Livestock, climate, and environment: Trends, challenges, and alternative pathways

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FAO
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Livestock production: Global trends
Herd sizes by regions

Source: FAOSTAT

Note: Large ruminants include cattle and buffalo, small ruminants sheep and goat
Meat* production by regions

*Note: Meat includes beef, pork, poultry, and sheep & goat meat

Source: FAOSTAT
Summary production trends

Herd sizes
• Regional proportions of animal herds fairly stable over last 25 years
• But: recently higher growth rates for ruminant herds in Sub-Saharan Africa
• Also: Accelerating growth for poultry in South Asia and Near East/North Africa
• High-income countries (including EU) have low to negative growth rates for all herds

Meat markets
• High-income countries largest producer of meat, China and Latin-America/Caribbean expanding
• International trade of meat and meat products expanded but remains low compared to domestic production and food use
• Domestic demand largely met by domestic production
Livestock production: Feed, land, and emissions
14% edible for humans
33% of global grain production

6 Billion tons dry matter

- **Grass & leaves**: 46%
- **Crop residues**: 19%
- **Oil seed cakes**: 5%
- **By products**: 5%
- **Other non-edible**: 3%
- **Other edible**: 1%
- **Fodder crops**: 8%

Fodder crops: grain and legume silage, fodder beets
Crop residues: straws and stover, sugar cane tops, banana stems
By-products: brans, corn gluten meal and feed, molasses, beetroot pulp and spent breweries, distilleries, biofuel grains
Other non-edible: second grade cereals, swill, fishmeal, synthetic amino acids, lime
Other edible: cassava pellets, beans and soy beans, rapeseed and soy oil
### Land-use for livestock production

Global land-use for forage and feed production by regions and species (million ha).

<table>
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<tr>
<th></th>
<th>Grasslands suitable for crops</th>
<th>Grasslands unsuitable for crops</th>
<th>Cereal and legume grains</th>
<th>Cereals silage, fodder beet</th>
<th>Cereals grains</th>
<th>Oil seed and oil seed cakes</th>
<th>Other crops</th>
<th>By-products</th>
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*a* Pulses, cassava and banana  
*b* Corn gluten feed and meal, brans, middling, molasses, sugar beet pulp, and by-products from breweries, distilleries and biofuels  
*e* Struvite, sugar cane tops, banana stems

At global scale:  
- 2505 million ha used for livestock production  
- 1260 million ha on grassland not suitable for crops, ~ 50%

OECD Countries:  
- 286 million ha used for livestock  
- 52 million ha on grassland not suitable for crops, ~ 18%
Total GHG emissions from livestock supply chains

* Includes emissions attributed to edible products and to other goods and services, such as draught power and wool.

Source: GLEAM.
KEY SOURCES OF EMISSIONS
• 33% percent of grain production used for feed (but not all immediately usable for human consumption).

• Half of the area required for livestock production uses grassland that is not usable for crop production.

• 14.5% of global greenhouse gas emissions originate from livestock production:
  • Large ruminants have highest share
  • Feed production and enteric fermentation contribute most
Challenges ahead and alternative pathways
Global population projections

Source: UN World Population Prospects 2015, medium variant
Income per capita projections (Shared Socio-Economic Pathways, SSP)

Note: Regional groups do not include high-income countries.
Source: FAO Global Perspectives Studies, based on IIASA, 2016; Alexandratos and Bruinsma, 2012.
Protein consumption per capita, historical and projections

Source: FAO 2017

Notes:
- Projections start after red vertical line
- All commodity groups expressed in primary equivalents
- Due to different definitions, direct comparison between “Other” and “Cereals” not always possible
Summary challenges

• Largest population growth projected for Sub-Saharan Africa and South Asia

• Projections for income per capita vary substantially across scenarios (here Shared Socio-Economic Pathways), but:
  • Low-income countries do not catch up to high-income countries

• Increased income causes higher demand for food protein per capita, animal products (meat, milk, eggs) gain importance in low- and middle income countries

• If domestic demand continues to be mainly met by domestic production (as in the past), large expansion of animal production in Sub-Saharan Africa to be expected
  • Expansion of ruminant herds and poultry

• Global greenhouse gas emissions from livestock continue to grow
Possible alternative pathways

- Investment in feed production technologies in major producing regions to reduce emissions (46.7% of livestock-related emissions)

- Improved feed efficiency and composition of animal diets to reduce emissions from enteric fermentation (39.1% of livestock-related emissions)

- Reduction of animal products share in high-income countries’ diets

- Global trade integration: Production in regions with comparative advantage, including emission and energy efficiency?
Global Perspectives Studies at FAO: Publications

Corporate reports on key issues
- E.g. report on “The future of food and agriculture: Trends and challenges” (FAO, 2017)

World Agriculture towards 20XX
- Long-term projections of agriculture, food security and natural resource use. Last baseline projection until 2050 (Alexandratos and Bruinsma, 2012)

Upcoming report: The Future of Food and Agriculture: Alternative pathways to 2050 – January 2018

Thank you!

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