Nam	high	high	medium	low	7
Average	**high**	**low**	**low**	**low**	**4**
Bolivia	high	high	high	high	4
Ecuador	high	high	high	high	2
Peru	low	low	low	low	11
Average	**high**	**high**	**high**	**medium**	**1**
Total	**high**	**medium**	**low**	**low**	

Table 8: *Estimated performance of sheep and goats production, 1994-2003*

	η = 0	η = 0.5	η = 0.75	η = 1	Rank
Ethiopia	low	low	low	low	13
Kenya	low	low	low	low	6
Sudan	medium	low	low	low	15
Tanzania	low	low	low	low	12
Uganda	medium	low	low	low	14
Average	**low**	**low**	**low**	**low**	**5**
Burkina Faso	medium	low	low	low	10
Mali	high	high	low	low	5
Senegal	medium	low	low	low	11
Average	**high**	**low**	**low**	**low**	**4**
Bangladesh	high	low	low	low	9
India	low	low	low	low	16
Nepal	medium	low	low	low	7
Average	**medium**	**low**	**low**	**low**	**3**
Cambodia	n.a.	n.a.	n.a.	n.a.	n.a.
Laos	high	high	medium	low	3
Thailand	low	low	low	low	17
Viet Nam	high	medium	low	low	8
Average	**high**	**low**	**low**	**low**	**2**
Bolivia	medium	low	low	low	4
Ecuador	high	medium	medium	low	2
Peru	high	high	high	high	1
Average	**high**	**high**	**medium**	**medium**	**1**
Total	**high**	**low**	**low**	**low**	

The ambiguous and mostly poor performance of livestock production in all case study countries, with production growth rate mostly declining between 1984-1993 and 1994-2003, suggests that the demand curve of livestock products shifted faster than supply. Indigenous livestock production, in fact, has not been able to keep pace with national meat/milk demand, and even with population growth in several cases, indicating that over the last twenty years policy makers have not designed and/or implemented successful policies to promote the long-term development of the livestock sector. Whether the current shifts in policy making, with poverty high on the political agendas of most developing countries, will reverse this trend and take advantage of the opportunities offered by the livestock revolution to reduce poverty level is examined in the following sections.

4. LIVESTOCK VERSUS LIVESTOCK PRODUCERS IN THE POLICY AGENDAS

At the end of the 1990s, following much disillusionment with the poverty reducing effects of stabilization and structural adjustment programs, most countries posed poverty reduction at the centre of their development agenda. Perhaps, the most powerful manifestations of the commitment to poverty reduction are the Millennium Declaration passed by the General Assembly of the United Nations in 2000 and the growing number of Poverty Reduction Strategy Papers (PRSPs). PRSPs are allegedly participatory development strategies aimed at fostering pro-poor economic growth (referred to as equitable, equity-based or broad-based) through a combination of core policies which typically include sound macroeconomic management, institutional reforms and a focus on increased social sector spending. PRSPs are expected to identify the priority public actions over a three year horizon, including a table summarizing the overall public expenditure program and its allocation among key areas. Hence, livestock inclusion/non inclusion in the PRSPs, and in the national policy documents in general, matters. Table 9 compares the potential effectiveness of pro-poor livestock policies (see table A3) with the relevance given to livestock in the national development strategies, and shows whether decision-makers have designed a strategy specifically targeted to livestock development.

Table 9: *Livestock in national policies*

Country	Potential efficacy of pro-poor livestock policies	Emphasis on livestock in national planning documents	Livestock development strategy
Ethiopia	high	high	no
Kenya	high	medium	yes
Sudan	high	high	yes
Tanzania	high	low	no
Uganda	high	medium	yes
East Africa			
Burkina Faso	high	high	yes
Mali	high	high	no
Senegal	high	medium	no
West Africa			
Bangladesh	medium	low	yes
India	medium	high	yes
Nepal	medium	low	no
South Asia			
Cambodia	medium	medium	no
Laos	medium	medium	no
Thailand	medium	low	no
Viet Nam	medium	medium	no
Southeast Asia			
Bolivia	low	low	no
Ecuador	medium	low	no
Peru	medium	low	no
Latin America			

Most national policy documents in the case study countries weakly appreciate the prospective contribution of livestock to economic development: there is no any clear correlation between the poverty reduction potentials of livestock, the role of the sector in the national development plans, and the endorsement of a livestock development strategy. Only four African countries and India have highly emphasized

the relevance of livestock in the economy, with all others making modest ('medium') or marginal ('low') reference to the livestock sector.

Box 1: *The role of livestock in national policy documents*

[...] It is of paramount importance to integrate the supply of drinking water and that of pasture so as to accelerate and improve animal resources development in these regions [arid and semi-arid]. In order to increase and improve pasture, the first priority task in those areas is to improve the supply of water both for humans and animals. [...] In pastoral areas, the need for the development of institutions which administer pasture lands among pastoral communities without violating indigenous long standing community (norms) is of paramount importance.... [and in crop-livestock production systems] although animal resource development should not be overlooked, the comparative advantage of these areas lies in crop production and feed generation for livestock systems (Ethiopia, Federal Democratic Republic of, 2002, p.57-58).

[...] the livestock action plan aims to protect traditional stock raising and enhance its productivity in order to increase the income of traditional livestock breeders; encourage and intensify the development of modern livestock sector so that the sector can attract new players and create jobs; and intensify the entire set of actions aimed at enhancing the contribution of the sector to the balance of payments, augmenting added value and increasing food security (Burkina Faso, Republic of, 2000, no page).

...animal husbandry and dairying will receive high priority in the efforts for generating wealth and employment, increasing the availability of animal protein in the food basket and for generating exportable surpluses. The overall focus will be on four broad pillars viz. (i) removing policy distortions that are hindering the natural growth of livestock production; (ii) building participatory institutions of collective action for small-scale farmers that allow them to get vertically integrated with livestock processors and input suppliers; (iii) creating an environment in which farmers will increase investment in ways that will improve productivity in the livestock sector; and (iv) promoting effective regulatory institutions to deal with the threat of environmental and health crises stemming from livestock (India, Planning Commission, 2002, p.570).

The Cambodian PRSP (2002) promotes the ...expansion of livestock production with emphasis on animal health services, nutrition and range management and establishment of meat processing plants (Cambodia, Kingdom of, 2002, p.55).

[...] the main causes of poverty are (in order of importance): (i) problems associated with land; (ii) livestock loss because of lack of veterinary services [and accordingly the government plans to] strengthen the animal health control system and livestock extension system (Lao People's Democratic Republic, 2004, p.36 and p.61).

The livestock sector [...] has a high growth potential and is of priority importance for subsistence farmers and pastoralists. The government plans to implement a concerted strategy for disease outbreak prevention and control, and improving quality and certification of

veterinarians and other service providers. (Kenya, Republic of, 2004, p.57).

[...] the intention is to set up specific lines of credit for development of the different sub-sectors in order to encourage greater involvement by the private sector; steps will be taken to improve marketing channels; livestock services will be properly equipped to enable them to perform their health control and inspection functions properly (Senegal, Republic of, 2002, pp.30-31).

[...] any strategy for addressing food security must involve actions to improve agricultural and livestock production and farm incomes to ensure availability and access to food (Tanzania, the United Republic of, 2000, p.26).

[...] the growth strategies for agriculture are to modernize, diversify and commercialize crop and livestock production by expanding the use of technology, and increasing the access of farmers to modern agricultural inputs and credit. Similarly, promoting the participation of private sector and NGOs/INGOs in service delivery, market promotion and infrastructure development are other major strategies (Nepal, Kingdom of, 2003, p.45).

[...] forestry, fisheries and livestock sub-sectors have high potential to accelerate growth and create employment, including social development multipliers (Bangladesh, People's Republic of, 2003, no page).

[...] investment in production infrastructure also includes basic and small-scale infrastructure relating to agricultural needs and marketing needs of this sector. Such projects include: collection centers, storage centers, silos, greenhouses, and livestock infrastructure (including livestock dips, stables, corrals, milking modules, and artisanal workshops) (Bolivia, Republic of, 2001, p. 64).

In Ethiopia, Sudan, Burkina Faso and Mali, animal rearing is a widespread and customary economic activity, while India has a long tradition of economic planning, with the first Five-Year Plan (1951-1956) already devoting a chapter to livestock. It is thus hardly unexpected that the national planning documents of these countries extensively deal with livestock. These documented strategies, however, (i) lack a vision for the present and prospected role of livestock in the economy; e.g. what is the role of livestock in the rural economy? What its contribution to environment protection? What the expected changes in meat/milk demand and how they will be accommodated? (ii) They primarily focus on livestock production and productivity, and do not adequately investigate the relation between enhanced production and poverty reduction: poverty is examined in an autonomous and independent section in all documents and the peculiar role of livestock in the portfolio activities of poor households, such as its social and insurance value, is not investigated.

Ethiopia, Sudan, Burkina Faso, Mali and India are the exception. Most national policy documents have either identified a shopping list of actions for livestock development, such as the majority of Asian economies, or neglected to address specific constraints to sector growth, such as the three Andean countries. The Kenyan, Ugandan, Senegalese, Cambodian, Laotian and Vietnamese national development strategies refer to livestock in few paragraphs, and present a piecemeal approach to sector

development. These strategies fail to appreciate the specificities of smallholder technologies/constraints, and restrict their focus primarily on animal health, particularly emphasizing the role of private sector in extension services. The national policy documents of the remaining case-study countries, i.e. Tanzania, Bangladesh, Nepal, Thailand, Bolivia, Ecuador and Peru, either mention the livestock sub-sector in-passing or treat it as and undifferentiated component of the agricultural/crop sector. Agriculture, however, is not a good proxy for livestock, which present idiosyncratic features that call for specific public actions. Bangladesh is an unusual case: despite the livestock sector is not significantly mentioned in the PRSP, an animal sector policy paper is under preparation, with a focus on mixed crop-livestock production systems.

While policy documents can be differentiated according to the relevance given to livestock, they share, with the partial exception of Ethiopia, two underlying common ingredients. They marginally analyse poverty (e.g. 3 pages over 152 in the Kenyan PRSP, 20/253 in the Cambodian PRSP; 12/131 in the Nepalese PRSP; 7/146 in the Malian PRSP; 10/224 in the Bolivian PRSP) and treat in different sections sector development strategies and poverty reduction. In the case of livestock, the policy documents, explicitly or implicitly, identify increased production as the overall development objective for the sector, rather than reducing poverty through livestock production. The policy entry point into the sector is thus the animal / livestock commodity and not the household. For example, the aim of improving veterinary services is to reduce animal diseases and, hence, improve production; it is not to increase the income of the poor. Processing facilities are to be developed for fresh meat and whole milk, not for the poor milk/meat producers. Sanitary standards have to satisfy export market requirements, not the needs of the poor livestock keepers and consumers. Livestock holders, however, are an extremely heterogeneous group and, being often extremely poor, do not always maximize a production function, such as all national policy documents assume. Their production and consumption decisions, in fact, are 'non-separable', and livestock are a factor of production, a 'consumption' good, and a form of saving and insurance. For instance, in arid and semi-arid zones livestock are the major source of wealth and income for pastoralists, but also a risk coping device in response to exogenous shocks. In rainfed and irrigated mixed production systems, livestock contribution to household income is less, but again animals not only provide food for home-consumption and market but also contribute to social status, are source of manure, draft power and hauling services, a buffer to risk and a form of savings (Imai, 2004; Mortimore, 1991; Wilson et al., 1995; Kristjanson et al., 2004).

While the national policy documents were not expected to take into full account the heterogeneity of livestock producers and the multiple roles that livestock play in the household, a broader disaggregation of the poor, a deeper analysis of their behavioural patterns, and a focus on household rather than on the production technology tout-court, would have facilitated the design of pro-poor policies, and pro-poor livestock policies in particular. Existing policies, in fact, as the following sections will show, fail to adequately address the most binding constraints preventing poor smallholders from taking advantages of growing livestock demand.

5. THE MACRO FRAMEWORK FOR POVERTY REDUCTION

5.1 Beyond macroeconomic stability

The determinants of the living standard of (the poor) livestock holders are due to the interplay of macro, meso, institutional and micro policies. At the micro level, prices and wages are typically exogenous, while they are endogenous at the macro level, as they depend on the interaction between aggregate supply and demand. The degrees of freedom of agricultural sector and livestock policies, therefore, are delimited by the current macroeconomic and institutional thrusts, which are outlined in the national policy documents.

Governments in the countries examined aim at reducing poverty in line with the Millennium Development Goals, and target GDP growth rates at between 4 to 8 percent per year[6] (e.g. 5.7% in Ethiopia; 6% in Tanzania; 7% in Uganda; 4-5% in Burkina Faso; 5% in Thailand; 5% in Ecuador; 6-7% in Cambodia; 7-8% in India). The core and common macro policy instruments identified to sustain economic growth and reduce poverty level are macroeconomic stability, investments in public goods and institutional reforms.

The overreaching objective of the government's poverty reduction strategy is to reduce poverty through enhancing rapid economic growth while at the same time maintaining macroeconomic stability (Ethiopia, Federal Democratic Republic of, 2002, p.42).

... the design of all public expenditure by a clear analysis of the link between inputs, outputs and outcomes, in a framework which ensures consistency of sectoral expenditure levels with the overall resource constraint in order to ensure macroeconomic stability and to maximise the efficiency of public expenditure in attaining predetermined outcomes (Uganda, Republic of, 2000).

Macroeconomic stability results when key economic relationships are in balance (e.g. example fiscal revenues and expenditure, savings and investments, the balance of payments). Cross-country regressions have found that stability is a major prerequisite to economic development: high and unpredictable inflation, a large black market exchange premium, real exchange rate appreciation, large government deficits and poorly developed financial systems are all significantly associated with slow growth (Easterly and Levine, 1995; Ojo and Oshikoya, 1995). The causal links between macroeconomic stability and poverty reduction, however, are not fully understood. On the one hand, most indicators of well-being are positively associated with macroeconomic stability; on the other hand, cross-country regressions on the relation between individual macroeconomic policies and changes in the Human Development Index (HDI) indicate that only low inflation (below 40 percent/year) is significantly correlated with poverty reduction[7] (Cashin et al., 2003; McKinley, 2003; Stiglitz, 1998).

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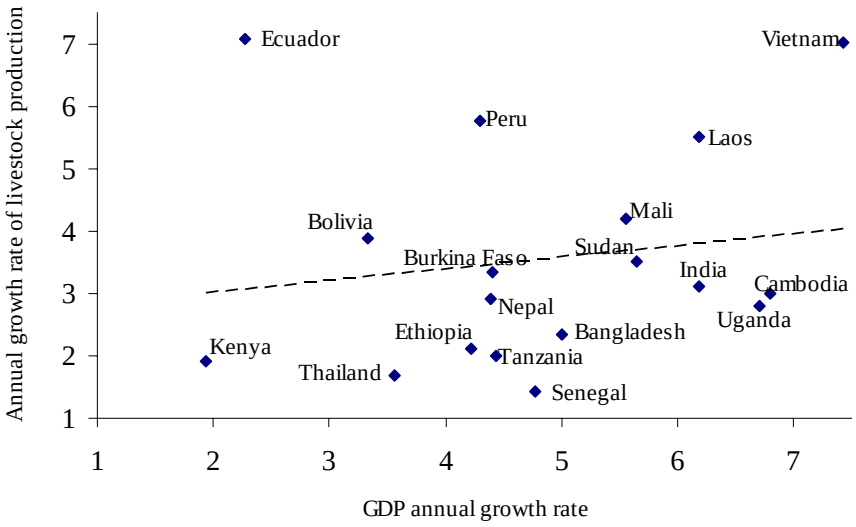
[6] Economic growth is by far the most important factor influencing poverty reduction. Dollar and Kraay (2002) analysed growth and poverty patterns in 80 countries over 40 years and concluded that, on average, economic growth is neutral with respect to income distribution, namely that growth is as good for the poor as it is for the entire economy, with no differences between developing and industrialized countries. White and Anderson (2001) decomposed the growth of the poor's income into a growth and a redistribution effect; they then examined 143 growth episodes in 20 countries and found that the growth effect dominates in almost three-quarter of cases.

[7] High inflation severely impacts on poverty level and the livelihoods of livestock holders, directly through a decline in real wage rates, owing to short-run rigidities of nominal wages, and indirectly as the poor mostly hold savings, if any, in the form of cash rather than assets and inflation reduces the real values of such savings. Of course, if the poor are indebted, inflation reduces the real cost of their debt, but poor livestock holders are typically rationed in the credit market. Even though the

Macroeconomic stability is relevant for livestock development, indirectly, through economic growth as in low-income countries the demand for food of animal origin is elastic with respect to income, and directly, because the sub-sector involves assets that are both production inputs and can be stored for value; an unstable macroeconomic environment may induce people to keep livestock as a risk hedge activity and not making efficient use of their production potentials (Williams et al., 1995).

Figure 2: *GDP and livestock average annual growth rate, 1994-2003*



Source: elaborated from FAOSTAT (2004) and World Bank (2004b)

Most sample countries have gone through one or more programs of stabilization and structural adjustment over the last two decades and boast a certain degree of stability these days. Between 1984 and 2003 GDP annual growth rate averaged over 4 percent, rising up from 3.5 percent in 1984-1993 to 4.7 percent in 1994-2003 (table A2). Inflation and price variability stay low, with only Ethiopia and Lao recording a two-digit inflation in 2003; central government deficits range between 1 to 7 percent of GDP, in spite of foreign aid significantly contributing to government budget: 34 percent in Bolivia (2001), 38 percent in Nepal (2002), 16 percent in Vietnam (2002), 21 percent in Bangladesh (1999), 41 percent in Senegal (2001), 65 percent in Uganda (2001). These deficits are often larger than those of high-income countries, but not necessarily deleterious for the economy as their viability depends on circumstances, including the cyclical states of the economy and prospects for future growth. Deficits are associated with government expenditures averaging 16 to 22 percent of GDP and fiscal revenues being around 8.8 to 15 percent of GDP. The balance of payments is negative in most countries, with current account deficits at 5 to 10 percent of GDP in African countries, and 0.5 to 4 percent in the other geographical regions. Government debts range between 9 to over 100 percent of GDP, and have been increasing since the mid 1980s, both in absolute terms and as a proportion of gross domestic production. Most countries could thus enter into debt-servicing difficulties, which are

literature shows that below the threshold of 40 percent per year inflation is not costly in terms of growth, inflation targets are often single digit and achieved by means of large raises in interest rates. Pasha and Palanivel (2004) and Stiglitz (1998) even maintain that at low level of inflation there is room for expansionary fiscal policy.

significantly associated with debts above 40-45 percent of GDP (IMF, 2004; World Bank, 2004b).

Countries have made significant progress towards achieving macroeconomic stability in recent years, but some further efforts should be made. However, there is today agreement that strategies primarily centred on macroeconomic efficiency and the associated growth are likely to weakly mitigate against poverty. Current national policy documents, therefore, not only focus on macroeconomic stability, such as old-style stabilization and structural adjustment packages, but also on ways to promote pro-poor economic growth, which is growth that effectively reduces poverty level. Particular emphasis has been given to investments in infrastructure, education, and basic social services in general.

... (i) provide free education ... for all girls and for those boys of oppressed, backward and below poverty line communities; (ii) provide education in mother languages (of communities) up to the primary level; (iii) regulate fees in private schools; (iv) provide scholarship in private/boarding schools to students from 'oppressed and backward communities' and (v) set up Rural Education Development Fund which would be utilized for funding the education of marginalized communities (Nepal, Kingdom of, 2003, p.20).

The establishment of basic infrastructures that are better in terms of quality and geographic distribution, together with availability of essential social services are prerequisites for strengthening the stock of human capital and offering viable solutions to the social demands through appropriate investment, particularly in the fields of education, health, hydraulic engineering and transport (Bolivia, Republic of, 2001, p. 41).

Such investments are essential as the poor need the skills to raise their productivity, and the infrastructural facilities to access input and output markets; at the same time, most countries, particularly in Africa, have so far under-invested in public goods benefiting the poor, preventing them from taking advantage of growing market opportunities. As examples, educational policies and infrastructural networks are briefly examined.

de Janvry and Sadoulet (2001) show that extensive secondary education is necessary for economic growth to mitigate against poverty.[8] In the case study countries the secondary gross enrolment ratio is particularly low, averaging 14.2 and 20.3 percent in West and East Africa, 46.4 and 53.8 percent in South and Southeast Asia, and over 75 percent only in the three Andean countries.[9] The available evidence, furthermore, suggests that public expenditure in education has been often biased against the poor. The ratio of government spending (as % of GDP) per student on primary to tertiary education, which is a proxy of inequality in public investment across the income percentiles, indicates that in East and West Africa a primary student receives 1.7 to 4.8 percent of what a university student does; these percentages are 16.9 to 29.0 in Asian and Latin American countries (World Bank, 2004b).

Poor smallholders not only are weakly educated, but also face high transaction costs because of the low density of road networks and other communication links in rural areas. The African and Latin American case-study countries have road networks to an

[8] For example, trade liberalization, which is positively associated with economic growth (World Bank, 2003a), should allow developing countries to specialize in labour-intensive products, which will eventually bid up the price of labour. Capital labour substitution will start to occur, but will be possible only if the government has subsidised education and training so as to complement capital formation with a sufficient supply of skilled labour.

[9] The secondary gross enrolment ratio is the ratio of total enrolment, regardless of age, to the population of the age group that officially corresponds to the secondary level of education.

average density of 4.5 to 8.7 kilometres of roads per 100 square kilometre of land area, compared to 14.5 to 93.4 in Southeast and South Asian countries; many roads in rural areas are even impracticable during the rainy season and, in Africa, only around 14 percent of the existing roads are paved (World Bank, 2004b). This is a consequence of land abundance and low population density. In such a setting, in fact, the opportunity cost of investing in rural infrastructure is particularly high, as per-capita public investment is higher than in densely populated areas and roads have lower utilization rates; on the other hand, smallholders are isolated, poor and uneducated and, therefore, not able to express their demands at the policy level in spite of accounting for a large share of votes (Binswanger and Deininger, 1997; Platteau and Hayami, 1998). Transaction costs are therefore higher in Africa and Latin America than in Asia. A comparative study of vertical and spatial price transmissions in sixteen countries worldwide concludes that African countries tend to show lower degrees of price transmissions compared to Asian and Latin America countries. It argues that physical barriers, infrastructural deficiencies, as well as the limited size of markets, are likely to be the main determinants of this gap (Conforti, 2004).

The above examples not only support the view of the national policy documents that increasingly pro-poor public investments are needed to benefit the poor (livestock keepers), but also bring to light the weakness of the institutional infrastructure of the countries analyzed and the implicit influence of interest groups politics in decision-making. There are, in fact, economic (efficiency) and political economy reasons indicating that (high-quality) governments should have invested into the poor. (i) The poorer a country, the poorer the median voter; hence, if democracy is at work, the poorer the country, the more pro-poor redistributive policies should be in place (such as investment in primary education). (ii) An increase in one person's income affects social welfare by both increasing total GDP and changing inequality; as inequality negatively affects national welfare and GDP growth, the first best option would be if the extra-income goes to a person below the mean/median income. (iii) Even if the welfare of the poor is not given extra-weight, investments into the poor are likely to be the most effective way to raise average income; it is a standard tenet of economic theory that raising real average incomes requires closing gaps between private and social costs, and these gaps are prevalent among the poor who often confront with imperfect and incomplete markets. (iv) The popular capabilities-oriented approach to human development, by which development is seen as a process of expanding the choices that people have, suggests prioritising poverty reduction strategies, as the capabilities set of the poor is severely limited (Addison and Rahman, 2001; Rodrik, 2000a).

5.2 Exogenous versus endogenous institutions

Institutional reforms, namely civil sector downsizing, anti-corruption policies, decentralization of services and improved regulations, are high on the political agendas in the countries examined, and in the medium to long-term are expected to favour the implementation of pro-poor policies:

... the administration is ill-equipped and insufficiently skilled to design and implement public policies, so as to adequately take into account the main concerns of citizens, and thereby ensure its legitimacy and social effectiveness ... Mali is pinning much hope on the current policy of decentralization in the fight against poverty, by promoting local democracy, the conscious involvement of the people in the exercising power and in the development through management of decentralized 'collectivites territoriales' (Mali, Republic of, 2002, p. 21-22).

... the government's policy document on governance issues provides a comprehensive approach for improving public sector management, and has been fully integrated into the

National Growth and Poverty Eradication Strategy (NGPES). Sound governance is essential to achieving a stable ad open society, where the rights of the people are guaranteed by an efficient administration of the law (Lao People's Democratic Republic, 2004, p. 47).

Table 10 attempts to capture the quality of the institutional infrastructure in African, Asian and Latin American countries, reflecting the way institutions are dealt within the national policy documents. These consider institutions as the (prominent) organizational establishments, such as government agencies and cooperatives, and as the rules of the game as distinct from the players, such as laws and regulations.

The second column of table 10 displays a proxy variable for institutional quality built as an equal-weighted average of five ordinal governance indicators produced by Kaufmann et al. (2003), and normalized to have zero mean (at world level) and scores between -2.5 and +2.5, with higher scores corresponding to better outcomes. The underlying indicators are 'voice and accountability', 'political stability', 'government effectiveness', 'rule of law' and 'control of corruption'. Voice and accountability measures the extent to which citizens are able to participate in the selection of government; political stability assesses the likelihood the ruling government will be overthrown through unconstitutional (violent) means; government effectiveness measures the quality of public service provisions and the credibility of government policies; rule of law assesses the extent to which economic agents have confidence and abide to the rules of the society; control of corruption measures the perceptions of corruption by ordinary citizens. The equal-weighted average of these indicators intends to assess the quality of governance, that is the quality of the decision-making process and the quality of the process by which decisions are implemented.

Table 10: *Institutional indicators for selected countries*

Country	Index of institutional quality*	Starting a business			Enforcing a contract		
	(-2.5 to 2.5)	*No. of procedures*	*Days*	*Cost (% of GNI per capita)*	*No. of procedures*	*Days*	*Cost (% of debt)*
Ethiopia	-0.80	7	32	77.4	30	420	14.8
Kenya	-0.88	12	47	53.4	25	360	41.3
Sudan	-1.44	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Tanzania	-0.53	13	35	186.9	21	242	35.3
Uganda	-0.88	17	36	131.3	15	209	22.3
Average	**-0.91**	**12.3**	**37.5**	**112.3**	**22.8**	**307.8**	**28.4**
Burkina Faso	-0.33	13	135	152.8	41	458	92.5
Mali	-0.32	13	42	187.4	28	340	34.6
Senegal	-0.15	9	57	112.9	36	485	23.8
Average	**-0.27**	**11.7**	**78.0**	**151.0**	**35.0**	**427.7**	**50.3**
Bangladesh	-0.72	8	35	91	29	365	21.3
India	-0.15	11	89	49.5	40	425	43.1
Nepal	-0.69	7	21	74.1	28	350	25.8
Average	**-0.52**	**8.7**	**48.3**	**71.5**	**32.3**	**380.0**	**30.1**
Cambodia	-0.63	11	94	480.1	31	401	121.3
Laos	-0.99	9	198	18.5	53	443	30.3
Thailand	0.23	8	33	6.7	26	390	13.4
Viet Nam	-0.44	11	56	28.6	37	404	30.1
Average	**-0.46**	**9.8**	**95.3**	**133.5**	**36.8**	**409.5**	**48.8**
Bolivia	-0.43	15	59	173.9	47	591	10.6
Ecuador	-0.67	14	92	47.4	41	388	15.3
Peru	-0.31	10	98	36.4	35	441	34.7
Average	**-0.47**	**13.0**	**83.0**	**85.9**	**41.0**	**473.3**	**20.2**
OECD countries	**n.a.**	**6.0**	**25.0**	**8.0**	**19.0**	**229.0**	**10.7**

*equal weighted average of 'voice and accountability', 'political stability', 'government effectiveness', 'rule of law' and 'control of corruption'

Source: elaborated from Kaufman et al. (2003) and Djankov et al. (2002, 2003).

The quality of governance is below the world average in all countries analysed, with the exception of Thailand. Sudan, Laos, Kenya and Uganda present the lowest scores in the institutional index; Thailand, India, Senegal and Peru boast the highest scores. At aggregate level, West Africa study countries (Burkina Faso, Mali and Senegal) make up the geographical region with the best governance architecture, followed by Southeast Asia and Latin America study countries; East Africa case study countries record the lowest level of institutional quality.

The right hand side of table 10 looks at the second institutional dimension examined in the national policy documents, and intends to capture the extent to which rules and regulations support market functioning and private initiatives. Markets, in fact, are only apparently institution-free and necessitate a number of ex-ante rules to function properly. For example, secure and legally recognized property rights and enforceability of contracts are essential for economic agents to enter into an agreement and benefit from market exchanges. The government, therefore, is supposed to protect property rights and ensure that all parties comply with their market obligations. At the same time, while rules are necessary, the state should avoid making it unprofitable for private economic agents to act in the market. For instance, bureaucratic barriers that hinder licensing of businesses and expensive labour legislation may create high 'costs of formality' that discourage investment. De Soto (1986) shows that, in Peru, small informal firms are often more productive than large ones, which cannot escape the regulatory control (e.g. taxes, fees) of the state. Furthermore, the informal economy is restricted in its growth and productivity as, as it grows, it attracts the attention of regulators potentially undercutting its profitability.

Following Djankov et al. (2002 and 2003), table 10 considers variables measuring the bureaucratic and legal procedures required to incorporate and register a new commercial or industrial firm; stricter regulation of entry into business, in fact, is associated with higher level of corruption and a greater relative size of the informal economy, rather than high quality products (Djankov et al., 2002); it also displays indicators measuring the legal procedures to enforce a contract, namely to collect an overdue debt, as higher procedural formalism in dispute resolution is associated, ceteris paribus, with lower honesty, consistency, fairness and higher level of corruption (Djankov at al., 2003).

The number of procedures and the time it takes to start up a simple business varies from the low of 7 in Ethiopia and Nepal to the high of 17 in Uganda; the minimum official time varies from 21 days in Nepal to 198 days in Laos; the official cost of following these procedures ranges from 6.7 percent of per capita GDP in Thailand to 480.1 percent in Cambodia.[10] The number of procedures required to pursue wither claim to courts are extraordinarily lengthy in the case-study countries, with no relevant exception. Collecting an overdue debt requires a minimum of 15 procedures in Uganda to up to 53 in Laos; it takes a minimum of 209 days in Uganda to a maximum of 591 days in Bolivia; it costs a minimum of 10.6 percent of debt in Bolivia to a maximum of 121.3 percent (!) in Cambodia.

The market mechanism appears to be poorly sustained in the countries examined, both because of the low quality of government institutions and because public authorities often support red-tape development instruments which pose constraints to private initiatives. In other words, if market reforms are undertaken, a thriving and efficient private sector will find it difficult to develop and engage in the functions previously performed by parastatals. The emphasis on institutional reforms in the national policy documents is thus highly motivated. However, on the one hand, how

[10] These figures assume that there are no delays by either the applicant or the regulators in the procedures. De Soto (2000) and his colleagues opened a small business in Lima: it took them 289 days having the business legally registered, with a cost amounting to 31 times the average monthly wage. In 6 years and 11 months they obtained a legal authorization to build a house and went through 728 administrative steps to obtain a legal title for the land they built in.

much time it will take for countries to have a pro-poor institutional environment has no clear answer; on the other hand, national planning documents fail to consider the endogeneity of institutions. Institutions, in fact, are not established by a *deus-ex-machina* but are the outcomes of the interaction between economic agents, market imperfections, relative prices and the current rules of the game (Aoki, 2001). As suggested by Demsetz (1967), they develop to internalise externalities when the gains of internalisation become larger than the cost of internalisation, and include both formal laws and authorities, and informal and illegal behaviours and contracts.[11] In other words, changing rules and regulations do not necessarily lead to better outcomes unless the underlying structural constraints are adequately addressed. For example, land titling programs in Africa have often conflicted with customary tenure rights which are considered the most efficient in arid and semi-arid zones (El-Ghonemy, 2002); the decentralization process, which is on going in most countries, is expected to enhance the accountability of local authorities and lead to more effective policies; however, in areas of high economic inequality it may provide incentives for the local elite to perform collective actions and 'capture' local government agencies (Bardhan and Gathak, 1999).

As emphasized by Rodrik (2000b), the question before decision-makers is no longer 'do institutions matter?' but 'which institutions matter and how does one acquire them?' He indicates two possible approaches: 'technology transfer', which means importing a blueprint from more advanced economies or dominant development narratives; and 'local-knowledge acquisition', which aggregates local information to the needs of the society in question. Both these approaches can be effective if based on the existence of 'participatory political institutions', i.e. meta-institutions that elicit and aggregate knowledge to facilitate building endogenous institutions which deliver pro-poor growth. Participatory development approaches and the endogeneity of institutions, however, are mainly neglected by the current policy documents which tend to adopt a 'technology transfer' approach to improve the quality of governance and market mechanisms.

[11] The most quoted example of the endogeneity of institutions is by Ester Boserup (1965) in her seminal book on 'The Conditions of Agricultural Growth', where she argues that population growth increases the land/labour price ratio leading customary tenure rights to evolve towards alienable (private) individual land rights. Sharecropping contracts can be thought as a risk-coping device and a substitute for financial institutions in case of imperfections in intertemporal markets (Laffont and Matoussi, 1995). Populations located in drought-prone zones tend to adopt property rights rules securing access to all members, and institutional structures that are less hierarchical than those where the environmental conditions are less prone to natural hazards (Nugent and Sanchez, 1999); with high risk of drought and variability of rainfall, in fact, the extremely high transaction costs of protecting scattered private property plots make it optimal for livestock keepers to be highly mobile and have common access to as many different grazing areas as possible.

6. PRO-POOR AGRICULTURAL AND LIVESTOCK SECTOR POLICIES

The current macroeconomic and institutional policies appear to be pro-poor despite a number of shortcomings, such as the deficient analysis of poverty and the household economy in the national policy documents. In any case, the economic growth ensuing from macroeconomic stability and increased institutional efficiency should provide opportunities for livestock holders to escape out of poverty. Market imperfections, however, loom large in rural areas and need to be addressed by agricultural and livestock sub-sector policies to have the poor livestock holders benefiting from opportunities offered by an efficient macro environment. Table 11 presents some preliminary indications of the variety of physical and developmental constraints that affect livestock keepers according to agro-ecological zones.[12] There exists a variety of complementarity policies that can be designed to address these constraints and facilitate rural dwellers coming out of poverty. While there are bright spots in every respect (e.g. credit policies; land policies), the real challenge is to have a coherent and comprehensive sector policy framework which consistently addresses all constraints locking livestock holders into poverty traps. Agricultural and livestock sub-sector policies in the case-study countries will be examined according to the three-level framework developed in section 2 (see table 1), which includes: 'establishing the basics for smallholder livestock production', 'kick starting domestic livestock markets', and 'supporting the expansion of livestock markets'. Readers should be aware that what follows examines paper policies, which are not necessarily implemented by the responsible authorities.

[12] For example, livestock keepers in pastoral areas have lower access to markets compared to smallholders in irrigated farming systems; it follows that price changes due to market liberalization will induce smallholders in irrigated areas to reallocate their productive resources according to price signals; but they will marginally affect pastoralists' production decisions, unless specific public actions are taken. Smallholders in rainfed farming systems are confronted with interlocked factor markets; for instance, imperfect land markets prevent financial institutions from extending loans according to efficiency criteria; it follows that reforming credit institutions without considering the way the land market works may prove ineffective.

Table 11: *Typologies of livestock smallholders, developmental constraints and market integration*

Producer / agro-ecological zone	Livestock owned	Main developmental constraints	Husbandry patterns	Main role of livestock	Market assumption	Access to markets	Theoretical effects	Practical effects	Policy interventions
Pastoralists	1. Sheep and goats 2. Horses, donkey mules 3. Camels 4. Cattle 5. Poultry	Natural hazards Lack of feed and water Animal diseases Theft	Migratory Semi-migratory	Milk Fibre Risk coping Social status	Absent and/or imperfect markets	Very low Low	Inefficient resource allocation	Underused variable inputs Unresponsive or low elasticity to price signals	Livestock insurance; improved access to resources Improved access to markets
Smallholders in rainfed farming systems	1. Cattle 2. Sheep and goats 3. Poultry 4. Horses, donkey mules 5. Pigs	Natural hazards Lack of feed Animal diseases Cost of inputs Theft	Tether Cut and carry Range	Power Fertilizer Meat Milk Eggs Risk coping Social status	Interlocked input markets Imperfect output markets	Low Medium	Inefficient resource allocation	Underused variable inputs Low to medium elasticity to price signals	Irrigation Crop insurance Improved access to markets Price stability
Smallholders in irrigated farming systems	1. Cattle 2. Buffalo 3. Poultry 4. Pigs 5. Sheep and goats	Cost of inputs Variability of prices	Stall-fed Cut-and carry Roadside	Power Fertilizer Meat Milk Eggs	Imperfect input markets	Medium High	Efficient resource allocation	Price efficient	None, a priori
Urban and peri-urban livestock holders	1. Poultry 2. Pigs 3. Sheep and goats 4. Cattle 5. Buffalo	Space of animals Human health Access to water	Roadside Rubbish Foraging	Milk Eggs Meat	Imperfect input markets	High	Inefficient resource allocation	Underused variable inputs Medium to high elasticity to price signals	Improved access to input markets Price stability

Source: elaborated from Ellis (1998); FAOSTAT (2004); IFAD (2004); Perry et al. (2002); Thornton et al. (2002)

6.1 Establishing the basics for smallholder livestock production[13]

6.1.1 Access to land, feed and water

Insecure access to land, water and feed and exposure to natural hazards are prominent constraints for small farmers in rainfed crop-livestock production systems and pastoralists. In mixed rainfed production systems, secure and long-term access to land provides the first best incentives for resource allocation, as smallholders are the ultimate beneficiaries of their efforts. In particular, it enhances opportunities to use resources (as family labour) that in many cases are underused (Deininger, 2001); it allows farmers to transact in markets where land can be used as collateral (Banjeree and Newman, 1994); it encourages lump-sum investments in both physical and human capital (Deininger et al., 2000); it has positive effects on nutrition level, both through enhanced income and direct access to calories intake (Burgess, 2000); and it protects against calamity, making it less severe exogenous shocks of nature (Berry, 1998). Arid and semi-arid pastoral areas are marked by long cycles of drought and post-drought recovery, with recurring forage scarcity for livestock buffered through cycles in animal weight and productivity changes. Pastoralists are thus characterized by low level and high variability of income, and often pursue a survival strategy rather than maximizing profit. Secure access to (common) natural resources so as to pool weather risks across different patches of rangelands is essential for their survival (Banks, 2003; Nugent and Sanchez, 1999; Kamara et al., 2004).

Some sort of state intervention is needed for the land system to be pro-poor, as the market is not able to shift land to the resource poor. The price of land, in fact, exceeds the present discounted value of the income flow that can be produced from farming, as it is inflated by credit subsidies, by fiscal policies allowing the use of agriculture as a tax shelter, by the social value of the land, and by macroeconomic instability that encourages the use of land as an inflation hedge. Even in perfect market environments the resource poor cannot buy land because at equilibrium the income increment from a unit of land would be exactly equal to the unit interest to be paid back to the bank. Individuals without accumulated savings, therefore, should have to reduce their consumption below subsistence level to make principal payments on the purchased land. It follows that the relatively wealthy landowners are expected to be net buyers of land and the relatively small ones net sellers (Binswanger, 1987; Carter and Mesbah, 1993; Carter and Salgado, 2001).

Land laws in the countries analyzed have been unable to establish an equitable and growth-supporting land tenure system so far. In Africa, there is inadequate recognition of customary tenure by policy makers, lack of formal property titles, frequent inconsistencies between customary and formal laws, and conflicts between pastoralists and settled farmers.[14] In Asia and Latin America, a major concern is the large and increasing number of rural landless or near landless families, with skewer access to land in the Andean countries compared to South and Southeast Asia. The current status of affairs not only is path-dependent on centuries of colonial dominations, but also on a number of ineffective land laws passed after independence. For example, in Ethiopia, the land belongs to the State and cannot be sold or mortgaged, with potential negative consequences for the credit markets; in Kenya, most land has been titled with the exception of grazing areas, with growing competition and conflicts among expanding farmers and pastoralists; in Sudan, since 1970 all land is formally in the hand of the State, which leases it to farmers and

[13] Unless differently indicated, all information in sub-sections 6.1, 6.2 and 6.3 is from FAO/PPLPI Livestock Sector Policy Briefs and the references therein.

[14] Several countries have been recording a shift from areas devoted to pastures towards crops: Jodha (1992) showed that, over the period 1951-1981, common property land declined between 31 and 55 percent in a number of Indian states; FAO (2002) estimated that in the next 30 years developing countries will need an additional 120 million hectares of land for crop production.

private entrepreneurs who have thus limited incentives to long-term investments; in Uganda, most farmers do not have registered land titles and the 1998 Land Act remains to be implemented; in Burkina Faso, the 1991 Agrarian Land Reorganization Law introduced for the first time the notion of private property rights, but land transactions are scanty and hampered by traditional customary tenure; finally, insecurity of tenure is widespread in Senegal and Mali, where land laws are still in their early implementation phase.

In India, but for Kerala and West Bengal, State-initiated land reforms are considered to have been unsuccessful in getting land to the poor: landless agricultural labourers account for less than a third of all rural population but make up almost half of those living below the poverty line. In Bangladesh, the Land Reform Ordinance, which governs contracts between landowner and sharecroppers, is often not applied; in Nepal, only in 2000 the government started developing a land cadastral system; in Laos, in 1991 land use rights were established for all individuals but have not been granted so far. In Latin America, Bolivia presents a highly unequal distribution of land, with poor farmers accessing only fragmented small plots in the highlands; in 1994, Ecuador endorsed a new agrarian law to equalize access to land, but results have been disappointing so far; in Peru, despite a widespread land titling program, a significant number of farmers have not yet been given a registered valid land property title.

Although inadequate land tenure systems worldwide prevent smallholders from making efficient use of their scarce resources, most national policy documents treat access to land as a marginal issue. For example, the Bolivian PRSP indicates that insecure and unequal access to land significantly hampers the development of rural areas; but the 'Matrix of Priority Actions and Policies for Promoting Rural Development' identifies only the 'regularization of rural land ownership' as a priority area of intervention, de facto overlooking the distributional issue (Bolivia, Republic of, 2001). In Uganda, only 0.6 percent of the total expenditure of the Poverty Reduction Action Plan is allocated for the implementation of the Land Act, while 67 percent to primary education and 7 percent to rural roads (Uganda, Republic of, 2000). In Ethiopia, the government plans to 'assist investors in large-scale commercial farms to have access to agricultural land with basic infrastructure', neglecting the needs of pastoral communities (Ethiopia, Federal Democratic Republic of, 2002, p. 108). In Cambodia, 'although more than 70 percent of the [...] population are employed in agricultural production, between 12 and 15 percent of them have no agricultural land'; however, in the poverty-reduction priority actions matrix there is no any mention to the land issue (Cambodia, Kingdom of, 2002, pp. iii-iv). In Tanzania, the PRSP policy matrix only refers to land suitable for irrigation, which is just around 3 percent of all agricultural land (Tanzania, United Republic of, 2000; FAOSTAT, 2004).

6.1.2 Risk coping mechanisms

A second basic developmental constraint for both pastoralists and farmers in mixed rainfed production systems is exposure to risks, including natural hazards, animal killer diseases, price volatility and human diseases.[15] Stability of production and prices, in fact, is a necessary condition for smallholders to efficiently allocate resources according to price signals and programme long-run investments. Conversely, in an unstable environment, prices only marginally drive resource allocation and smallholders show a bias towards food production, use non-risky technologies, diversify their income sources towards off-farm incomes with low covariation with agricultural production, assume storage behaviour that accounts for food security considerations, and accumulate assets that can be easily transformed

[15] Investment in basic social services, including human health, is a cornerstone of the national policy documents (see section 5.1). This section does only focus on livestock-specific issues.

into cash (including livestock). Response to risks can also rely on mutual credit and insurance for consumption smoothing (de Janvry and Sadoulet, 2005). While these endogenous risk-coping mechanisms can allow populations to cope with income/wealth loss associated with a single hazard, consecutive crises can have devastating and long-term consequences on the livelihoods of smallholders. Natural hazards are not exceptional events: in 2005 drought conditions were expected in Ethiopia, Kenya, Tanzania, Cambodia and Bolivia; tropical storms (floods) in Bangladesh, and wetter-than-average conditions in coastal areas of Ecuador and northern Peru (WFP, 2005).

Ex-ante and ex-post risk coping mechanisms for natural disasters and animal killer diseases, such as insurance (ex-ante) schemes and loss compensation funds (ex-post), are undersupplied by the market (private agents) as dependent on exogenous uncertain and covariating factors, which also provide opportunities for moral hazard behaviour by farmers/pastoralists. A large insurer, for example, that could reduce production covariance by insuring pastoralists in distant areas and even in different countries, cannot deal with moral hazard behaviours as, because of asymmetry of information, smallholders may pretend that their animals have been killed by drought conditions though they have sold them to market. On the other hand, a small local insurer, which could somewhat 'supervise' moral hazard behaviour because of its social networking, cannot overcome the covariance problem (Binswanger and Deininger, 1997). It follows that smallholders do not have access to insurance for natural disasters but in case of public actions.

Few countries have designed strategies specifically targeted to protect smallholders from natural disasters, and these are usually under-funded, uncertain in their functioning, and covering limited areas. Burkina Faso and Ethiopia, in Africa, and Bangladesh, in South Asia, have established ex-post insurance mechanisms for droughts and floods respectively; in India, a famine code was endorsed under the British colony and the country has been financing research for drought proofing forage and plans to eradicate rinderpest and contagious bovine pleuropneumonia; Ecuador and Peru have been drafting contingency plans to ensure food security in the case of 'el Niño'; finally, Senegal intends to invest in rural hydraulic works to reduce the negative effects of droughts on land productivity. All other governments, to our knowledge, have not designed any specific and comprehensive strategic framework to deal with natural disasters, contributing to make the market mechanism ineffective towards smallholders.

Excessive price variability is another source of income risk for livestock producers. For those countries for which times series data are available, livestock input and output prices appear to be highly variable, with a coefficient of variation often higher for output than input prices.

Table 12: *Coefficient of variation (%) of producer prices for selected commodities, 1991-2002*

	Maize	Wheat	Soybeans	Indigenous cattle meat	Whole Milk	Indigenous chicken meat	Pigmeat	Eggs (excluding hens)
Ethiopia	22.7	14.6	21.5	157.6	11.5	11.1	164.3	
Kenya	41.5	40.9		35.9	32.6	27.9	80.0	
Sudan	85.8	85.8		144.3	101.6	100.2		
Burkina Faso	24.3		28.8	28.8	28.8	28.8	107.8	
Mali	43.9	20.3		17.2	53.8	20.3	138.5	
Bangladesh	13.5	13.5		4.6	22.8	9.7		4.8
India	21.0	22.2	15.4	5.6	25.1	88.3	76.0	
Nepal				33.2	25.8	26.9	90.4	29.7
Cambodia	46.3		35.1	33.7	33.7	49.9	90.8	40.1
Laos	87.2		74.9	59.3	72.0	81.7	149.6	73.6
Thailand	17.6		10.9	122.8	145.3	112.4	95.0	19.6
Bolivia	28.1	22.9	22.0	16.9	15.6	26.3	54.5	
Ecuador	125.5	125.8	107.3	95.8	96.0	100.9	69.3	
Peru	36.9	28.4	33.8	31.3	32.1	27.5	93.6	

Source: elaborated from FAOSTAT (2004)

Swings in price result from seasonal supply changes, but are also associated to changing trade flows, disease outbreaks, social events (e.g. the Haji pilgrimage), etc. In theory, price shocks can indicate the presence of a frictionless market and, in case of a flexible economy, should conduce towards an efficient reallocation of resources. In practice, in case of imperfect contracting and limited access to productive assets, they result in high level of risk aversion of smallholders and inelastic and counter-intuitive responses to price signals. Livestock holders, in fact, are not only producers but also consumers of meat and milk; production, therefore, acquires an insurance value additional to its contribution to income. It follows that, when price goes down, smallholders reduce production less than profit-maximizing producers, contributing to keeping price low. On the other hand, when output price increases, they reduce animal slaughtering, as in the long term cattle and small ruminants are the major inputs in their own production, and by so doing they push prices further up. These behaviours contribute to exacerbate price movements with negative consequences for the efficient allocation of resources and stability of income (de Janvry and Sadoulet, 2005; Jarvis, 1986).

Current sector policies do not include any public intervention to reduce price volatility of livestock commodities, but for macroeconomic policies intended to keep inflation low. Following stabilization and structural adjustment programs in the 1980s and early 1990s, in fact, most countries have dismantled state marketing boards and ended government involvement in the procurement and distribution of agricultural products and price intervention schemes. Market reforms, however, have been going less far than expected, particularly in sub-Saharan Africa and South Asia. The Cotton Marketing Board and the Gum Arabic Company in Sudan, the Coffee and (agricultural) Produce Marketing Boards in Uganda, the Malian Company for the Development of Textile Fibres and the National Company for Oleaginous Marketing in Senegal are examples of existing public involvement in the agricultural sector. Bangladesh, India and Nepal, and partly Laos, support staple food production and distribution, particularly rice, through a combination of buffer stock and trade policies. Interestingly, parastatals dealing with livestock products, which were typically few in numbers and mainly dealing with milk producers (such as the Kenya Cooperative Creameries), have all been dismantled or privatized. The case study countries,

therefore, while pledging to liberalize input and output markets in order to facilitate allocation of resources according to comparative advantages, moderate cereal price fluctuations from one season to another and from year to year in order to protect consumers and producers. However, they do not seriously address the issue of price fluctuation in livestock commodities.

6.2 Kick-starting domestic livestock markets

Access to land, feed and risk-coping mechanisms would not be sufficient to take livestock holders out of poverty because of high transaction costs / imperfections in financial and animal input / output markets. Therefore, the way governments regulate credit markets, the supply of preventive and curative animal health services, drug distribution, extension services as well as output markets is crucial for paving a way for livestock holders to escape poverty.

6.2.1 Access to formal credit

Public rural financial institutions, which had been the principal supplier of subsidies to agriculture during the 1970s and the 1980s, have been mostly dismantled or privatized, and governments have reduced their roles in the provision of insurance for use as collateral for loans. Despite there is over-whelming evidence that almost all rural credit went to rural elites, according to many financial market liberalization, even though efficiency-enhancing, has had a negative impact on the access of smallholders to credit (e.g. de Janvry et al., 1997). Rural dwellers, in fact, are intrinsically more difficult to provide with financial services than their urban counterparts, being poor, lacking collateral, spatially dispersed, and subject to high transaction costs. They are thus trapped into a low-wealth-low-growth vicious circle as, being rationed on the credit market, they can enter only into technology and activity portfolios with lower returns and are not able to start accumulating savings (capital).

In recent years governments in the sample countries have recognized that liberalized financial markets in underdeveloped areas are often not able to meet the demand for credit by the poor rural dwellers. In Ethiopia, regional governments act as intermediaries between commercial banks and farmers; in Sudan, since 1999 the government has been providing direct lending and guarantees for agricultural loans within a consortium of agricultural banks; in Tanzania, the government has given legal status to Savings and Credit Cooperatives; in Burkina Faso, the *Caisse National de Credit Agricole* charges below market interest rates to farmers; since 1998 Mali has been carrying out a National Strategy for Microfinance. In South and Southeast Asia, rural public banks are still performing a significant role along with a growing number of microfinance institutions, such as the National Bank for Agriculture and Rural Development in India, the Bangladesh Rural Development Bank, the Agricultural Development Bank in Nepal, the Agricultural Promotion Bank in Laos and the Vietnamese Bank for Agriculture and Rural Development. Finally, in Latin America, main sources of credit for farmers are microfinance institutions, with the exception of Peru where in 2001 the government established AgroBanco with the explicit aim of releasing sustainable loans to farmers.

Despite these efforts, access to formal credit is still inadequate for the majority of the resource poor, suggesting that current policies are ineffective and/or likely to benefit the well-to-do. In Sudan, only 1-2 percent of all agricultural credit is extended to smallholders; in Mali, microfinance institutions, which provide credit to rural households, account for only 3 percent of all disbursed loans; in Laos, almost 80 percent of rural households have never received a loan; in Ecuador, over 92 percent of agricultural producers do not have access to formal credit.

Current policy thrusts are not likely to significantly reverse this trend, and poor livestock holders are expected to be credit-rationed also in the years to come. On the one hand, credit programs specifically targeted for animal production have been designed in four countries only. In Nepal, low interest rate credit is available for the purchase of livestock from the Agricultural Development Bank; in Thailand, there is a no interest loan program to support hog farmers; in Kenya, the Ministry of Agriculture offers rural communities heifers through micro-loan in the coastal region; in Senegal, the intention is to set up lines of credit specifically targeted to actors in the livestock production chain. On the other hand, current policies tend to address only the weaknesses of existing financial institutions, rather than to promote the development of the entire rural financial environment.

... reform the commercial banking system, reorganize and strengthen the health of financial and credit organizations (Vietnam, the Socialist Republic of, 2003).

Expansion of the decentralized savings and loan approaches in complementarity with the National Agricultural Credit Bank of Senegal ought to expand the financing and income-enhancing opportunities for farmers (Senegal, Republic of, 2002).

A Financial Sector Strategy Statement was prepared in 2001 and its key recommendations are now being implemented. These include: (i) Strengthening the autonomy and authority of the Nepal Rastra Bank; (ii) Enhancing its capacity for supervision and regulation of commercial banks; (iii) Concurrently, the two major banks (which own nearly 60% of the banking assets) have been placed under external management in order to address their deep-rooted management and financial problems and possible restructuring needs (Nepal, Kingdom of, 2003).

Rural lending institutions should of course attain financial sustainability, eschew government and donor assistance, charge interest rates commensurate to the full cost of the loan and high enough to mobilize savings. The central issue in financing the poor, however, lies beyond traditional financial networks and is deep-rooted in the very structure of an underdeveloped rural economy. This includes asymmetric information between financial institutions and farmers, high and covariant risks in livestock production, lack of insurance / collaterals from the part of smallholders, etc. While there are no blueprint solutions to reforming the financial system, the socio-economic literature has recently emphasized the effectiveness of innovative approaches to provide poor farmers with credit. Pearce et al. (2004), for instance, report that micro-insurance could have a strong leverage on agricultural finance; that better access to output market makes rural households more reliable borrowers; that contract growing schemes can provide ample avenues in providing credit to livestock holders; that improved contract enforceability supports the functioning of rural financial markets. Existing policy documents, however, fail to propose innovative and experimental solutions to the financing problem of the poor, and simply emphasize the importance of efficient orthodox financial institutions, which however do not adequately serve the poor and, when serve them, are not always sustainable. Even traditional micro-finance institutions remain often substantially subsidized (Morduch, 2000).

6.2.2 Animal health services and extension

Beyond credit, access to an adequate and affordable supply of animal health and extension services is essential for effective livestock production, even though little is known about the impact of specific endemic, epidemic and zoonotic animal diseases on the livelihoods of the poor.

In all countries examined, animal diseases severely constraint meat/milk production and smallholder income. In Bangladesh, endemic Foot-and-Mouth disease is estimated to halve the capacity of buffalo herds to work during rice planting, and reduce milk yields by 80 percent; in Cambodia, disease outbreaks (mainly Newcastle disease)

regularly decimate village poultry flocks and there are high mortality rates in pigs as well (mainly due to Swine Fever); in Uganda, Newcastle disease in poultry, African Swine Fever in pigs, and Foot-and-Mouth disease in cattle contribute to low productivity of livestock; in Laos, sporadic disease epidemics frequently kill most pigs and chickens in upland villages, and the mortality rate of buffalo calves due to internal parasites is particularly high. Heffernan at al. (2001, quoted in IFAD, 2004) carried out 1700 household surveys in Kenya, Bolivia and India and concluded that livestock diseases are the most significant problem for approximately 20 percent of all producers.[16]

Since the 1960s governments in a large number of countries built heavily subsidised systems and networks of services delivery, but the rigorous budgetary policies connected to macroeconomic and institutional reforms have been forcing most countries to reform animal health services. Two complementary approaches are being adopted: decentralization and privatization of services. A number of governments have decentralized animal health services provision to local government units, such as Uganda, Cambodia, Thailand, Vietnam and Bolivia; at the same time, private actors have been allowed to supply veterinary services, particularly drug distribution and curative services, such as in most sub-Saharan African countries. While both decentralization and privatization can be pro-poor, policy documents lack of a clear vision of the hows and whys the reformed animal health services will serve the poor.

First, privatization and decentralization may be both ineffective as far as the roles of public and private sector in service provision are not clarified, as it is today acknowledged that animal health services present a mixture of private/public goods. For example, clinical veterinary services and distribution of drugs can be considered as private goods; disease surveillance and prevention and food safety are classified as public goods (Ahuja, 2004). Which services are best provided by the private sector, which by decentralized and/or central authorities? Second, decentralization may provide incentives for the local elite to perform collective actions and 'privatize' local government agencies, and it does not change the attitude and the capacity of service providers; it is true that it may render services more effective, but the core problems of public delivery of services (funds and incentives) do not change. For instance, in Ethiopia, the regional departments of veterinary services often lack of vaccines and drugs. In India, the number of federal state-run veterinary institutions was 54,912 in 2003, with some 100,000 professionals and para-professionals; the quality of services provided by these institutions was often poor, especially as they were not adequately equipped with clinical diagnosis facilities, with reported indiscriminate use of antibiotics and other drugs, high costs and potential threats to human health. Third, privatization is not necessarily pro-poor. Poor livestock keepers are in many cases willing to pay for animal health services, but it is a formidable challenge to develop a system that is both affordable for the poor and, at the same time, profitable for the service providers. In a study from Kenya, it was shown that livestock keepers spend about 50 percent less than required to access efficient animal health services (IFAD, 2004). In Mali, the ongoing process of privatization appears to have encouraged the demand of veterinary services, but serious concerns are about livestock holders in the most remote areas; because of high transaction costs, in fact, service providers find it unprofitable to serve far-off and sparsely populated areas. In Burkina Faso, increased demand for veterinary services is stimulating the development of public and private animal health services; services fees are particularly high, however, and the focus is exclusively on cattle and small ruminants, neglecting diseases of poultry which are mainly raised by the poor rural dwellers. Finally, in South Asia, public veterinarians are allowed to charge for services they provide outside office hours; this reduces the

[16] The majority of households rank lack of access to fodder and water as their most binding constraint, followed by animal diseases. After these, problems vary across countries and areas within countries widely.

incentives for private actors to enter the service business and constraints the development of an efficient system of private services delivery.

In order to make services delivery pro-poor, a number of innovative experiences are being implemented, such as support to para-professionals, to community-based animal health workers, government sub-contracting and networking between paraprofessionals and veterinarians. While there are both successful and unsuccessful examples of these innovative approaches, the policy documents do not aim at scaling up effective programs country-wide and tend to follow the mainstream approach to services delivery, which is delineated by the macro framework and appears to be driven more by budgetary and efficiency considerations than by the determination of establishing an effective system of animal health services delivery for the poor. Second, policy documents fail to consider services to livestock production within the broader context of agricultural extension, whereas producers necessitate also information about crop-livestock interaction, market opportunities and marketing strategies.

6.2.3 Access to domestic output markets

A poultry vaccination campaign in India proved unsuccessful as, despite chickens surviving for a longer time, farmers withdraw from the program because of lack of accessible output markets for poultry meat. On the Bolivia Altiplano, livestock holders who had favorable price and a reliable market outlet widely adopted fodder production technologies in a complex crop rotation of potatoes, quinoa and onion with alfalfa and oats for hay (IFAD, 2004). 'Access to markets is another precondition for livestock development; economic growth of poor livestock keepers will depend on fair market access for their livestock produce' (IFAD, 2004, p.xvii); '...it is not the subsidized service delivery but access to output market and general awareness level that determines the demand for veterinary services' (Ahuja et al., 2004, p.31).

Two sets of elements determine access to markets for livestock holders: household idiosyncratic characteristics and the broader institutional/physical infrastructure, where infrastructure refers here to the institutional architecture and livestock-marketing facilities.[17] Lapar et al. (2003) show that smallholder participation (and selling decisions) to markets are mostly affected by income, educational level, extension visits, composition of livestock assets (cattle, pigs, chicken) and information; Were Omano (1998) maintains that smallholders may reject the adoption of technically feasible and production-increasing innovations if these involve high market transaction costs; Staal et al. (1995) argue that, while individual households may face insurmountable transaction costs to markets, grassroots organizations reduce marketing costs and government should provide an enabling environment for local groups and private enterprises to collaborate. In general, income level, land assets, ownership of livestock, non-farm earnings, proximity to markets, educational level and membership to producer organizations are household characteristics positively associated with access to markets.

Incentives to market participation depend also on the institutional architecture and existing livestock-marketing infrastructure. Under this perspective, sub-Saharan African producers face the strongest constraints to access markets profitably. In Ethiopia, livestock are the most repeatedly taxed agricultural commodity, because of a number of marketing and transit fees, which are usually not reinvested in the sector; in Sudan, many of the 23 Federal States rely heavily on livestock taxes as their primary source of revenue: there are over 20 types of taxes and fees between Darfur (western Sudan) and Port Sudan (eastern Sudan) for sheep, and around 17 taxes between Darfur and the Sudan-Egypt border for camels; the Kenyan Cooperative

[17] See section 5.2 for a brief review of broader infrastructural policies.

Creameries closed down because farmers were unable to find reliable buyers for milk and the current 45 existing processing firms are unable to handle the 3.8 million of liters produced annually; canning and freezing plants for beef are found only in Nairobi, Thika, and Nakuru and poor livestock producers get 40 percent of consumer price; in Uganda, livestock markets are run by private individuals who charge unregulated fees, and slaughterhouses are few and located only in urban centres; in Mali, domestic marketing is competitive, but the only existing abattoir, located in Bamako, is in the hands of the government which has not been able to sell it since the last six years, denoting that the private sector finds it unprofitable to enter into meat processing; in Senegal, the marketing system is dominated by a small network of exchanges based on ethnic relations and contacts, and therefore is not competitive, while existing abattoirs are in extremely poor conditions.

In Asia and Latin America output markets are more competitive than in Africa, even though bottlenecks exist: in Nepal, most markets are organized around the quasi-monopolistic 'Four Legged Buying and Selling Cooperative Ltd'; in Laos, local governments significantly constraint livestock trade, establishing quotas for animals to be moved across provinces; in India, the Operation Flood Program succeeded in establishing linkages between milk producers in rural areas and urban consumers[18]; in Bolivia, existing slaughterhouses are able to process half of the meat consumed in the country; in Ecuador, though there are over 200 abattoirs, 89 percent are in urban and peri-urban areas and only 11 percent in rural areas.

The current state of affairs partly depends on the unsatisfactory sequence of reforms implemented in most countries. There is a general agreement that price reforms should be attempted before removal of all marketing regulations, and that measures to promote a competitive private sector should be initiated long before dismantling the public sector (Bardhan, 2001). Most countries, however, have liberalized the entire marketing system through dismantling public marketing boards without having in place the economic and institutional infrastructure necessary for a thriving and efficient private sector to develop (see section 5.2). Current policies on livestock marketing, where existing, intend to fill these gaps through government financing. In Bangladesh, the government has recognized that increasing the number of rural marketing facilities is a means of improving sale prices in remote rural areas, and the Local Government Engineering Department (LGED) is designing a 'market growth' program. Burkina Faso provides funds to slaughterhouses and supports cooperative and grassroots organizations; it also organizes livestock national-days (*journée du lait, du porcs, de la volaille*) to indirectly contribute to market development. In India, a centrally sponsored scheme 'Assistance to States for improvement / modernisation of abattoirs, establishment of carcass utilization centres' is being implemented since the 8th Five Year Plan. Under this scheme, which should terminate in 2004-2005, financial assistance is given to State Governments on a 50:50 basis for building abattoirs; 100 percent financial assistance is provided for building plants and machinery and effluent treatment, and 50 percent for water, electricity and land development for establishing carcass utilization centres. Overall, however, the few existing interventions on livestock marketing appear to be piecemeal and neither driven by any specific guideline and policy thrust, nor by detail considerations of the multiplicity of factors limiting access to markets for smallholders.

[18] The Operation Flood (OF) program, one of the world's largest and most successful dairy development programs, was launched by the Indian Government in 1970, and its main thrust was to organize farmers' cooperatives in rural areas and link them with urban consumers. Operation Flood has led to the modernization of India's dairy sector and has created a strong network for procurement, processing, and distribution of milk by the cooperative sector, which continues to play an important role in keeping smallholders involved with this fast-growing sector. Milk production grew at an average annual rate of 4.6% during the 1970s, 5.7% during the 1980s, and 4.2% during the 1990s (Delgado et al., 2003).

6.3 Expanding livestock markets

6.3.1 Livestock research

Once smallholders have secure and adequate access to basic inputs and markets have been 'kick-started', two elements can support the development of a thriving and sustainable pro-poor livestock sector in the long run: research activities, which should allow countries to satisfy the growing demand of high quality livestock products and by-products; and international trade, which should allow smallholders to benefit from increased livestock demand worldwide and specialize in what they have a comparative advantage at.

The genetic traits of local breeds, such as hardiness, disease resistance, and multipurpose, have developed over centuries and are very relevant to poor livestock keepers. Good examples are resistance of African zebu cattle to vector-borne disease such as East Coast Fever, and West African cattle and sheep breeds with tolerance to African Trypanosomiosis (IFAD, 2004). As consumer preferences change, there is scope to develop alternative breeds so that poor livestock holders may satisfy demand for high-quality livestock products and not be crowded out by large scale industrial farms.

Agricultural research budgets, however, have been traditionally very low in most developing countries and, following current macroeconomic and institutional policies, have been further reduced. At the same time, research centres have been undergoing significant reorganization, though all research institutions of significant dimension are still managed by public authorities. Some countries have centralized the entire set of research activities into one broad-based research centre, to take advantage of economies of scale. For example, the Ethiopian Research Organization, the Independent National Institute for Agricultural Research in Ecuador and the Agricultural Research Council in Nepal are responsible for all agricultural research in their respective countries. Some other countries have decentralized and delocalized their research institutions to take advantage of specialization. In Uganda, there are nine research centres located in different agro-zones across the country; the Senegalese Institute of Agricultural Research has been reorganized in eight institutions each carrying out research in different agro-ecological zones; four research institutions have been established in Ecuador to conduct research for products grown in the highlands, the valleys, the tropic semiarid region and the humid tropics; the recently established Bolivian Agricultural Technology Institute comprises four Foundations, one for each main agro-ecological zones. Peru is an unusual case: five agricultural research centres have been converted into private foundations but salaries of staff are paid by the central government.

How this institutional reorganization will affect livestock research is unknown. First, only Bangladesh possesses a research centre specifically established for livestock (the Bangladesh Livestock Research Institute), while in all other countries livestock research is carried out by agricultural research institutions. Second, funds for livestock research are typically less than proportional compared to the role of the sector in the economy, and livestock is given secondary relevance compared to crops. In Ethiopia, for instance, research efforts have been mainly on intensification of crop production by small farmers, and the Cambodian Agricultural Research and Development Institute has traditionally focused on wet and dry rice. On the other hand, all policy documents emphasize the relevance of livestock research: Ethiopia plans to increase productivity of local cows by artificial insemination and preserving and improving indigenous breeds; in Kenya, research will be carried out on livestock breeds and indigenous stock; the Ugandan government intends to invest in livestock genetic improvement; in Mali, research programs on small ruminants, poultry and bovines have been designed; Peru plans to improve the quality of alpaca fibre for camelids through genetic improvements, artificial insemination, and sanitary

programmes; since the 1990s Ecuador has been introducing European and Asian breeds to improve the qualities of the native Creole breeds.

Compared to Africa and Latin America, research activities in Asia focus both on livestock and fodder production. India has endorsed a broad long term program for both genetic improvement and fodder crops development; in Nepal, seed production programmes to promote the sustainable use of grazing lands have been recently initiated; in Thailand, the Department of Livestock Development has embarked on an ambitious program of forage improvement for upland cropping systems, rainfed lowland rice systems and agro-forestry systems; the Cambodian government plans to establish a National Livestock Research Centre to develop and disseminate appropriate technology for animal raising and feeding.

Whether research activities will be pro-poor in the long run is not clear. First, it must be emphasized the research development could not be achieved by the profit-seeking efforts of (poor) farmers and private institutions, as it is always difficult to set and protect patents on agricultural/livestock 'inventions'. Public supported institutions are expected to develop pro-poor technologies with public good attributes, and their capacity will be clearly dependent on availability of funds. Second, with the exception of India, in no country there are specific directives about pro-poor research activities and research institutes often prioritize their efforts according to lobbying criteria. Third, whereas universities and non-profit organizations are most likely to carry out pro-poor research, no policy document explicitly envisages the necessity of establishing firm and long-term relations with actors beyond the government agencies themselves. Finally, in no case do the policy documents refer to the issue of technology adoption by poor smallholders and, consequently, to the relations among public and private extension service providers and research institutions.

6.3.2 Access to international markets

Livestock and livestock products contribute one-sixth to agricultural world trade value. Developed countries are net exporters of virtually all livestock products, while developing countries are mostly net importers of milk (equivalent) and marginally import meat products (Upton, 2001).

The current trend toward markets integration is supposed to benefit both developed and developing countries, as shifting allocation of resources intersectorally according to comparative advantages should promote economic growth and poverty reduction, and several of the case-study countries, especially in sub-Saharan Africa, boast a comparative advantage in livestock production.[19] A recent World Bank (2003a) study shows that the 24 developing countries that increased the most their integration into the world economy over the last two decades have achieved higher growth not only in incomes, but also in life expectancy and education. On the other hand, the causal relations between international trade and poverty reduction are not yet well understood, probably because of the countless ways through which trade can impact on poverty, such as exchange rate and price movements, employment creation/destruction, movement in the balance of payments, changes in the bargaining power along the global production chains, changing ratios between tradable and non-tradable commodities (UNCTAD, 2004).

The countries examined are widely open to international markets. They are members of regional economic communities, such as the Economic Community of West African States (ECOWAS), the Common Market for East and Southern Africa (COMESA), the South Asian Association for Regional Cooperation (SAARC), the Association of Southeast Asian Nations (ASEAN) and the Andean Community of Nations (CAN). All

[19] According to Stiglitz (1998), the main gains from trade seem to come inter-temporally as a result of increased efficiency, with little sectoral shift.

countries are also WTO member, but for Ethiopia, Laos, Sudan and Vietnam, which have however submitted request for accession. Trade value averages 58.7 percent of GDP at aggregate level, higher than United States (24 percent) and below the average of the European Union (69 percent). Southeast Asia is particularly open to global markets, with trade value being at 112 percent of GDP compared to 45 to 55 percent of the other regional aggregates (World Bank, 2004b).

Since the late 1990s, however, global trade in agricultural products has been characterized by a gradual increase in sanitary and phytosanitary barriers (FAO, 2003). For instance, BSE (bovine spongiform encephalopathy) and Foot-and Mouth disease have led countries over the 1998-2001 period to impose import bans and stricter sanitary requirements, as well as other technical barriers, such as requirements on labelling and animal traceability schemes. In Ethiopia export bans and limited slaughtering capacity constrain livestock and meat export to 4 percent of total export earnings; the Ugandan Beef Producers' Association maintains that the country does not export any significant quantity of meat because of sanitary barriers and lack of any export-standard abattoir. The case study countries, however, appear not to be significantly affected by sanitary and phytosanitary (SPS) barriers, being net importers and modest exporters of selected livestock products, and trading mainly inter-regionally (table A3). India exports live animals and some milk, but imports significant quantities of feed and fodder; Nepal imports around half of its current meat requirement; Cambodian livestock trade is almost inexistent, while Lao PDR exports some cattle and buffaloes to Thailand; Bolivia is a net although modest importer of chicken and dry whole cow milk. There are two exceptions: Thailand is the fourth world exporter of poultry meat and imports milk for over US$ 200 million (2002); in Burkina Faso, livestock is the second biggest export earner, accounting for about 20 percent of the total export values.

National policy documents emphasise the importance of livestock trade for development, particularly Southeast Asian countries that explicitly aim at establishing an outward-oriented livestock sector. Mali plans to expand tradable livestock exports by 6 percent per year; Kenya intends to create disease free zones to facilitate the export of live animals, and to encourage private investors to establish export-standard slaughterhouses; the Ugandan Beef Producers' Association plans to build an export quality abattoir in Kampala; Bangladesh will support farms exporting poultry, beef and dairy products; Cambodia plans to encourage the development of meat processing industry to stimulate exports; Lao aims at expanding livestock exports to US$ 50 million by 2020; Vietnam plans to develop high-quality cattle and poultry for exports on a large scale in the future; Bolivia intends to support production, processing and marketing of livestock products with a focus on export markets; Peru aims at developing an industrial livestock sector able to compete on international markets. Some countries, such as Ethiopia and Peru, also intend to soon harmonize sanitary standards according to the SPS Agreement finalized under WTO.

While the focus on livestock exports is reasonable given the current global development trends, and in the long run all countries will be required to meet international sanitary standards, this appears somewhat at odds with the fact that, in the last two decades, local production has been rarely able to satisfy the growing national demand for food of animal origin. In the next coming years, therefore, priority should be given to those complementarity policies necessary for domestic supply to meet national and regional demand, and avoid local (poor) producers be substituted by foreign competitors despite boasting a comparative advantage in livestock production. In Tanzania, for instance, a study about trade in agricultural products shows that transport costs to Dar es Salaam from the most distant and nearest markets exceed by 60 and 25 percent total marketing costs borne by international traders (inclusive of prices and costs of transport, loading and unloading expenses, market fees, storage costs and bribes) (Santorum and Tabaijuka, 1992). Hence, if the policy priority is poverty reduction, countries should first consider

reducing transaction costs to markets for smallholders and setting up regional sanitary and phitosanitary standards so as to efficiently regulate inter-regional trade and improve the nutritional status of local population. It is only in the long run that export markets could be targeted and international sanitary and phytosanitary standards met to avoid local producers be excluded by global trade and, eventually, crowded out by international competitors

7. BALANCING LIVESTOCK POLICIES

In the last twenty years in the case-study countries in Africa, Asia and Latin America livestock production has been unable to keep pace with the growing demand for food of animal origin. Even the poultry sector, which is considered leading the 'livestock revolution', has been performing badly in most countries, with the exception of Ecuador, India, Peru, Thailand and Vietnam. Yet, the broad-based development of the livestock sector could significantly contribute to poverty reduction, particularly in East and West Africa, as a large share of the poor are livestock keepers. The current policy thrusts, however, appear not to take full advantage of the pro-poor opportunities provided by the livestock revolution, despite poverty having been placed at the centre of the development agenda.

GDP growth and poverty reduction are the overreaching aims of all national policy documents, and macroeconomic stability and improved governance are deemed to support these objectives. These are pan-territorial policies undifferentiated by household typologies, and are necessary but not sufficient to take the poor livestock holders out of low-income equilibria. Specific sector policies should address those market imperfections affecting rural areas and preventing the poor livestock keepers from deriving benefits from increased meat/milk demand.

Few countries appear to have designed a comprehensive and consistent pro-poor strategy for the development of the livestock sector, which is overlooked in most policy documents. Ethiopia, Sudan, Mali, Burkina Faso and India have appreciated the relevance of livestock development for poverty reduction, but decoupled livestock production from poverty reduction; Kenya, Uganda, Tanzania, Senegal, Bangladesh, Nepal, Cambodia, Laos, Thailand, Vietnam, Bolivia, Ecuador and Peru have either identified a shopping list of actions for livestock development, or neglected the sub-sector tout-court. Consequently, the designed sector policies are not consistently biased towards the poor livestock holders. They tend to be undifferentiated between livestock species and agro-ecological zones, making it more difficult targeting the very poor, who face specific technological constraints and market imperfections. The issues of vulnerability and access to land and water, which are key constraints for poor livestock holders, are given marginal priority in current policy documents. Much more emphasis is given to policies promoting access to credit, animal health services and, partly, access to markets. These, however, have not an adequate focus on the resource poor: efficient credit institutions do not necessarily serve the poor livestock keepers; privatization of animal health services contributes to increasing the income of the poor rural dwellers only under special circumstances. All policy documents appreciate the relevance of livestock research, but in no case priorities are given to pro-poor research activities; for example, they not even mention issues of technology dissemination and adoption by the poor. Finally, most countries have a focus on livestock export markets in spite of being often net importers of milk and meat products.

The current policy framework appears unbalanced under two perspectives. First, it implicitly focuses on livestock production and productivity, rather than on the poor livestock holders and poverty reduction through livestock development.[20] Second, current policies are biased towards 'kick-starting livestock domestic markets' and 'expanding output markets'. Yet, secure access to basic production inputs (land, water, feed) and reduced vulnerability are key elements for the poor livestock holders

[20] Note that increased livestock production per se does not necessarily benefit poor smallholders because of the fallacy of composition: at the household level higher production tends to make the poor livestock keepers better off; but if all households produce more they will be better off only if the price elasticity of demand is greater than one, which is rarely the case (Delgado and Courbois, 1998; quoted in Delgado et al. 1999). Furthermore, in developing countries the elasticity of food demand is negatively correlated to per capita income; it follows that opportunities from the livestock revolution will be reduced by the advance of the livestock revolution itself.

to efficiently respond to 'kick-starting' and 'expanding' market policies, otherwise they tend to overproduce food for insurance, be slow in technology adoption, and accumulate rather than invest savings.

How to redress the unbalances in livestock policies? The inclusion of livestock in the national policy documents, and in the poverty reduction strategy papers in particular, is widely recognized as the most relevant step to be taken in this direction (e.g. Seré, 2004). While this action seems obvious and may be beneficial, it is not necessarily the most appropriate. The policy reduction strategy papers, in fact, present a number of gaps going beyond the livestock sector. Environmental issues are weakly dealt in the national policy documents; marginally and insignificantly addressed are also issues relating to child-poverty, rural-urban migration, the informal economy, landless labourers, gender, forestry, population growth, urban slums. The list could be endless. Expectations are that national governments will be lobbied by a plethora of supranational agencies, donors and national/international interest groups to include this or that issue in their national development strategy.

Four strategies can facilitate coming out from this impasse and pave a way for livestock holders to escape poverty. First, different donors and international agencies should cooperate with each other. This is not naïve, as the situation replicates that of a non-cooperative game where each player will be better off if cooperates, but has no incentives to cooperate. For instance, if the livestock player expected all other actors not to lobby for having a specific issue addressed by the national policy document, then it would have incentives to push for livestock to be included, alone, in the overall development strategy. Second, efforts should be pursued to increase national ownership/participation of development strategies which, according to many, is severely lacking (e.g. Stewart and Wang, 2003; World Bank, 2004a). This is a current and recurrent theme: 'empowerment', 'participatory process', 'institutional building', 'bottom-up approach' are among the most abused terms in the current socio-economic literature. The challenge, therefore, is not discussing about participatory approach but to make the approach participatory so as to better consider the endogeneity of local institutions while designing development policies and strategies. Third, if the policy priority is poverty reduction, national planning documents should be built around the poor with a minor focus on increased (livestock) production and the ensuing, often intuitive, trickle down effects to the poor. This should imply, as a preliminary step, a deeper and more disaggregated analysis of the poor household, bringing to light what are the roles of livestock in its portfolio of activities and identifying the priority areas of intervention for the livestock sector to effectively contribute to poverty reduction. Fourth, once and if a budget for livestock development had been allocated in the national policy documents, livestock policies would have to be designed within the broader agricultural sector development strategy. This should entail having a dynamic and long-term vision of the sector role in the agricultural and national economy, which goes beyond current meat/milk production, including, for instance, environment protection; it should also avoid livestock policies be exclusively focused on animal health services, taking into account the broader set of market and institutional imperfections trapping the poor livestock keepers into a low-wealth-low-growth vicious circle.

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ANNEX

***Table A 1**. Putting livestock policies in context*

Country	Putting policy in context			Relevant ministry
Ethiopia	Sustainable Development and Poverty Reduction Program, 2002	Agricultural Development Led Industrialization	Livestock Development Masterplan study (ongoing)	Ministry of Agriculture & Rural Development
Kenya	Investment Programme for the Economic Recovery Strategy for Wealth and Employment Creation 2003-2007	Rural Development Strategy	Livestock Development Program	Ministry of Livestock and Fisheries Development
Sudan	Twenty Five Year Comprehensive Development Strategy, 2003-2027	Agricultural Development and Investment Strategy	Livestock Development Plan	Ministry of Animal Resources
Tanzania	Poverty Reduction Strategy Paper, 2000	Agricultural Sector Development Strategy		Ministry of Agriculture and Livestock Development
Uganda	Poverty Erdication Action Plan, March 2000	Plan for Modernization of Agriculture	Livestock Sector Intervention Strategy	Ministry of Agriculture, Animal Industry and Fisheries
East Africa				
Burkina Faso	Poverty reduction strategy paper, 2000	Sustainabe Growth Strategy for Agriculture and a Strategic Operating Plan	Plan d'actions et programme d'investissement du secteur de l'élevage	Ministère des ressources animales
Mali	Poverty reduction strategy paper, 2002	Rural Development Master Plan		Ministère du developpement rural et de l'eau
Senegal	Poverty Reduction Strategy Paper, 2002	Letter for Agricultural Development Policy		Ministère de l'elevage
West Africa				
Bangladesh	A National Strategy for Economic Growth, Poverty Reduction and Social Development, 2003	National Agricultural Policy (NAP), 1999		Ministry of Fishery and Livestock
India	10th Five Year Plan (2002-2007)	National Agricultural Policy, 2000		Ministry of Agriculture
Nepal	The Tenth Plan (Poverty Reduction Strategy Paper), 2002-2007	Agricultural Perspective Plan, 1997		Ministry of Agriculture and Cooperatives
South Asia				
Cambodia	National Poverty Reduction Strategy 2003-2005	Agricultural Development Plan, 2001-2005		Ministry of Agriculture, Forestry and Fishery
Laos	National Growth and Poverty Eradication Strategy, 2004	Vision 2020 on Agricultural Development		Ministry of Agriculture and Forestry
Thailand	9th National Economic and Social Development Plan, 2002.	Agricultural Development Plan		Ministry of Agriculture and Cooperatives
Vietnam	The Comprehensive Poverty Reduction and Growth Strategy, 2003.	Agricultural and Rural Development Plan 2004		Ministry of Agriculture and Rural Development
Southeast Asia				
Bolivia	Poverty Reduction Strategy Paper, March 2001	National Policy for Agricultural and Rural Development		Ministerio de Asuntos Campesinos y Agropecuarios
Ecuador	Programa de Ordenamiento Económico y Desarrollo Humano, 2003			Ministerio de Agricultura y Ganaderia
Peru	Plan Nacional De Superacion de la Pobreza, 2004-2006	Estrategia Nacional de Desarrollo rural		Ministerio de Agricultura
Latin America				

***Table A 2**. Socio-economic indicators for selected countries, 2004*

Country	Demographics			Land area ('000 sqkm)				Economy						Social			
	Human population (million)	*Rural population (%)*	*Rural pop density (km2)*	*Land area ('000 sqkm)*	*Agricultural area (%)*	*of which arable*	*of which pastures*	*GDP (million US$ 1995)*	*GDP per capita (PPP)*	*Agriculture (% of GDP)*	*Agri-employment (% of total)*	*GDP annual growth, 84-93*	*GDP annual growth, 94-03*	*International Poverty rate*	*National Poverty Rate*	*Nat. Rural Poverty Rate*	*Human Develop. Index*
Ethiopia	72,420	84.1	198.6	1,000	30.7	*34.8*	*65.2*	7,887,290,000	622	41.8	79.8	n.a.	4.2	31.3	n.a.	n.a.	0.359
Kenya	32,420	59.4	72.8	569	46.5	*19.5*	*80.5*	10,225,780,000	900	16.6	18.5	3.5	1.9	26.5	42.0	46.4	0.488
Sudan	34,333	60.2	15.4	2,376	56.3	*12.4*	*87.6*	11,644,990,000	1779	39.2	69.5	3.0	5.7	n.a.	n.a.	n.a.	0.505
Tanzania	37,671	63.5	59.6	884	45.4	*12.7*	*87.3*	7,692,649,000	531	43.4	84.2	0.9*	4.4	19.9	n.a.	n.a.	0.407
Uganda	26,699	87.7	190.2	197	62.5	*58.5*	*41.5*	9,264,139,000	1279	33.1	89.6	3.9	6.7	36.7	n.a.	n.a.	0.493
Average	**40,709**	**71.0**	**107.3**	**1,005**	**48.3**	***27.6***	***72.4***	**9,342,969,600**	**1,022**	**34.8**	**68.3**	**2.8**	**4.6**	**28.6**	**n.a.**	**n.a.**	**0.450**
Burkina Faso	13,393	81.8	105.4	274	38	*42.3*	*57.7*	3,577,868,000	1023	31	92.4	3.3	4.4	61.2	n.a.	n.a.	0.302
Mali	13,409	67	25.9	1,220	28.4	*13.5*	*86.5*	3,937,321,000	864	36.3	85.8	2.0	5.6	72.8	n.a.	n.a.	0.326
Senegal	10,339	49.7	63	193	42.3	*30.7*	*69.3*	6,586,644,000	1463	16.9	76.7	1.6	4.8	26.3	n.a.	n.a.	0.437
Average	**12,380**	**66.2**	**64.8**	**562.3**	**36.2**	**28.8**	**71.2**	**4,700,611,000**	**1,117**	**28.1**	**85.0**	**2.3**	**4.9**	**53.4**	**n.a.**	**n.a.**	**0.355**
Bangladesh	149,664	75.4	1249.7	130	69.4	*93.4*	*6.6*	56,621,890,000	1553	21.7	62.1	4.0	5.0	29.1	35.6	39.8	0.509
India	1,081,229	71.5	426.5	2,973	60.9	*93.9*	*6.1*	558,644,300,000	2530	22.7	66.7	5.2	6.2	44.2	35.0	36.7	0.595
Nepal	25,725	84.5	432	143	35.2	*65.5*	*34.5*	6,014,511,000	1233	40.1	78.5	5.3	4.4	37.7	42.0	44	0.504
Average	**418,873**	**77.1**	**702.7**	**1,082.0**	**55.2**	**84.3**	**15.7**	**207,093,567,000**	**1,772**	**28**	**69**	**4.8**	**5.2**	**37**	**37.5**	**40**	**0.536**
Cambodia	14,482	80.7	220.4	177	30.1	*71.7*	*28.3*	5,597,822,000	1904	35.6	70.2	n.a.	6.8	n.a.	36.1	40.1	0.568
Laos	5,787	78.9	242.9	231	8.1	*53.3*	*46.7*	2,771,816,000	1649	50.9	78.1	3.4**	6.2	n.a.	46.1	53	0.534
Thailand	63,465	67.9	213.6	511	39.5	*96*	*4.0*	197,325,800,000	6592	8.8	46.2	8.7	3.6	< 0.2	13.1	15.5	0.768
Viet Nam	82,481	73.8	637.9	325	29.3	*93.3*	*6.7*	35,607,440,000	2165	23.0	69.1	5.6**	7.4	n.a.	50.9	57.2	0.691
Average	**41,554**	**75.3**	**328.7**	**311.0**	**26.8**	**78.6**	**21.4**	**60,325,719,500**	**3,078**	**29.6**	**65.9**	**5.9**	**6.0**	**n.a.**	**36.6**	**41**	**0.640**
Bolivia	8,973	36.2	8.8	1,084	34.1	*8.4*	*91.6*	8,479,420,000	2215	14.6	4.9	2.1	3.3	11.3	n.a.	79.1	0.681
Ecuador	13,192	37.8	61.7	277	29.2	*37*	*63.0*	23,612,060,000	3203	9.1	7.7	2.8	2.3	20.2	35.0	47	0.735
Peru	27,567	25.7	22.6	1,280	24.5	*13.7*	*86.3*	66,178,730,000	4580	7.8	8.8	0.7	4.3	15.5	49.0	64.7	0.752
Average	**16,577**	**33.2**	**31.0**	**880.3**	**29.3**	**19.7**	**80.3**	**32,756,736,667**	**3,333**	**10.5**	**7.1**	**1.9**	**3.3**	**15.7**	**42.0**	**64**	**0.723**
Total average	**106,019**	**64.6**	**246.9**	**768.2**	**39.1**	***47.8***	***52.2***	**62,843,920,753**	**2,064**	**26.2**	**59.1**	**3.5**	**4.8**	**33.7**	**38.7**	**48.4**	**0.5**

* 1989-1993; ** 1985-2003

Source: elaborated from FAOSTAT (2004), UNDP (2004); World Bank (2004b)

***Table A 3**. Livestock and poverty in selected countries, 2004*

Country	Livestock stock		Livestock production		Livestock value added		Livestock trade (net)		Livestock and poverty					
	Livestock units	*Livestock units/100 agr people*	*Meat (Mt)*	*Milk (Mt)*	*% of GDP*	*% of agricultural value added*	*Meat (Mt)*	*Milk equivalent (Mt)*	*Proportion of rural poor holding livestock*	*Potential effectiveness of pro-poor livestock*	*Income-weighted spatial distribution of poor livestock holders**			
											in grassland based systems	*in mixed rainfed systems*	*in irrigated systems*	*in other systems*
Ethiopia	22,316,050	31.6	549,175	1,518,125	14.3	30.0	3,443	-21,206	62.4	high	35.5	*63.2*	*1.0*	*0.3*
Kenya	8,548,300	26.7	455,732	2,853,700	9.2	46.8	-929	1,045	52.8	high	31.1	*68.0*	*0.0*	*0.9*
Sudan	30,726,078	91.4	698,375	5,105,250	21.4	52.0	1,752	-65,043	54.9	high	77.1	*19.4*	*3.1*	*0.5*
Tanzania	10,918,547	29.5	360,540	935,000	13.2	29.4	-849	-221,505	65.8	high	17.2	*81.7*	*0.0*	*1.0*
Uganda	4,527,570	17.5	292,751	700,000	4.7	12.6	189	-3,387	69.4	high	19.8	*79.0*	*0.0*	*1.0*
Average	**15,407,309**	**39.3**	**471,315**	**2,222,415**	**12.6**	**34.2**	**721**	**-62,019**	**61.1**	**high**	**36.1**	**62.3**	**0.8**	**0.7**
Burkina Faso	4,621,720	35.5	141,019	237,250	7.8	22.9	-398	-62,374	66.8	high	34.7	*65.2*	*0.0*	*0.0*
Mali	6,526,620	50.2	259,052	578,280	16.2	39.0	-257	-34,695	66.0	high	62.0	*37.9*	*0.0*	*0.1*
Senegal	3,250,437	32.2	161,993	124,852	5.4	27.9	-14,055	-181,948	59.4	high	43.2	*56.2*	*0.0*	*0.6*
Average	**4,799,592**	**39.3**	**187,355**	**313,461**	**9.8**	**29.9**	**-4,903**	**-93,006**	**64.1**	**high**	**46.6**	**53.1**	**0.0**	**0.2**
Bangladesh	17,781,000	12.1	440,600	2,172,930	3.1	12.0	-1,594	-290,156	41.8	medium	0.4	*60.0*	*39.2*	*0.4*
India	194,115,008	18.2	5,940,764	91,100,000	7.5	30.4	-30,401	370,620	40.3	medium	2.2	*46.1*	*51.4*	*0.2*
Nepal	6,534,100	26.0	256,942	1,289,200	12.0	29.5	-162	30,428	40.2	medium	4.9	*46.9*	*47.7*	*0.6*
Average	**72,810,036**	**18.8**	**2,212,769**	**31,520,710**	**7.5**	**24.0**	**-10,719**	**36,964**	**40.8**	**medium**	**2.5**	**51.0**	**46.1**	**0.4**
Cambodia	3,147,200	22.3	194,570	20,400	7.7	19.5	-137	-26,622	52.6	high	2.5	*90.1*	*6.7*	*0.7*
Laos	2,212,450	39.1	93,700	6,000	7.7	14.5	-55	-19,405	32.9	medium	14.9	*66.2*	*12.7*	*6.1*
Thailand	8,307,680	13.2	2,167,148	620,000	1.9	20.7	631,431	-1,307,143	35.8	medium	0.9	*51.0*	*47.3*	*0.7*
Viet Nam	13,754,391	16.9	2,487,028	157,697	4.5	18.4	1,231	-647,532	33.5	medium	0.4	*36.9*	*62.1*	*0.6*
Average	**6,855,430**	**22.9**	**1,235,612**	**201,024**	**5.5**	**18.3**	**158,118**	**-500,176**	**38.7**	**medium**	**4.7**	**61.1**	**32.2**	**2.0**
Bolivia	7,748,226	88	440,205	281,500	5.4	36.5	-524	-26,859	16.3	low	65.0	*34.3*	*0.0*	*0.6*
Ecuador	6,530,518	50.2	616,931	2,465,310	4.6	43.0	-3,994	-6,800	34.5	medium	24.4	*51.4*	*23.0*	*1.2*
Peru	7,699,000	28.3	939,807	1,246,330	2.8	33.0	-131,185	-14,513	33.5	medium	71.8	*24.0*	*2.3*	*1.9*
Average	**7,325,915**	**55.5**	**665,648**	**1,331,047**	**4.3**	**37.5**	**-45,234**	**-16,057**	**28.1**	**medium**	**53.7**	**36.6**	**8.4**	**1.2**
Total average	**21,439,656**	**35.2**	**954,539**	**7,117,731**	**7.9**	**28.8**	**19,596**	**-126,859**	**46.5**	**medium**	**28.7**	**52.8**	**17.5**	**0.9**

* assuming that livestock contribute to 75% of income in pastoral areas, 15% in rainfed production systems, 20% in irrigated areas and 1.5% in peri-urban zones
Source: elaborated from FAOSTAT (2004), Thornton et al. (2002) and World Bank (2004b)

***Table A 4**. Average, growth rate and variability of beef production*

Country	Average supply (Mt)			Annual growth rate			Coefficient of variation of growth rate		
	1984-2003	*1984-1993*	*1994-2003*	*1984-2003*	*1984-1993*	*1994-2003*	*1984-2003*	*1984-1993*	*1994-2003*
Ethiopia	n.a.	n.a.	277,172	n.a.	n.a.	3.2	n.a.	n.a.	1.4
Kenya	247,257	222,962	271,552	2.2	2.8	2.6	2.2	2.0	2.1
Sudan	251,843	229,637	274,049	1.7	-1.9	5.2	4.6	4.9	3.3
Tanzania	202,982	185,250	220,714	2.0	3.5	1.6	2.5	2.7	2.9
Uganda	86,126	77,668	94,584	2.1	1.7	2.7	6.3	6.6	1.4
Average	**197,052**	**178,879**	**215,225**	**2.0**	**1.5**	**3.1**	**3.9**	**4.0**	**2.2**
Burkina Faso	43,477	35,824	51,130	3.6	3.1	4.8	1.2	1.2	1.2
Mali	78,546	67,251	89,841	3.0	4.3	2.2	1.9	1.7	1.9
Senegal	43,004	39,701	46,308	1.4	1.7	0.0	4.9	4.7	7.3
Average	**55,009**	**47,592**	**62,426**	**2.7**	**3.0**	**2.3**	**2.7**	**2.5**	**3.5**
Bangladesh	150,848	136,746	164,949	1.9	1.3	2.4	1.3	1.3	1.3
India	1,288,374	1,143,136	1,433,613	2.5	4.5	0.9	1.7	1.6	1.5
Nepal	43,868	40,715	47,021	1.2	0.5	0.7	2.0	1.7	1.8
Average	**494,363**	**440,199**	**548,527**	**1.8**	**2.1**	**1.4**	**1.7**	**1.5**	**1.5**
Cambodia	35,870	25,428	46,311	6.3	8.1	5.1	1.2	1.3	1.4
Laos	11,165	6,482	15,849	9.2	11.0	7.0	1.1	1.1	1.2
Thailand	195,251	185,816	204,685	1.1	6.2	-3.9	4.6	4.6	4.6
Viet Nam	78,459	68,344	88,574	2.8	3.6	3.5	1.9	2.1	1.5
Average	**80,186**	**71,518**	**88,855**	**4.8**	**7.2**	**2.9**	**2.2**	**2.3**	**2.2**
Bolivia	139,446	126,059	152,833	1.9	1.3	2.3	1.9	2.1	1.3
Ecuador	135,628	100,623	170,634	5.1	4.2	5.5	1.0	1.0	1.0
Peru	110,310	97,967	122,653	2.7	3.2	4.5	4.3	4.4	2.0
Average	**128,461**	**108,216**	**148,707**	**3.2**	**2.9**	**4.1**	**2.4**	**2.5**	**1.4**
Total average	**191,014**	**169,281**	**212,748**	**2.9**	**3.4**	**2.8**	**2.6**	**2.6**	**2.2**

Source: elaborated from FAOSTAT (2004)

***Table A 5**. Average, growth rate and variability of milk production*

Country	Average supply (Mt)			Annual growth rate			Coefficient of variation of growth rate		
	1984-2003	*1984-1993*	*1994-2003*	*1984-2003*	*1984-1993*	*1994-2003*	*1984-2003*	*1984-1993*	*1994-2003*
Ethiopia	n.a.	n.a.	1,168,937	n.a.	n.a.	7.4	n.a.	n.a.	1.4
Kenya	2,270,287	2,091,471	2,449,103	2.3	4.5	3.9	2.1	2.0	2.3
Sudan	3,881,957	3,066,307	4,697,606	4.2	5.5	2.2	1.4	1.3	1.0
Tanzania	676,812	570,708	782,916	3.4	3.6	4.5	1.0	0.4	1.4
Uganda	461,593	396,830	526,357	3.1	3.8	4.7	2.2	1.4	2.4
Average	**1,822,662**	**1,531,329**	**2,113,995**	**3.3**	**4.3**	**4.5**	**1.7**	**1.3**	**1.7**
Burkina Faso	157,977	114,917	201,037	5.5	4.9	5.7	1.2	1.2	1.2
Mali	421,123	357,188	485,057	3.0	2.2	3.6	1.0	1.9	0.5
Senegal	120,864	114,052	127,675	1.1	3.0	-1.2	3.4	1.1	7.3
Average	**233,321**	**195,386**	**271,256**	**3.2**	**3.3**	**2.7**	**1.9**	**1.4**	**3.0**
Bangladesh	1,805,400	1,508,793	2,102,008	3.2	3.9	1.4	0.9	0.2	1.7
India	63,070,569	50,109,455	76,031,684	4.1	3.7	4.4	0.4	0.4	0.3
Nepal	1,000,196	874,134	1,126,259	2.5	2.2	3.0	0.5	0.7	0.3
Average	**21,958,722**	**17,497,461**	**26,419,983**	**3.3**	**3.3**	**2.9**	**0.6**	**0.4**	**0.7**
Cambodia	17,277	17,034	17,521	0.2	1.3	-1.1	23.6	1.1	12.5
Laos	5,179	4,600	5,757	2.4	4.0	0.9	1.5	0.9	3.6
Thailand	279,176	105,177	453,176	14.2	13.4	11.7	0.8	0.7	0.8
Viet Nam	67,833	57,258	78,408	3.4	2.5	9.3	1.8	1.2	1.5
Average	**92,366**	**46,017**	**138,716**	**5.1**	**5.3**	**5.2**	**6.9**	**1.0**	**4.6**
Bolivia	198,407	148,405	248,409	4.7	3.3	4.0	3.1	0.9	3.2
Ecuador	1,776,151	1,456,433	2,095,869	3.7	4.1	3.3	1.3	0.9	1.7
Peru	927,423	821,469	1,033,378	2.2	-0.3	4.3	1.3	8.7	0.3
Average	**967,327**	**808,769**	**1,125,885**	**3.5**	**2.4**	**3.9**	**1.9**	**3.5**	**1.7**
Total average	**5,014,880**	**4,015,792**	**6,013,967**	**3.7**	**3.7**	**3.8**	**2.6**	**1.5**	**2.4**

Source: elaborated from FAOSTAT (2004)

***Table A 6**. Average, growth rate and variability of poultry production*

Country	Average supply (Mt)			Annual growth rate			Coefficient of variation of growth rate		
	1984-2003	*1984-1993*	*1994-2003*	*1984-2003*	*1984-1993*	*1994-2003*	*1984-2003*	*1984-1993*	*1994-2003*
Ethiopia	n.a.	n.a.	40,641	n.a.	n.a.	4.3	n.a.	n.a.	2.5
Kenya	47,406	43,016	51,797	1.9	2.3	1.1	3.4	4.1	2.9
Sudan	24,520	21,122	27,918	2.7	2.4	2.7	0.6	0.4	0.7
Tanzania	31,782	24,096	39,469	7.3	11.2	6.4	1.0	0.7	1.5
Uganda	35,304	28,842	41,767	3.8	3.5	5.1	1.3	1.3	1.3
Average	**34,753**	**29,269**	**40,238**	**3.9**	**4.8**	**3.9**	**1.6**	**1.6**	**1.8**
Burkina Faso	20,516	16,656	24,377	4.2	6.0	3.9	0.8	0.7	0.6
Mali	25,325	22,529	28,122	2.4	3.1	3.2	1.7	1.3	2.1
Senegal	43,464	27,603	59,325	7.8	12.5	-0.4	1.7	0.9	23.8
Average	**29,769**	**22,263**	**37,274**	**4.8**	**7.2**	**2.2**	**1.4**	**1.0**	**8.8**
Bangladesh	92,890	73,893	111,888	4.0	5.6	1.0	1.3	0.6	2.7
India	650,144	325,502	974,786	11.7	14.2	12.6	1.0	0.9	1.0
Nepal	9,689	7,272	12,106	5.6	7.6	5.7	1.4	1.7	0.6
Average	**250,908**	**135,556**	**366,260**	**7.1**	**9.1**	**6.4**	**1.2**	**1.1**	**1.4**
Cambodia	19,884	16,074	23,693	4.1	6.2	3.0	1.9	1.1	4.6
Laos	9,428	6,871	11,985	5.4	4.4	5.3	1.7	2.4	1.3
Thailand	1,159,707	795,226	1,524,187	7.3	11.2	6.4	1.0	0.7	1.5
Viet Nam	233,982	161,160	306,803	6.1	2.0	11.5	1.9	7.5	1.1
Average	**355,750**	**244,833**	**466,667**	**5.7**	**5.9**	**6.5**	**1.6**	**2.9**	**2.1**
Bolivia	80,092	37,188	122,997	12.0	14.7	4.3	1.3	1.1	1.2
Ecuador	110,948	60,909	160,987	9.3	8.4	8.4	1.6	0.9	1.8
Peru	363,287	252,614	473,959	6.3	5.1	7.7	1.5	2.2	0.4
Average	**184,776**	**116,904**	**252,648**	**9.2**	**9.4**	**6.8**	**1.5**	**1.4**	**1.2**
Total average	**171,191**	**109,765**	**232,617**	**6.2**	**7.3**	**5.2**	**1.5**	**1.6**	**3.1**

Source: elaborated from FAOSTAT (2004)

***Table A 7**. Average, growth rate and variability of egg production*

Country	Average supply (Mt)			Annual growth rate			Coefficient of variation of growth rate		
	1984-2003	*1984-1993*	*1994-2003*	*1984-2003*	*1984-1993*	*1994-2003*	*1984-2003*	*1984-1993*	*1994-2003*
Ethiopia	n.a.	n.a.	31,346	n.a.	n.a.	3.7	n.a.	n.a.	2.8
Kenya	47,711	39,363	56,058	3.2	1.4	3.2	2.3	4.5	1.3
Sudan	37,330	32,023	42,636	2.9	3.5	2.6	0.7	0.6	0.8
Tanzania	32,483	29,707	35,259	2.0	5.5	-0.6	2.4	0.9	-7.0
Uganda	16,851	14,540	19,161	2.9	3.3	3.1	1.6	1.5	1.6
Average	**33,593**	**28,908**	**36,892**	**2.7**	**3.4**	**2.4**	**1.8**	**1.9**	**-0.1**
Burkina Faso	16,047	14,825	17,270	1.6	2.7	0.8	1.7	1.3	1.5
Mali	11,476	11,502	11,450	-0.1	1.8	-1.9	14.3	1.9	-3.5
Senegal	23,123	14,030	32,215	8.7	13.6	0.8	1.1	0.6	1.6
Average	**16,882**	**13,452**	**20,312**	**3.4**	**6.0**	**-0.1**	**5.7**	**1.3**	**-0.1**
Bangladesh	112,055	77,639	146,471	5.8	4.5	4.0	1.9	2.4	1.5
India	1,399,109	1,074,499	1,723,720	4.8	5.5	4.4	0.5	0.4	0.5
Nepal	19,100	15,303	22,897	4.1	4.2	4.1	2.7	4.6	0.8
Average	**510,088**	**389,147**	**631,029**	**4.9**	**4.7**	**4.1**	**1.7**	**2.5**	**0.9**
Cambodia	12,744	10,825	14,663	3.1	3.6	2.6	1.0	0.6	1.4
Laos	6,445	4,326	8,564	6.3	0.1	14.3	1.8	3.7	1.1
Thailand	708,363	613,356	803,369	3.0	6.2	0.6	2.4	1.9	2.8
Viet Nam	137,985	96,936	179,034	6.0	5.2	6.0	1.0	1.4	0.7
Average	**216,384**	**181,361**	**251,407**	**4.6**	**3.8**	**5.9**	**1.5**	**1.9**	**1.5**
Bolivia	44,472	38,514	50,429	2.5	10.2	-7.6	4.4	1.3	-7.0
Ecuador	56,822	48,330	65,314	3.2	3.0	3.2	3.1	3.3	2.9
Peru	121,170	97,450	144,890	4.2	4.6	5.2	1.7	2.1	1.0
Average	**74,155**	**61,432**	**86,878**	**3.3**	**6.0**	**0.3**	**3.1**	**2.2**	**-1.0**
Total average	**170,220**	**134,860**	**205,304**	**3.8**	**4.8**	**2.5**	**2.8**	**2.0**	**0.2**

Source: elaborated from FAOSTAT (2004)

***Table A 8**. Average, growth rate and variability of pigmeat production*

Country	Average supply (Mt)			Annual growth rate			Coefficient of variation of growth rate		
	1984-2003	*1984-1993*	*1994-2003*	*1984-2003*	*1984-1993*	*1994-2003*	*1984-2003*	*1984-1993*	*1994-2003*
Ethiopia	n.a.	n.a.	1,348	n.a.	n.a.	2.6	n.a.	n.a.	1.2
Kenya	8,894	5,847	11,941	7.1	7.4	5.5	1.7	0.9	2.2
Sudan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Tanzania	9,985	8,638	11,332	2.7	2.0	3.5	1.0	0.6	1.1
Uganda	55,281	36,252	74,309	10.4	23.9	3.1	1.9	1.3	0.4
Average	**24,720**	**16,912**	**24,732**	**6.7**	**11.1**	**3.7**	**1.5**	**0.9**	**1.2**
Burkina Faso	6,827	5,640	8,014	3.6	3.3	5.1	0.7	0.5	0.7
Mali	1,949	1,844	2,055	1.3	3.1	0.7	4.6	4.1	2.7
Senegal	5,797	5,013	6,582	2.6	-5.6	12.2	3.0	21.6	1.1
Average	**4,858**	**4,166**	**5,550**	**2.5**	**0.3**	**6.0**	**2.8**	**8.7**	**1.5**
Bangladesh	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
India	438,487	394,265	482,710	2.1	4.0	-0.1	1.8	1.0	7.1
Nepal	11,125	8,864	13,386	4.3	5.1	4.7	0.7	0.8	0.5
Average	**224,806**	**201,564**	**248,048**	**3.2**	**4.6**	**2.3**	**1.3**	**0.9**	**3.8**
Cambodia	78,589	60,365	96,814	5.1	7.6	3.2	1.8	1.4	2.1
Laos	25,595	20,812	30,378	3.4	2.4	2.2	2.4	3.3	1.9
Thailand	448,389	356,031	540,748	4.2	4.6	3.3	2.5	2.3	2.7
Viet Nam	1,024,071	701,326	1,346,816	6.4	5.2	7.1	0.6	0.8	0.4
Average	**394,161**	**284,633**	**503,689**	**4.7**	**5.0**	**4.0**	**1.8**	**1.9**	**1.8**
Bolivia	68,155	58,526	77,784	3.1	1.9	6.6	2.2	7.8	1.1
Ecuador	91,470	70,051	112,889	4.6	2.9	6.5	1.5	1.4	1.4
Peru	72,481	66,146	78,816	1.9	3.6	0.5	3.0	1.7	5.6
Average	**77,369**	**64,908**	**89,830**	**3.2**	**2.8**	**4.5**	**2.3**	**3.6**	**2.7**
Total average	**145,183**	**114,437**	**174,370**	**4.1**	**4.7**	**4.1**	**1.9**	**3.2**	**2.2**

Source: elaborated from FAOSTAT (2004)

***Table A 9**. Average, growth rate and variability of sheep and goat meat production*

Country	Average supply (Mt)			Annual growth rate			Variability of growth rate		
	1984-2003	*1984-1993*	*1994-2003*	*1984-2003*	*1984-1993*	*1994-2003*	*1984-2003*	*1984-1993*	*1994-2003*
Ethiopia	n.a.	n.a.	63,170	n.a.	n.a.	1.1	n.a.	n.a.	3.1
Kenya	54,236	51,135	57,338	1.5	4.4	0.0	4.8	2.4	47.0
Sudan	186,549	115,831	257,267	7.2	6.3	2.0	1.6	1.5	1.5
Tanzania	34,612	30,613	38,610	2.2	2.2	1.6	1.0	0.9	1.1
Uganda	25,039	21,639	28,440	2.6	1.5	2.7	2.3	3.8	0.6
Average	**75,109**	**54,804**	**88,965**	**3.4**	**3.6**	**1.5**	**2.4**	**2.1**	**10.7**
Burkina Faso	30,283	25,539	35,027	3.5	5.8	2.4	0.8	0.6	0.6
Mali	49,065	37,535	60,595	4.8	3.6	6.4	1.2	2.4	0.5
Senegal	24,910	20,022	29,798	4.3	7.2	2.2	1.6	1.2	1.1
Average	**34,753**	**27,699**	**41,807**	**4.2**	**5.5**	**3.7**	**1.2**	**1.4**	**0.8**
Bangladesh	95,863	67,684	124,041	6.1	8.0	3.2	1.1	0.8	1.2
India	646,473	597,405	695,542	1.5	2.1	0.8	1.0	1.0	0.9
Nepal	34,443	30,628	38,258	2.3	2.3	2.8	0.7	0.7	0.7
Average	**258,926**	**231,906**	**285,947**	**3.3**	**4.1**	**2.3**	**0.9**	**0.8**	**0.9**
Cambodia	0	0	0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Laos	328	233	422	6.2	6.8	6.5	1.5	1.9	0.9
Thailand	849	926	771	0.0	11.5	-2.9	4.9	1.0	2.6
Viet Nam	3,742	2,828	4,656	4.0	-2.4	4.7	2.1	23.5	1.1
Average	**1,230**	**997**	**1,462**	**3.4**	**5.3**	**2.8**	**2.8**	**8.8**	**1.5**
Bolivia	19,318	17,660	20,975	1.8	1.3	2.3	1.8	3.3	0.6
Ecuador	6,308	4,972	7,644	3.7	0.5	3.1	2.5	5.6	1.6
Peru	25,842	19,492	32,193	3.3	2.5	5.9	-19.5	-10.4	1.8
Average	**17,156**	**14,041**	**20,271**	**2.9**	**1.4**	**3.8**	**-5.1**	**-0.5**	**1.3**
Total average	**77,435**	**65,889**	**87,690**	**3.4**	**4.0**	**2.8**	**0.5**	**2.5**	**3.0**

Source: elaborated from FAOSTAT (2004)