Livestock production in developing countries: globally significant and locally relevant

John McDermott
Deputy Director General
Livestock in Developing Countries

Globally Significant
1. Global trends and drivers
2. Environmental implications
3. Livestock issues - developing vs developed

Locally Relevant
1. Important systems for the poor
2. Future issues and choices
Livestock in Developing Countries

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Annual growth in per capita consumption of livestock products
Revised demand for livestock products to 2050

<table>
<thead>
<tr>
<th>Year</th>
<th>Annual per capita consumption</th>
<th>Total consumption</th>
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<tbody>
<tr>
<td></td>
<td>Meat (kg)</td>
<td>Milk (kg)</td>
</tr>
<tr>
<td></td>
<td></td>
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</tr>
<tr>
<td>Developing</td>
<td>2002</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>2050</td>
<td>44</td>
</tr>
<tr>
<td>Developed</td>
<td>2002</td>
<td>78</td>
</tr>
<tr>
<td></td>
<td>2050</td>
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</tbody>
</table>

Rosegrant et al 2009
Population Growth in Developing and Industrialized Countries: 1750 - 2050
The Livestock Revolution:
A strong increase in demand for meat and milk as income grows.

Livestock to 2020: The Next Food Revolution, a joint IFPRI, FAO, ILRI study.
As people get richer they consume more animal products

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<tr>
<td>Cereals</td>
<td>132</td>
<td>145</td>
<td>159</td>
<td>170</td>
<td>161</td>
<td>156</td>
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<tr>
<td>Roots and tubers</td>
<td>18</td>
<td>19</td>
<td>17</td>
<td>14</td>
<td>15</td>
<td>15</td>
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<tr>
<td>Starchy roots</td>
<td>70</td>
<td>73</td>
<td>63</td>
<td>53</td>
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<tr>
<td>Meat</td>
<td>10</td>
<td>11</td>
<td>14</td>
<td>19</td>
<td>27</td>
<td>29</td>
</tr>
<tr>
<td>Milk</td>
<td>28</td>
<td>29</td>
<td>34</td>
<td>38</td>
<td>45</td>
<td>48</td>
</tr>
</tbody>
</table>

Steinfeld et al 2006
Livestock in Developing Countries

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TROPICAL BIOMASS TRADEOFFS

Intensive Agriculture

- soil fertility
  - Conservation agriculture

- grains

- fodder

- livestock
  - Monogastrics
  - Ruminants

- energy

- trees

Natural Habitats

- people

- food

- livestock products

- feed
In intensive systems, feed shortages for ruminants might increase demand for cereals further...this will increase competition for biomass with other sectors.
When it was all holding together…

…it might still do…but it is much more complicated and we need to target appropriate investments thoughtfully.
ETHANOL PRODUCTION

Mostly from grain feedstocks
– except for Brazil

BIODIESEL PRODUCTION

Increasing land and water constraints (WDR, 2008)

- Index of cropland per ag population (1961=100)
- Percent (%)
- Cropland per capita of agricultural population
- % of population in absolute water scarcity

Graph showing trends in cropland per capita across different regions (ECA, LAC, MENA, EAP, SA, SSA) from 1961 to 2003. Bar chart showing percentage of population in absolute water scarcity across different regions.
Projected land use changes to 2050 from several studies (Smith et al 2010)

Cropland: +10 to 20%

Rangeland: avg = 10%

Natural habitats: 0 to -20%

Croplands expanding at a faster rate than rangelands

Key driver: Expansion of monogastric production and intensification of ruminant production with grains
Rates of cereal production due to water and other constraints in places

Annual changes in Cereal Production
2000 - 2030

Rates lower than those of population growth
Rates of growth of mixed intensive similar to developed countries

Catching up

AgroPastoral
Mixed Extensive
Mixed Intensive
Other
Developed countries
Rates of production of animal products increase at significantly faster rates….

Increased consumption
Increased incomes

…but increased pressure on resources (land, feeds, etc)

Growing industrialisation….
Livestock and GHG: 10-12 [rather than 18%] of global emissions

Prepared by Bonneau, 2008
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Developing vs developed differences: Production

- No consolidation of small into larger farms (Africa)
- Livelihoods will require high-value products and diversification

*Cultivated land per agricultural person (ha) (FAO)*

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<tr>
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<td>0.51</td>
<td>0.45</td>
<td>0.36</td>
<td>0.25</td>
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<tr>
<td>Kenya</td>
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<td>0.35</td>
<td>0.28</td>
<td>0.23</td>
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<td>Mozambique</td>
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<td>0.37</td>
<td>0.30</td>
<td>0.25</td>
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<tr>
<td>Rwanda</td>
<td>0.22</td>
<td>0.21</td>
<td>0.20</td>
<td>0.16</td>
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<tr>
<td>Zambia</td>
<td>1.37</td>
<td>1.07</td>
<td>0.90</td>
<td>0.78</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>0.73</td>
<td>0.66</td>
<td>0.58</td>
<td>0.53</td>
</tr>
</tbody>
</table>
An example of the changing nature of livestock systems

W. Africa 1966 – pastoral system  →  2004 – crop-livestock system

Courtesy of B. Gerard
Developing vs developed differences: Markets

- Booming Demand – how will the poor participate?
- Nature of demand differs by country type (World Development Report 2008)
  Agriculturally–based / Transforming/ Urbanizing
- Demand differs by income (Table 1.4 LLS, 2006)
  - quantity < USD 5 per day
  - quality critical > 10 USD per day
- Evolution to longer and more complex value chains
- Greatest opportunities in agriculturally-based poor countries is in local and not export markets
The Livestock Revolution: Growth in meat mainly in industrial systems

Growth Rates (%/Y) of Meat Production in Different Production Systems in Developing Countries

Livestock to 2020: The Next Food Revolution, a joint IFPRI, FAO, ILRI study.
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Globally, most people are (and will be) in mixed crop – livestock systems

Mixed systems produce 65% beef, 75% milk and 55% of lamb in the developing World

Mixed systems produce almost 50% of the cereals of the World and the share will increase to over 60% by 2030
Over the past twenty-five years developing countries contributed nearly three-quarters of global consumption gains for both meat and dairy.

.....in dairy  80% of production increase came from smallholders.
Smallholder dairy systems – East Africa and South Asia

Community-Based Hub
- AI/Breeding
- Agro-vet/Animal Health
- Feed
- Chilling Plant
- Market & Financial Services

Regional and National Levels
- Market Information
- Policies
- Regulations
- Advocacy
- Dairy Services

Knowledge Supporting Environment

Improved Traditional Market

Dairy Farmer Business Association
- Farmer Groups

Formal Market
Smallholder dairy systems – East Africa and South Asia

3. Production efficiency

Feeds (important)
  a. Better utilization of dual purpose crops and agricultural by-products
  b. high-yielding grasses (Napier, Bracharia spp.
  c. formulation and supplementation

Breeding (important)
  a. Increase supply of improved animals (potential for strategic application of new technology)
  b. Role for private entrepreneurs
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Can livestock be sustainable?

Livelihood / income

- Intensive and regulated livestock production (Netherlands)
- Poor livestock keepers: low output and intensification
- Unregulated Beef feedlots
- Unregulated commercial pig or broiler (East Asia)
- Overstocked Communal

Environmental impact

- Low
- High
Some key trade-offs

• **Biomass**: food, feed, fuel and conservation agriculture

• **Sustainability** – socio-economic versus environmental and how are these valued (“multi-value” approach)

• Choices about where and how we raise animals
  – Wetter versus drier areas
  – Ruminants versus monogastrics
  – Moving towards moderate intensity systems
Livestock and climate change

- Adaptation and mitigation have to go hand in hand……… to generate win/win solutions, especially for poor countries with low carbon footprints

- Significant adaptation needs as systems change to meet demand for livestock products and/or become more resilient to climate change

- Mitigation options (developing countries):
  - Bridging large production gaps
  - Reduced deforestation: animals from wetter to drier areas
  - Techs – fermentation, many management, …. 
  - Incentives >> rules

Herrero et al 2009
Efficiency of GHG emissions per kg of protein produced

Higher efficiencies in the developed world due to better diets...

...but highest potential for improvement in the developing world by improving diets

Herrero et al. PNAS (forthcoming)
Consumption: the higher the income, the higher the GHG emissions per capita

McDermott et al 2010
What might change in future?

1. Dramatic change in relative prices of grain to meat (ruminants versus monogastrics)

2. Improvements in inputs and arrangements for sustainable intensification of smallholder agriculture to meet demands

3. Better valuation of environmental and/or social (equity) externalities and how to manage these
   • Incentives and rules (poor versus richer countries)
   • Livestock in drier versus wetter areas
Better lives through livestock
Animal agriculture to reduce poverty, hunger and environmental degradation in developing countries

www.ilri.org