The role of livestock in food and nutrition security

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University of Florida Global Nutrition Symposium

‘Nurturing development: Improving human nutrition with animal-source foods’

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Overview

Livestock and global food security

Issues of food security and nutrition

Multiple roles of livestock

Complexities and trade-offs for the future
Livestock and global food security
Animal-source foods are valuable: 5 of 6 highest value global commodities (total value of these 5 = US Int $715 billion)

Cow milk has overtaken rice
Demand for animal-source foods

![Graph showing production of various commodities for LMICs and HICs over time.](image)

**Commodities**
- Eggs HIC
- Eggs LMIC
- Milk/10 HIC
- Milk/10 LMIC
- Pork HIC
- Pork LMIC
- Poultry HIC
- Poultry LMIC

**Production (millions of tonnes)**

- Year: 1975, 2000, 2025, 2050

**Legend**
- LMICs
- HICs
Smallholders still dominate livestock production in many countries

<table>
<thead>
<tr>
<th>Region (definition of ‘smallholder’)</th>
<th>% production by smallholder livestock farms</th>
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<tbody>
<tr>
<td></td>
<td>Beef</td>
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<tr>
<td>East Africa (≤ 6 milking animals)</td>
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<tr>
<td>Bangladesh (&lt; 3ha land)</td>
<td>65</td>
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<tr>
<td>India (&lt; 2ha land)</td>
<td>75</td>
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<tr>
<td>Vietnam (small scale)</td>
<td></td>
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<tr>
<td>Philippines (backyard)</td>
<td>50</td>
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</table>
Livestock: 40% of agricultural GDP and growing

Herrero et al. 2014
Total ODA disbursements to developing countries, USD million
Percentage of ODA disbursements for agriculture and livestock
Issues of food and nutrition security
Nutritional divides among 7 billion people today

- Less than one third well fed and nourished
- 11% of GNP lost annually in Africa and Asia from poor nutrition
- Hungry people
- Stunted children
- Insufficient nutrients
- Overweight/obese
- Balanced diets

Healthcare for obesity economic cost: $2 trillion
Diverse nutritional status demands diverse solutions

**Low income countries**
- **Hungry**: [Bar graph showing percentage]
- **Stunted children**: [Bar graph showing percentage]
- **Obese**: [Bar graph showing percentage]

**Middle income countries**
- **Hungry**: [Bar graph showing percentage]
- **Stunted children**: [Bar graph showing percentage]
- **Obese**: [Bar graph showing percentage]

**High income countries**
- **Hungry**: [Bar graph showing percentage]
- **Stunted children**: [Bar graph showing percentage]
- **Obese**: [Bar graph showing percentage]

- **Reduce energy deficiency**
- **Reduce micro-nutrient deficiency**
- **Reduce excessive net energy and unhealthy diets**
‘.....all people at all times have physical, social and economic access to safe and nutritious food that meets their dietary needs for an active and healthy life.....’
Multiple roles of livestock
Food and nutrition security: Animal-source foods contribute to global food and nutrition

Balanced nutrients

Enough food

Diet diversity
Animal products provide 40% of global daily protein supply (18% of total kcal)
Balanced nutrition: The critical and unique role of animal-source foods

Animal-source foods

- High density of macro- and micro-nutrients per 100 g
- Contain essential nutrients difficult or impossible (e.g. vitamin B12) to find in other foods
- Contain micronutrients in biological forms enabling easier uptake into the body (bioavailability)
- Better digestibility and biological value of proteins, with amino acid profile matching human needs
- Contain lower levels of anti-nutrient factors (i.e. compounds that interfere with absorption of nutrients)

Hidden hunger (missing nutrients)

- E.g.: stunted children in Malawi lacked amino acids that are deficient in plant foods

photo credit: ILRI/Dave Elsworth
Livestock-derived foods enhance the nutrition of mothers & of infants in the first 1,000 days of life

**Milk:** improves children's growth, prevents stunting

**Meat:** improves long-term cognitive ability

**Livestock interventions improve**
- production, incomes, expenditure
- nutrient composition and diets
- nutritional outcomes in children and women

**Diseases associated with livestock-derived foods**
- Disproportionate burden for children under 5
- Pregnant women more vulnerable to foodborne diseases
Evidence?

In Ethiopia

- Cow ownership reduced stunting by 6-13%

In millennium development village clusters

- Households with livestock are more likely to consume animal-source foods
- Linking animal-source food consumption with anthropometric measures is complex and influenced by other variables

Photo credit: ILRI/Apollo Habtamu
Food and nutrition security: Livestock contribute to crop production

- Manure
- Crop production
- Traction
- Income

- Balanced nutrients
- Enough food
- Diet diversity

Incorporates income, traction, and crop production outputs from livestock for balanced nutrients, enough food, and diet diversity.
At least half the cereals in the world can *only* be produced with animals in the farm system.

Developing-country mixed crop-livestock systems, most of them smallholders, supply a large proportion of cereal and livestock products.
Soil fertility: 23% of nitrogen for crop production in crop-livestock systems comes from manure

In Europe as much as 38% of the nitrogen inputs come from manure
Animal traction remains essential for crop production, especially in Africa. 15% farms in southern Africa and 81% in northern Africa depend on traction for ploughing. 7 million oxen are the main source of power for tilling soil in the Ethiopian highlands.
Food and nutrition security:
Livestock provide income to purchase nutritious food

- Balanced nutrients
- Enough food
- Diet diversity

Income
Livestock generate income, some of which is spent on food

**Income—value of meat, milk, eggs**
- Market value of animal-source foods in Africa in 2050 estimated as USD151 billion
- Milk and eggs provide a steady (daily) income stream

**Income—employment**
- 700,000 employed in the dairy sector in Kenya
- Major opportunities for youth

**Income—animals**
- Important to manage ‘lumpy’ expenditures (school and medical fees)
- Insurance against risks
Engel's law (economics):
‘As income rises, the proportion of income spent on food falls, even if absolute expenditure on food rises.’

8 countries spent less than 10% of household income on food: Australia, Austria, Canada, Ireland, Singapore, Switzerland, UK, USA

9 countries spent more than 40% of household income on food: Algeria, Azerbaijan, Cameroon, Guatemala, Kenya, Kazakhstan, Nigeria, Pakistan, Philippines
Annual income spent on food
(% of household consumptive expenditures)

A map of the world based on food costs as a percentage of income compared with incidence of juvenile malnutrition.

The size of the country represents the percentage spent on food. The darker the color, the higher the rate of malnutrition.
Zambian households that received animals (via Heifer):

- Increased their dietary diversity via:
  - Direct consumption (1/3 more for dairy)
  - Increased expenditure on more food groups
- Decreased their poverty (from 78% to 59% below $1.25/day for dairy cow recipients)
- Increased ‘sense of security’ and improvement in welfare

Beyond recipients
- Influence on local food markets (e.g. more affordable dairy)
Complexities and trade-offs for the future
Today’s producers: Tomorrow’s enterprises

750 million smallholder livestock producers are diverse:
• 1/3 will find alternate livelihoods
• 1/3 may or may not remain
• 1/3 will succeed at market-oriented livestock livelihoods

Opportunities to respond to food and nutrition security

Smallholders to smartholders: To thriving enterprises, part of a vibrant, productive and resilient food system . . . with particular opportunities for women and youth

photo credit: ILRI/ Camille Hanotte
Competition for land and grains? Maybe not!

6 billion tonnes dry feed

- Inedible by humans 86%
- Could be eaten by humans 14%

5 billion ha global agricultural area

- Feed production 10%
- Crop agriculture 49%
- Grassland that could be converted for crops 14%
- Pastures/rangelands - not suitable for crops 27%

Latest for 1 kg boneless meat:
- 2.8kg human-edible food for ruminants
- 3.2kg human-edible food for monogastrics
Trade-offs and opportunities in responding to future demand

• Livestock contribute to GHG emissions but are also one of the key ways to reduce future emissions
• Livestock production is intimately linked to the environment
• Transforming markets present new opportunities for safe food

3 interlinked principles:
• Improve resource use efficiency
• Strengthen resilience
• Improve social equity/responsibility outcomes
better lives through livestock

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