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.
The rapid increase of intensive (confined) livestock production and the land and livelihood needs of extensive production (range/field grazing) are crucial challenges.

The livestock sector emerges as a very significant contributing factor to environmental problems at every scale from local to global, including land degradation, climate change and air as a pollution, water shortage, and pollution and loss of biodiversity.

Formulating responses to the wide range of consequences remains a complex task, but there are many promising solutions.

- Livestock products provide one-third of humanity’s protein intake.
- Livestock production, including production of food, fibre, leather, and fuel, is responsible for 14% of global greenhouse gas emissions (GGE).
- Livestock products provide livelihoods for one billion people.
- Growth and changes in the livestock sector increasingly contribute to a range of social, environmental, and health challenges.
- Various scales of industrialized production systems impair air and water quality, de-value real estate, and create health problems.
- Extensive systems impact biodiversity and ecosystems functioning by reduced farming practices that cause habitat loss, species decline, and increased competition and predation.
- Extensive systems are responsible for major global shifts in consumption, marketing, production, and trade.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
- Labor and environmental policies.
- Rising incomes.
- Demographic shifts.
- Technology in food chains.
The rapid increase of intensive (confined) livestock production and the land and livelihood needs of extensive production (range-based grazing) are crucial challenges.

The livestock sector emerges as a very significant contributor to environmental problems at every scale from local to global, including nutrient depletions, climate change and as an end product, water shortage and pollution and loss of biodiversity.

Formulating responses to the wide range of consequences remains a complex task, but there are many promising solutions.

- Livestock products provide one-third of humanity’s protein intakes.
- Livestock production, including production of food, fibre, feed, energy and labor, contributes to 45% of all domestic added value (GDP).
- Livestock production is contributing to more than 3 billion people’s livelihoods.
- Extensive systems impact biodiversity and ecosystems functioning by replicating grazing patterns that cause habitat loss, severe soil degradation and desertification and the transmission of diseases from livestock to wildlife.
- Changes in economies, production rates and systems have led to a substantial shift of livestock production from North to South, with large scale production moving from temperate to tropical and sub-tropical regions.
- The emergence and continued growth of extensive systems response to the rise in demand for animal products and market pressures.
- Meanwhile, extensive systems continue to exist alongside, occupying vast territories and providing livelihoods for a large number of impoverished producers.

**Global Food Supply: The Livestock Challenge in the 21st Century**

The livestock sector emerges as a very significant contributor to environmental problems at every scale from local to global, including nutrient depletions, climate change and as an end product, water shortage and pollution and loss of biodiversity.

**Deliveries of change in the livestock sector**

**Biodiversity loss**

- Deforestation loss in terms of biodiversity and productive capacity of ecosystems is particularly in arid and tropical regions.

**Pollution and depletion of water**

- An increased demand for livestock production and meat will influence water scarcity. Livestock production demands a large share of global water resources due to their high water requirements. They lead to significant environmental impacts on water resources.

**Negative consequences of change**

- Massive loss in biodiversity loss due to changes in land use and crop production systems.
- The demand is increasing. Global meat production tripled from 47 million to 139 million tonnes per year between 1980 and 2002. Although the pace of growth in slowing down, current meat production is expected to double by 2050 to meet growing demand.

**Changes in global biogeochemistry**

- Increase in greenhouse gas emissions. Higher carbon emissions are associated with grazing systems than with industrial livestock production systems.

- Livestock are responsible for 14% of greenhouse gas emissions. It accounts for 9% of anthropogenic carbon dioxide emissions, mainly due to changes in livestock and land use, improved crop production systems and efficient diet production systems.

- Livestock are responsible for 60% of global anthropogenic ammonia and methane. Livestock production systems contribute to a range of problems, including climate change, air pollution, water pollution, biodiversity loss and increased social and health risks.

**Increased social and health risks**

Livestock can transmit diseases to humans and livestock systems. Emissions may be a source of pollution, including: emissions of New Zealand. Photo: © UNESCO/I. Forbes.

- Diseases to humans and livestock systems. Emissions may be a source of pollution, including: emissions of New Zealand. Photo: © UNESCO/I. Forbes.
The rapid increase of intensive (confined) livestock production and the land and livelihood needs of extensive production (range/field grazing) are crucial challenges.

The livestock sector emerges as a very significant contributor to environmental problems at every scale from local to global, including the depletion of resources, climate change and its pollution, water shortage and pollution and loss of biodiversity.

Formulating responses to the wide range of consequences remains a complex task, but there are many promising solutions:

- Livestock products provide one-third of humanity’s protein intake.
- Livestock production, including production of feed, hay, fertilizers, energy and labor, accounts for 38% of global gross domestic product (GDP).
- Creates livelihoods for 1.3 billion people.
- Livestock production can contribute to a range of social, environmental and health problems.
- Various scales of industrialized production systems impair air and water quality, devalue real estate and create health and well-being concerns.
- Extensive systems impact biodiversity and ecosystems functioning by regrouping overgrowing pastures that cause habitat loss, species extinction, deforestation and the transmission of diseases from livestock to wildlife.
- Changes in economies, production rates and systems have led to a substantial shift of livestock production from North to South, with large scale production moving from tropical to arid and sub-tropical regions.
- The emergence and continued growth of extensive systems respond to the rise in demand for animal products and market pressures.
- Meanwhile, extensive systems continue to exist alongside, occupying vast territories and providing livelihoods for a large number of impoverished producers.

Changes in global biogeochemistry

- Increase in nitrogen, ammonia and methane.
- The global nitrogen cycle is being deeply impacted by fertilizer production and intensive grazing systems.

Livestock are responsible for 19% of anthropogenic carbon dioxide emissions, mainly due to expansion of pastures and fields by biodiversity and ecosystem dynamics and functioning. This includes impacts on biogeochemical and hydrological cycles and desertification.

An increased demand for livestock production for meat, milk, eggs and hides will influence water scarcity. Livestock production demands an estimated 18% of the energy used in agriculture, depleting local supplies. Inadequate waste management also raises pollution that impacts water quality.

An estimated 26% of the total land used for livestock production is being degraded by grazing, instigated by policy.

Livestock production is responsible for 30% of greenhouse gas emissions. It accounts for 9% of anthropogenic carbon dioxide emissions, mainly due to expansion of pastures and fields. Livestock emissions have greater potential to warm the atmosphere, as much as 17% of total methane, nitrous oxide and 45% of anthropogenic ozone.

Livestock production systems are critical to global food security. Inadequate waste management and uncontrolled intensification and modification lead to alteration of terrestrial systems, improving vegetation cover, land degradation and depletion of water supplies. An increased demand for livestock products worldwide will influence water scarcity. Livestock production demands an estimated 20% of the total land used for livestock production.

Livestock are responsible for over 60% of global anthropogenic ammonia emissions, which contributes significantly to acid rain and sulfur oxides, contributing to acidification of ecosystems. Most nitrogen added to fields is lost.

Increased social and health risks

Livestock can transmit diseases to humans and other animal populations may be a source of zoonoses. International standards for food safety and animal health are essential to meet standards and to implement procedures to protect human and animal populations. Advanced technologies are not equally available to all countries. Inadequate awareness across these technologies cannot compete on a real basis with biosecurity and livelihoods back.
1. Environmental services, such as carbon sequestration, water provisioning and biodiversity need to be considered in management of grassland-based production systems, particularly in vulnerable areas.

2. Carbon losses caused by deforestation for pasturage can be reduced if intensive systems are used and with appropriate environmental conditions. These measures include locating high-grazing systems on fertile soils in regions of moderate rainfall in the tropics, rather than on highly weathered, low-productive soils in high rainfall areas.

3. Environmentally sustainable intensification of livestock production can be achieved through various measures that include:
- Applying appropriate technology in feeding and waste management;
- Providing efficient gains in resource use for livestock production through genetic improvements;
- Replacement of current sub-optimal production practices with advanced production methods;
- Reducing nitrogen inputs.

4. Livestock production can contribute to poverty reduction and economic growth in those poor countries that are not fully exposed to globalized food markets, in rapidly growing and developed societies, market barriers, and economies of scale will continue to push smallholders out of production; thus alternative livelihoods need to be sought in other ways.

5. Livestock products are scarce in the diets of poor and under-nourished people but they figure prominently in the diet of the wealthy. Both conditions lead to health problems, and steps need to be taken to improve poultry and small ruminants nutritional status. For example, Steinfeld et al., 2006.

Sources


For further information, see www.cirad.fr

Additional information: Livestock in a Changing Landscape: Regional Perspectives


Additional information: Livestock in a Changing Landscape: Regional Perspectives
Recommended courses of action to address the environmental, economic and social consequences of intensification of livestock production

1. Environmental services, such as carbon sequestration, water provision and biodiversity need to be considered in management of grassland-based production systems, particularly in vulnerable areas.

2. Carbon losses caused by deforestation for pastures can be reduced if intensive systems are used and land is managed at appropriate environmental conditions. These measures include locating high- production feed crop systems on fertile soils in regions of moderate rainfall in the tropics, rather than in the currently widespread, low-productive soils in high rainfall areas.

3. Environmentally sustainable intensification of livestock production can be achieved through various measures that include:
   - Applying appropriate technology in feeding and waste management;
   - Providing efficiency gains in resource use for livestock production through price corrections;
   - Replacement of current sub-optimal production with advanced production systems;
   - Reducing nitrogen loads.

4. Livestock production can contribute to poverty reduction and economic growth in those poor countries that are not fully exposed to globalized food markets, in rapidly growing and developed e-commerce, market barriers, and economies of scale will continue to push smallholders out of production; thus alternative livelihoods need to be sought in other economic sectors.

5. Livestock products are scarce in the diets of poor and under-nourished populations but they figure prominently in the diets of populations in the industrialized and developed economies, market barriers and developed economies of scale will continue to push smallholders out of production; thus alternative livelihoods need to be sought in other economic sectors.

6. Livestock can transmit diseases to humans. Vigilance, hygiene, biosecurity and food safety control are required with consumer awareness to address the mounting threat of traditional and emerging diseases.

Livestock production can contribute to poverty reduction and economic growth in those poor countries that are not fully exposed to globalized food markets.