



Asian Livestock Sector Development and Climate Change

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The livestock sector plays a vital role in the economies of many developing countries including those in Asia. In light of increasing incomes leading to changing diets and lifestyles, Asia's demand for livestock-derived food (meat, milk and eggs) has grown at a very high rate over the past decade and high demand growth is expected to continue for at least another two decades (see Table 1).

Table 1. Demand growth for livestock-derived food items in East and Southeast Asia between 2000 and 2030

	Beef		Mutton		Pork		Poultry		Eggs		Milk	
	MMT	%	MMT	%	MMT	%	MMT	%	MMT	%	MMT	%
E. Asia	7.8	112	1.6	56	23.0	52	16.2	111	7.6	33	20.0	95
SE. Asia	1.9	123	0.1	84	5.9	159	7.9	217	3.3	147	7.7	115

MMT = million metric tons; Source: FAO 2006: *World Agriculture: Towards 2030/2050*. Interim Report

Although this is good news for the livestock industry as a whole, livestock sector growth and development (LSG&D) is associated with environmental, health and social risks. The livestock industry has responded to the demand growth for meat, milk and eggs by increasing livestock numbers, a shift towards shorter-cycle species (i.e. pigs and poultry numbers growing faster than cattle, sheep and goats), acceleration of production cycles (to a large extent due to increased use of concentrate feeds), larger farming units characterized by high-input and high-output and their spatial concentration (close to feed sources), stratification and vertical integration of production and the globalization of supply chains.

Livestock's impact on climate change

Through this rapid growth process, the livestock sector is now responsible for nearly half of the global non-CO₂ GHG emissions (methane and nitrous oxide) directly attributable to agriculture. (In 2005, this amounted to 2.4 of the 6.1 billion tons CH₄ and N₂O CO₂ eq from agriculture (US EPA, 2006)). The livestock sector further contributes to climate change (CC) by inducing land use changes and associated land degradation reducing CO₂ absorption capacity of vast tracts of land. Poorly or un-managed LSG&D is associated with increased risks to animal and human health stemming from larger interfaces between livestock and wildlife, increased movement of livestock and livestock products (amounts, distance and speed) including across borders and high livestock densities and rapid turnover favouring the development of rapidly replicating (virulent) contagious disease agents. Furthermore, in most countries, intensive livestock production is accompanied by the routine use of anti-microbial substances, which are losing their effectiveness as resistance genes are selected

for and rapidly spread between microorganisms. The spread of antimicrobial resistance reduces the spectrum of treatments available for human infections and increases human disease burden. Finally, the rapid expansion of industrial livestock production and marketing systems carries the risk of social exclusion for many small-scale livestock producers and processors due to barriers to entry and non-level playing fields thereby blocking one of the possible pathways for rural poverty reduction.

Climate change impact on livestock

Whilst contributing to CC, the livestock sector will itself also be a victim of the effects of CC. CC is expected to express itself in two related but distinct manifestations, which will affect the livestock sector in different ways. The first manifestation of CC is the (gradual) increase in average annual temperatures by some 2 to 3°C, which *per se* will not have major impacts on livestock as these can regulate body temperature and currently kept livestock species can survive in a wide range of climatic conditions (it should also be borne in mind that increases in average temperature are as much the result of increases in average minimum temperature as average maximum temperature). Increases in average temperature will be accompanied by changes in average annual rainfall and in combination will determine water availability and length of growing period and thereby cropping potential.

Agriculture and water resources are particularly vulnerable to the changing climate. Annual crop losses due to drought and flood will be pronounced and the feedstuff market will be more volatile. This will expose livestock producers to higher production risks. Thus, changes in 'averages' will indirectly affect the livestock sector but these second order effects are hard to predict because livestock are mobile and production inputs as well as shelter can be provided. Adaptation to these changes may lead to increases in production costs for shelters and possibly cooling. Rises in average temperatures will lead to an increase in abundance and geographic range of parasites and insect pests, some of which transmit animal diseases. Vector capacity of insects may also be enhanced at higher average temperatures and 'tropical' livestock diseases can therefore be expected to establish themselves in currently temperate zones. These diseases also increase production risks while disease control measures will increase production costs.

The second manifestation of CC is increased within and between year variability of climatic variables and the increased occurrence of weather extremes (heat waves, storms, etc.). The consequences of this will be a growing number of 'natural' disasters which undermine peoples livelihoods and, as people and animals may be displaced, and / or sanitary systems may break down, the direct impacts of natural disasters are likely to be aggravated by communicable diseases of people and of animals (livestock and pets). The rising likelihood of calamities will change the 'economics' of insurance and raise the dividends of disaster risk preparedness.

Livestock sector development

Social, health and environmental issues associated with the expected strong livestock sector growth and development in East and Southeast Asia overlap and are interlinked through positive and negative feedback loops. All three issues merit serious concern and climate change is one (but not the only one) of the ‘lenses’ that can be used to leverage investment into the sector. Investment to address any of the identified issues will always impinge on the others, either positively or negatively and trade-offs are therefore inevitable but these may be counterbalanced by synergies.

Asia’s livestock sector development over the coming decades is likely to be shaped more strongly by economic incentives than by climatic variables, particularly in the case of pigs and poultry. Possible climate ‘smart’ interventions related to the livestock sector are to: (i) curb demand for GHG intensive food items, (ii) promote rangeland carbon sequestration, (iii) reduce GHG emissions from livestock production, and (iv) enhance resilience of livestock systems. Curbing demand for livestock derived food is clearly a mitigation activity while enhancing resilience of livestock systems is primarily an adaptation measure. Interventions (ii) and (iii) combine mitigation and adaptation characteristics. The following is a tabular listing of possible interventions under each of the above areas.

(i) Curb demand for GHG intensive food items	
<i>Interventions</i>	<i>Positive side-effects</i>
<ul style="list-style-type: none"> • Internalize cost of negative environmental externalities in food prices (vouchers / subsidies for needy groups) • Consumer awareness raising campaigns • Nutrition and health education at school age 	<ul style="list-style-type: none"> • Reduced incidence of non-communicable diseases associated with unbalanced diets • Savings in public health expenditures

(ii) Promote rangeland rehabilitation and carbon sequestration (with priority on degraded rangelands)	
<i>Interventions</i>	<i>Positive side-effects</i>
<ul style="list-style-type: none"> • Develop markets for rangeland produce (e.g. eco-labelling) • Promote (temporary) destocking by capitalizing the extensive livestock production sector through additional incomes from voluntary carbon markets • Reduce overgrazing by (i) improved monitoring and forecasting of pasture availability, (ii) promoting flexibility of rangeland management • Payment for environmental services • Create an enabling environment for community participation in natural resources management 	<ul style="list-style-type: none"> • Enhanced pastoral livelihoods and food security • Reduced sand storms • Improved water retention and availability • Maintained / enhanced biodiversity and increased recreational value • Empowered communities

(iii) Reduce GHG emissions from livestock production

<i>Interventions</i>	<i>Positive side-effects</i>
<ul style="list-style-type: none"> • Promote dry and phase out wet manure management systems • Promote use of biogas from animal waste • Improve animal feeding and sanitary regimes to increase production per unit feed and reduce waste per unit feed • Manipulation of rumen biology to reduce production of methane and enhance feed conversion • Promote policies and consumer behaviour in favour of white meat as compared to red meat 	<ul style="list-style-type: none"> • Reduced water use • Reduced public health risks associated with animal waste (enteric pathogens) • Reduced pollution (nitrates) • Reduced fossil fuel use

(iv) Enhance resilience of livestock systems

<i>Interventions</i>	<i>Positive side-effects</i>
<ul style="list-style-type: none"> • Conserve and improve local / adapted livestock breeds • Promote livelihood diversification • Develop insurance systems and markets • Implement surveillance and early warning systems • Promote 'One Health' approaches to jointly address human, animal, and environmental health • Enhance DRR and DRM at household, community and national levels 	<ul style="list-style-type: none"> • Strengthened rural livelihoods and food security • Reduced emergency response and rehabilitation costs • Reduced costs associated with climate-sensitive health impacts

Reducing GHG emissions from livestock production should primarily target large-scale, industrial livestock production as many of the interventions are associated with economies of scale while interventions to enhance resilience of livestock systems should focus on small-scale livestock keepers.

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