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 biodiversity 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 climate change, 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, transport and energy, accounts for about 40% of global domestic product (GDP).

Globally, over one billion people live on pastures.

Employ 1.5 billion people.

Growth and changes in the livestock sector increasingly contribute to a range of social, environmental and health problems.

Various scales of industrialized production systems generate water, air and soil quality, devalue real estate and create health and well-being concerns for communities.

Extensive systems impact biodiversity and ecosystems functioning by modifying agricultural practices that cause habitat loss, erosion, land degradation, desertification and the transmission of diseases from livestock to wildlife.

Changes in economies, production and societies 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 intensive 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.

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

Drivers of change

- Demographic shifts.
- Changing food demands.
- Urbanization.
- Labor and environmental policies.
- Variable grain prices: decreasing prices over the past four decades. But increasing trend due to changes in land use and crop production shifting from feed to biofuels.
- Fluctuating energy cost and substantial externalities: those by-products of activities that affect the well-being of people or the environment and are not reflected in market prices.
- Development of new communication and transport facilities.

Changes in global biochemistry

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

Livestock production is responsible for 10% of greenhouse gas emissions. It accounts for 9% of anthropogenic carbon dioxide emissions, mainly due to expansion of pastures and cropland; 70% of land degradation is instigated by policy.

Egg production

- Increased social and health risks. Livestock transmission diseases to humans and livestock economic opportunities may be a source of social inequities. International standards for food safety and animal health often restrict trade in live animals and livestock products. Many consumers are not willing or able to meet standards and to implement procedures to protect human and animal populations. Advanced technologies are not equally available to all countries. In addition, livestock activities across these technologies cannot compete on a level basis with biofuels and livestock.

Increased demand for livestock products is driven by population growth and changing dietary preferences. By 2050 to meet rising demand.

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

Recent research has informed concern that livestock activities, particularly in intensive grazing systems, may be a significant source of negative effects on ecosystems, human and livestock health, including photochemical smog, acid deposition, and coastal eutrophication.

The demand is increasing. Global meat production tripled from 47 million to 139 million tons per year between 1960 and 2002. Although the pace of growth in slowing down, current meat production is expected to double by 2050 to meet rising demand.

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Recently, for instance, 40% of global atmospheric ammonia emissions, which contribute significantly to acid rain and loss of agricultural yields, have originated from domestic livestock meats or fed to an animal to be raised to environmental quality.

Other consequences of change

- Biodiversity loss.
- Drought-prone land is used for livestock production and land productivity of most arable land is decreased by 30 to 50%.

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Negative consequences of change

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Negative consequences of change

- Global food production will influence water scarcity.
- Livestock production demands more land for feed crops. It generates emissions of other gases and water use.

Livestock production can lead to unsustainable land degradation.

- Reduced soil quality from excess nitrate, organic matter and erosion; 70% of land degradation is instigated by policy.
- Higher carbon emissions are associated more with grazing systems than with industrial livestock production systems.

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The emergence and continued growth of intensive systems has led to a substantial increase in the transmission of diseases from livestock to wildlife.

Livestock production can lead to unsustainable land degradation.

An increased demand for livestock products will influence water scarcity. Livestock production demand has led to a single source diet shifting local food production. Inadequate water management also causes pollution that impacts water quality.

Livestock production can be a significant contributor to environmental problems at every scale from local to global, including land degradation, climate change and as pollution, water shortage and pollution and loss of biodiversity.

The demand is increasing. Global meat production tripled from 1970 million to 532 million tons 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 rising demand.

While pasturization and reuse of former rangelands, forest clear-cutting, climate change and land degradation, pollution and water shortage are crucial challenges.

The livestock sector emerges as a very significant contributor to environmental problems at every scale from local to global, including land degradation, climate change and as 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.

- Negative consequences of change

Biodiversity loss

Dairy grazing loss is reduced to less of biodiversity and productive capacity of ecosystems, particularly in arid regions.

While pasturization and reuse of former rangelands, forest clear-cutting, climate change and land degradation, pollution and water shortage are crucial challenges.

- Biodiversity loss

Many livestock systems provide environmental services for terrestrial systems, improving vegetation coverage, biodiversity and carbon sequestration. However, land modification and degradation led to alteration in ecosystems dynamics and functioning. This includes changes in hydrological and ecological cycle, emission and de-vegetation.

- Land degradation

- Pollution and depletion of water

- Changes in social and health risks

- Livestock production is responsible for 18% of greenhouse gas emissions. It accounts for 19% of anthropogenic carbon dioxide emissions, mainly due to expansion of pastures and forests and the conversion of forests to agricultural land with greater potential to store the atmosphere, as such an 1% of anthropogenic methane, and 65% of anthropogenic ozone.

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

- Deliverable change in the livestock sector

- Important driving forces

- Global nitrogen cycle is being deeply modified by anthropogenic activities; 70% of land degradation is being degraded by grazing livestock production systems.

- Increase in nitrogen, ammonia, and methane.

-負荷及びさらなる生物多様性の減少

- capacity of ecosystems, particularly is arid regions.

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Formulating responses to the wide range of consequences remains a complex task, but there are many promising solutions.
Growth and changes in the livestock sector increasingly employs and creates livelihoods for billions of people worldwide. Livestock products provide significant contributions to the gross domestic product (GDP) and well-being concerns in local communities. Air and water quality, de-value real estate and create health problems due to transmission of diseases from livestock to wildlife. Habitat loss, erosion, polluted watershed, desertification and loss of biodiversity occur due to overgrazing practices that cause land degradation.

While pasturization and feed farming produce food, intensive climate change and pollution of water is caused by dwindling resources, limited alternatives are available, environment protection is an expensive impact.

An increased demand for livestock production occurs worldwide in response to high food prices and growing population pressures. Livestock production demands include increasing energy costs, per unit of land, pollution and land degradation. Land degradation is estimated to be 26% of the total land area and for livestock production is being degraded by 79% of land degradation in arid and semiarid regions.

Many livestock systems provide environmental services for terrestrial ecosystems, improving vegetation cover, biodiversity and carbon sequestration. However, land modification and degradation lead to alteration of ecosystem dynamics and functioning. This includes changes in biogeochemical and hydrological cycles, emission and destruction.

- Increase in greenhouse gas emissions. Higher methane emissions are associated with grazing systems than with industrial livestock production systems.
- Increase in nitrogen, ammonia, and methane. The global nitrogen cycle is being deeply impacted by fertilizers production and intensive grazing systems.
- Global livestock production is responsible for 30% of greenhouse gas emissions. It accounts for 19% of anthropogenic carbon dioxide emissions, mainly due to expansion of pastures and feedlots in both tropical and sub-tropical regions.
- Livestock are responsible for over 60% of global anthropogenic ammonia and methane.
- Livestock production and total production of meat and milk.
- Global trends in land-use area for livestock production are shown. Source: Steinfeld et al, 2006.

Pollution and depletion of water: Livestock production can lead to undesirable consequences in the environment. Air and water pollution increases and pollute runoff, which impacts water quality and aquatic ecosystems. Livestock systems can also cause pollution that impacts water quality and aquatic ecosystems.

Increased social and health risks: Livestock can transmit diseases to humans and livestock products. International standards for food safety and animal health often restrict trade in live animals and livestock products. Many consumers demand higher standards and to implement procedures to protect human and animal populations. Advanced technologies are not equally available to all producers, in particular smallholders, who cannot access these technologies cannot compete on a level basis with businesses and livelihoods are lost.

Negative consequences of change

- Biodiversity loss
- Soil nutrient loss
- Reduced productivity of crops
- Reduced productivity of livestock
- Reduced productivity of ecosystems
- Reduced productivity of people
- Reduced productivity of livelihoods

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The demand is increasing. Global meat production tripled from 47 million to 139 million tons per year between 1961 and 2002. Although the pace of growth in slowing down, current meat production is expected to double by 2050 to meet rising demand.

Challenges in global biochemistry

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Important drivers of change in the livestock sector

- Global Food Supply: The Livestock Challenge in the 21st Century
- Expanded livestock production
- Fluctuating energy cost and substantial variable grain prices: shifting from feed to biofuels.
- Liberalization of trade and capital.
- Variable grain prices: decreasing prices over time.
- Labor and environmental policies.
- Incentive frameworks, sanitary standards and regulations.
- Technology in food chains.

Land degradation

- Over-grazing has widespread impact.
- Pollution: livestock production has widespread impact.
- Increased social and health risks: disease transmission.

Biodiversity loss

- Soil nutrient loss
- Reduced productivity of crops
- Reduced productivity of livestock
- Reduced productivity of ecosystems
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The Livestock Challenge in the 21st Century

- Increased social and health risks: disease transmission.
- Disease transmission and countermeasures to implement procedures to protect human and animal populations. Advanced technologies are not equally available to all producers, in particular smallholders, who cannot access these technologies cannot compete on a level basis with businesses and livelihoods are lost.

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but they figure non-commercial inputs to the system of raising animals under conditions that use predominantly extensive inputs and trade. Extensive livestock units per square km. Livestock specific causes of biodiversity change in agricultural production systems, water provision and biodiversity. Global livestock impacts on biodiversity of any country, territory, city or territory. Livestock's Long Shadow: Environmental Issues and Options. Food and Agricultural Organization, United Nations. Washington DC.


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 regions.

2. Carbon loss caused by deforestation for pasturlands can be reduced if intensive systems are used under appropriate environmental conditions. These measures include locating high-impact-based crop systems on fertile soils in regions of moderate rainfall in the tropics, rather than very wetland, low-productive soils or 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 methods;
- 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 economies of state will continue to push smallholders out of production; thus alternative livelihoods need to be sought by in other areas.

5. Livestock products are scarce in the diets of poor and under-nourished people but they figure prominently in the socio-cultural habit of the wealthy. Both conditions lead to health problems, and steps need to be taken to improve animal diets towards healthy levels of animal product consumption.

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

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LIVESTOCK POLICY BRIEF No. 6 – March 2008.


Sustainable intensification of livestock production feed crop systems on fertile soils in those poor countries that are not fully exposed to globalized food markets. In rapidly growing economies of state will continue to push smallholders out of production; thus alternative livelihoods need to be sought in other areas.

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2. Carbon losses caused by deforestation for pastures can be reduced if intensive systems are used and if systems are improved. These measures include locating high- productivity pasture systems on fertile soils in regions of moderate rainfall in the tropics, rather than highly weathered, low-nutrient soils or in high rainfall areas.

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