

The Future of Agriculture - Scenarios, Concepts, Visions-

Efficiency of Livestock

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Managing the Livestock Revolution

Policy and Technology to Address the Negative Impacts of a Fast-Growing Sector

June 2005



The World Bank
Agriculture and Rural Development

UNESCO - SCOPE - UNEP
Policy Briefs
April 2008 - No. 6

inforesources

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focus

LIVESTOCK in a CHANGING LANDSCAPE

Livestock production is an important resource ensuring global food supply, meeting the increasing demand for protein and supporting human livelihoods and well-being. Both extensive and intensive livestock production systems require attention and intervention to promote fewer negative and more positive impacts on social, economic, and environmental aspects, all within a global context.



livestock's long shadow

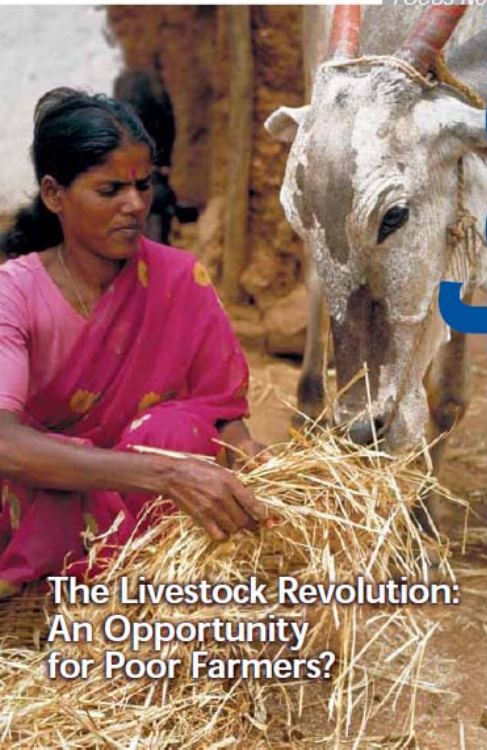
environmental issues and options



Livestock
in the balance



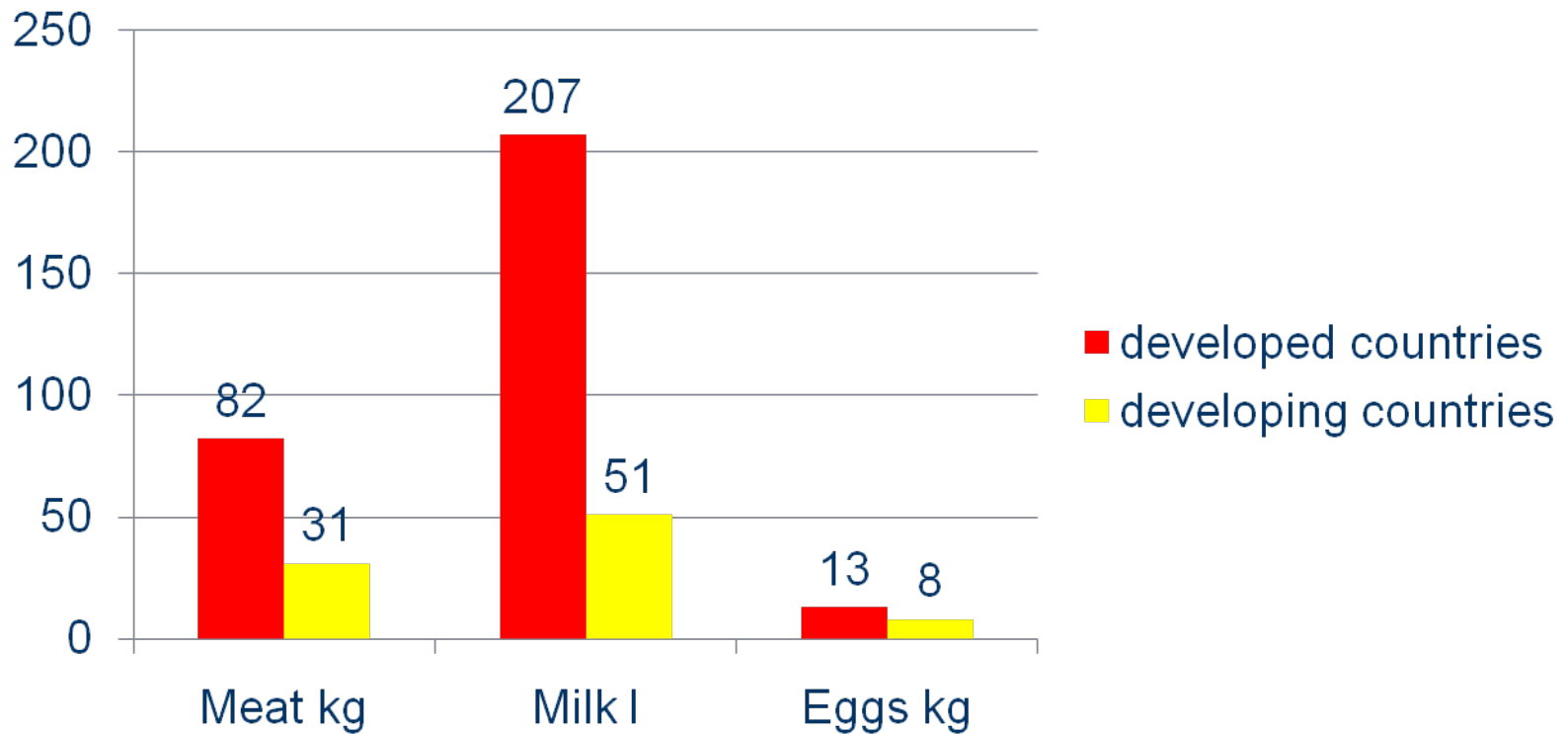
The Livestock Revolution:
An Opportunity
for Poor Farmers?



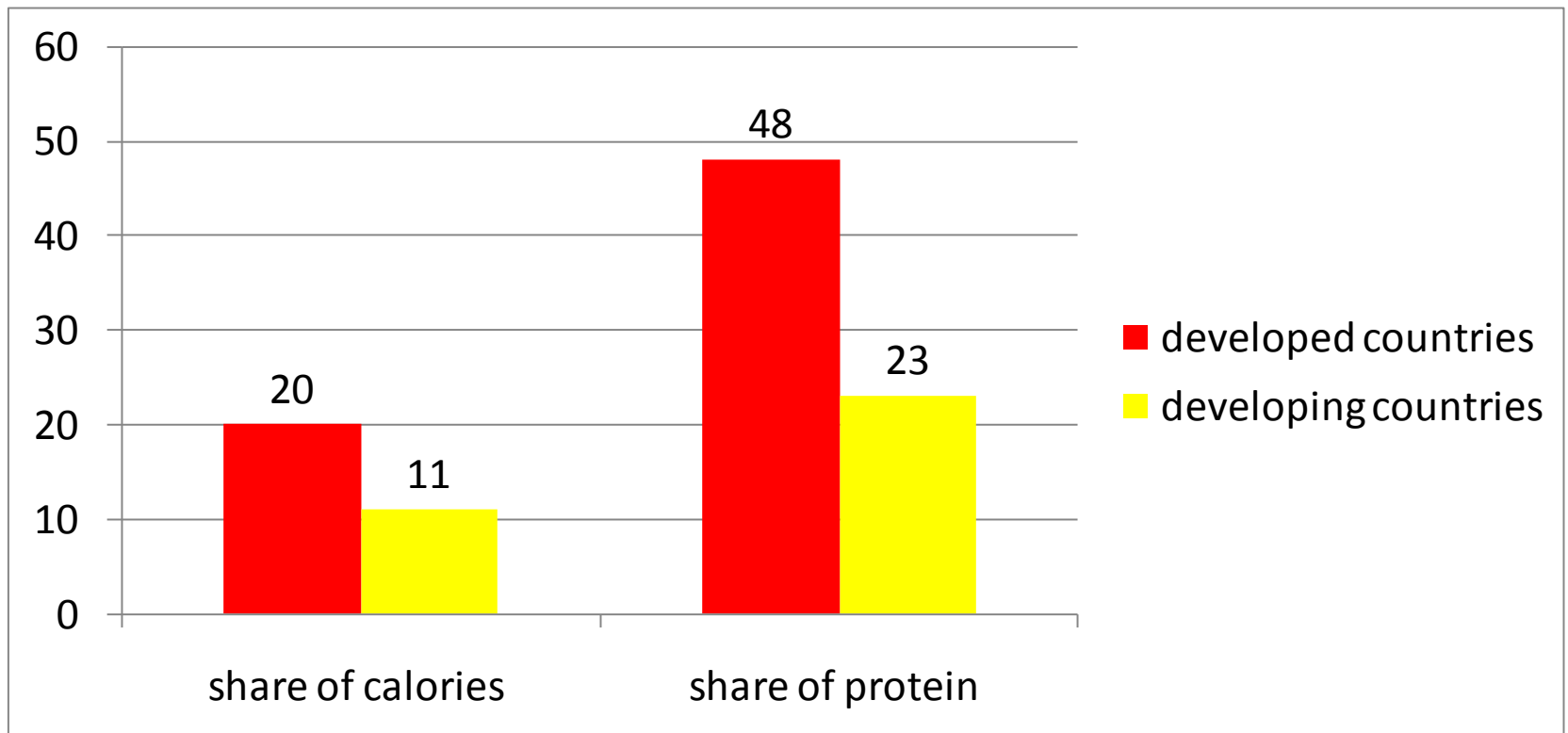
Global snap-shot

- Livestock products provide one-third of humanity's protein intake
- Livestock production
 - accounts for 40 % of agricultural GDP
 - creates livelihood for one billion of the world's poor
 - employs 1,3 billion people
- Livestock growth and changes in the livestock sector increasingly contribute to a range of social, environmental and health problems
 - water quality, polluted watershed, animal and human health risks, overgrazing, erosion, desertification, air quality, nitrogen and ammonia emissions, greenhouse gas emissions, loss of biodiversity, social inequities, value of real estate, habitat loss

Per-capita consumption of livestock products (FAO, 2005)



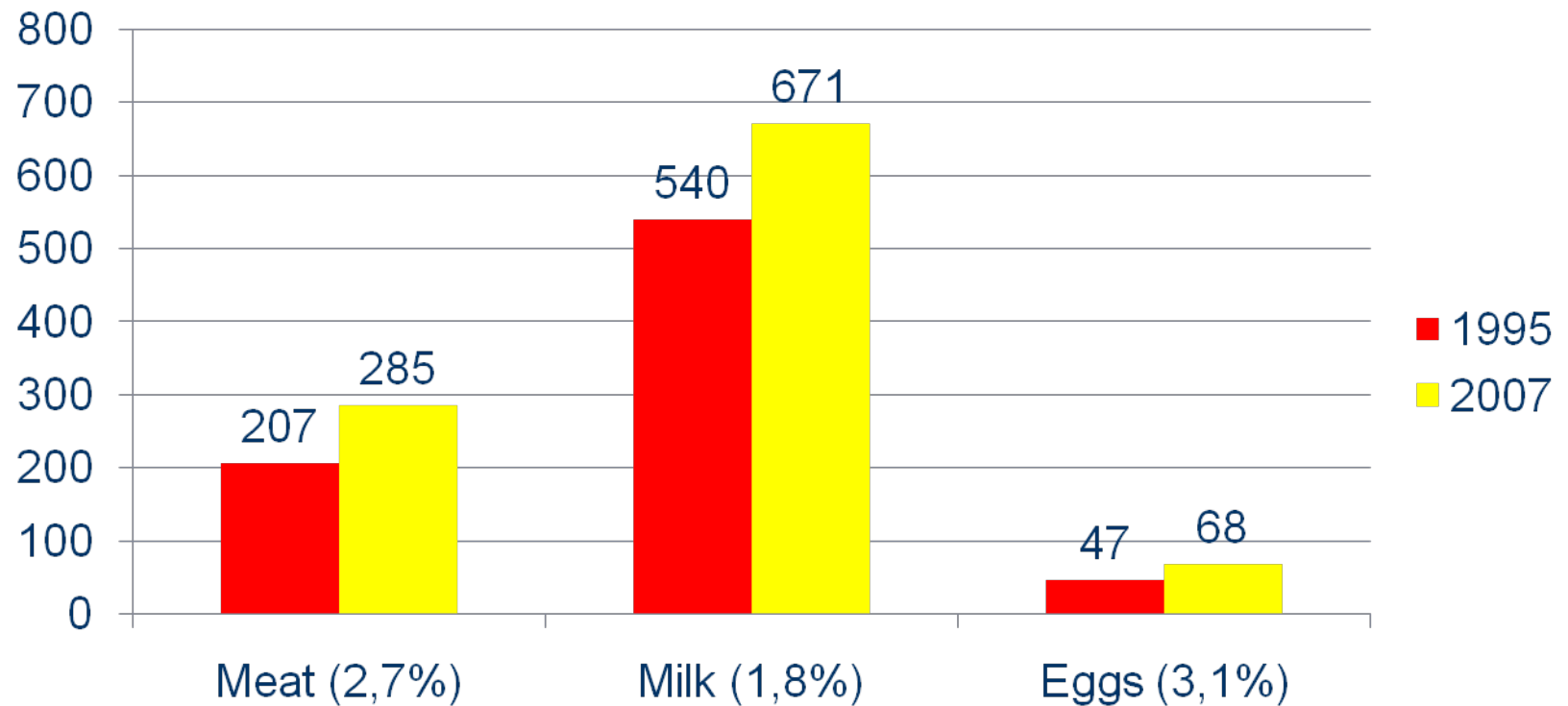
Share of total calories and total protein from livestock products (FAO, 2005)



Trends in the consumption of livestock products

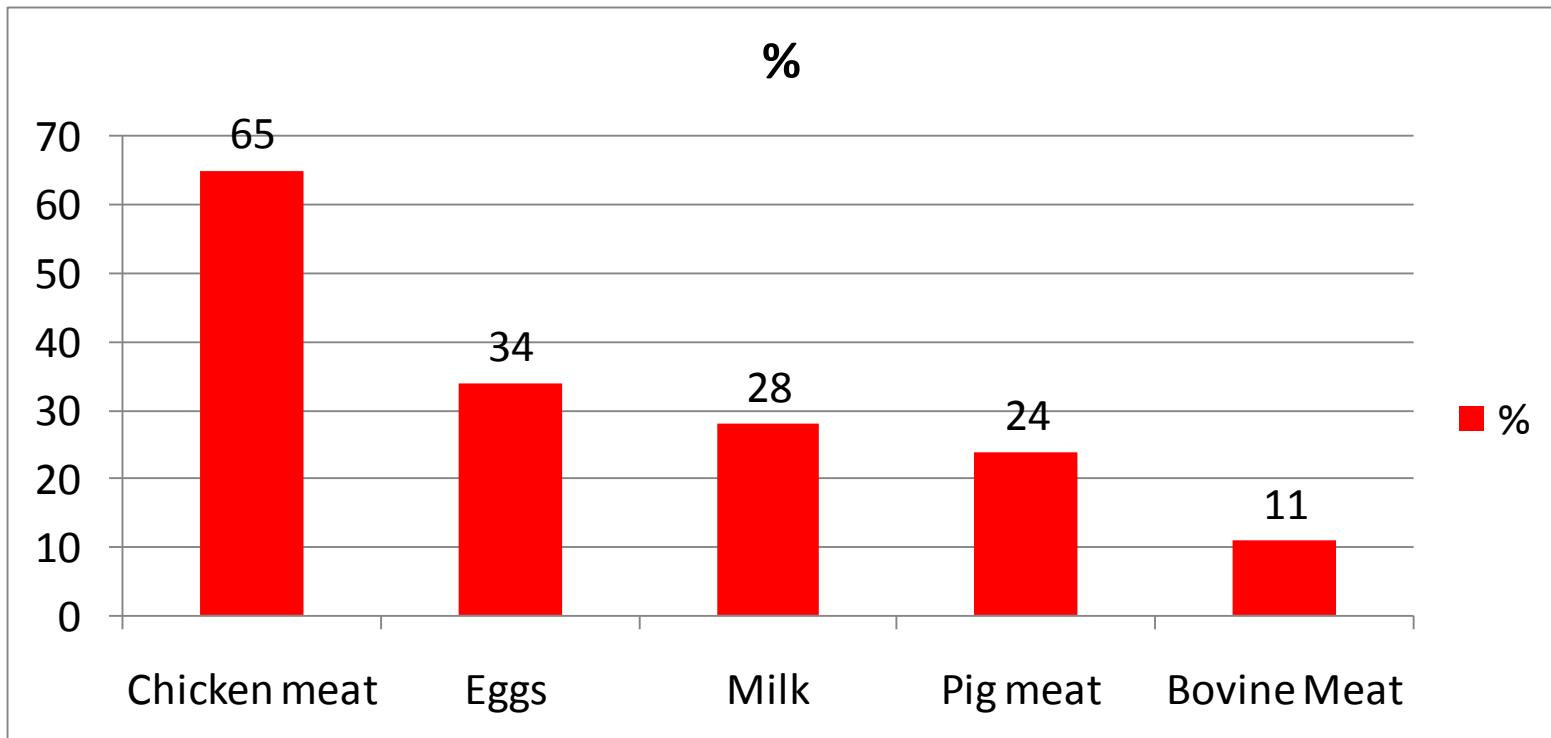
- If people can afford it, they will first satisfy their calorie and protein requirements and then increase the share of animal calories and protein
- In developed countries the share of calories from livestock remains on a high level (slight decrease for calories, slight increase for protein)
- China and other emerging countries show a strong per-head increase of calories and protein from livestock products
- Other developing countries show little or no per-head increase of protein from livestock products but require more livestock products due to a strong increase of human population

World production of livestock products



Annual growth

Trend for animal species (1995 – 2007)



Outlook on world livestock production

- By 2050 the World will need about 70% more food and even more food of animal origin
- Major questions:
 - How to supply this growing demand?
 - How to develop and handle different production systems?
 - How to improve the efficiency of livestock production?
 - How to minimise negative impacts on social, economic and environmental aspects?

Definition of efficiency of livestock

- Productivity
 - head of animal (for ex. kg milk per cow)
 - feed efficiency (kg feed per kg live weight gain, kg meat)
- Profitability / cost effectiveness
 - Key criterion for the entrepreneur or the investor
- Resource efficiency
 - Land, water, energy (utilisation per animal, per kg milk or meat)
 - Environment (green house gas emissions per animal, per kg meat or milk)

Major categories of livestock production systems

- Livestock species
 - Domesticated animals raised for food (cattle, sheep, goats, swine, poultry)
- Farm Size
 - Subsistence small holder
 - Commercial large scale livestock farming
- Degree of intensification
 - **Intensive livestock** production systems are associated with:
Concentration of animals into large units, generally focusing on a single species and relying on commercial inputs and trade
 - **Extensive livestock** production systems refer to:
Raising of animals under conditions that use predominantly non-commercial inputs to the system, in which more than 90 % of dry matter fed comes from rangelands, pastures, annual forages and purchased feed

Assessment of livestock efficiency in different livestock production systems

- Complex undertaking which requires a detailed analysis taking into account all aspects of efficiency
- Huge range in productivity of production systems
 - Milk yield per cow (600 kg to 8.000 kg)
 - Feed ratio pigs (5 to 2,5 kg feed per kg live weight gain)
 - Feed ratio poultry (4 to 2 kg feed per kg live weight gain)
- Significant progress and global approximation (catching-up) of productivity of commercial livestock production systems (poultry, swine, Holstein cattle)
- Large differences in productivity remain in particular for milk and beef production

Livestock Efficiency: Example China's catching up in poultry and pig production

- Pig meat increased from 33 Mio t (1995) to 44 Mio t in (2007); poultry meat increased from 6 Mio t (1995) to 11 Mio t (2007)
- Application of landless commercial production systems (turnkey solutions)
 - Improved genetics
 - Modern housing systems
 - Better feed supply/import from Latin America
 - Improved skills of farmers and management systems
- However, local concentration of poultry and pig farms with negative environmental impacts

Livestock Efficiency: Example Development in India's dairying from 1990 to 2008

	Status 1990	Change in quantity	%
Milk Production	51,2 Mio t	+54,7 Mio t	+104
number of buffaloes/cattle	283 Mio	-10 Mio	-3,6
number of cows (buffaloes/cattle)	56,3 Mio	+20,3 Mio	+36,1
Milk yield buffaloes	1.121 kg	+477 kg	+42,4
Milk yield cattle	732 kg	+414 kg	+56,4

Quelle: FAOSTAT, Indian State Department of Animal Husbandry

Livestock Efficiency: Example India's dairying

- from 1995 to 2008 India has had the largest quantitative expansion of milk production in any country and is now the leading milk producer in the world
- increased and better livestock services, input supply and market access to the predominantly smallholder milk producers were the keys for this development
- substantial increase of productivity per buffalo/cow; however productivity is still on a modest level (1.590 kg for buffaloes, 1.145 kg for cattle)
- Future: from 2008 to 2021 milk production will increase from 105 to 180 Mio t; improvement of milk productivity remains major tool to achieve this ...

Livestock efficiency: a look into the future I

- Straight forward conclusions and prejudices do fail, for ex.
 - Intensive (large scale) = negative
 - Extensive (small scale) = environmental-friendly
- Due to limited land and feed resources the expansion of livestock numbers seems to be feasible only for a few countries in the world (for ex Brazil)
- Increasing trade with feed and livestock products will raise the competition between different production systems and regions
- The improvement of livestock productivity remains the major tool to meet the increasing demand for livestock products

Livestock efficiency: a look into the future II

- Technical progress/improvements are further needed on:
 - forage varieties and feed conservation
 - animal health to prevent illness and mortality
 - animal genetics adapted to specific livestock production systems
 - product quality
 - waste management
- Improved productivity provides the floor for fewer negative impacts on environmental aspects, but this has to be analysed for each production system in its regional context

Recommendations for international co-operation

- Strengthening the role and impact of international organizations for livestock efficiency and the participation of emerging and developing countries
 - FAO, OIE, ICAR; expansion of regional and technical standards and codes for productivity, resource efficiency, product quality, animal health, animal welfare
- Strengthening the capability of national livestock authorities on sector governance, regulatory enforcement, sector development and provision of public goods to promote fewer negative and more positive impact
 - animal disease control, animal identification and registration, sustainability of natural resources use, quality and safety of food of animal origin

Starting points for technical assistance for the improvement of the efficiency of livestock

- small holder:
 - integrated system with organized input supplies, market access, training and extension, veterinary and livestock services as part of the value chain, stepwise improvement of productivity (facilitation of the livestock ladder)
- large-scale:
 - master plan and regulatory framework for commercial investments, minimising social, environmental and economical disadvantages

