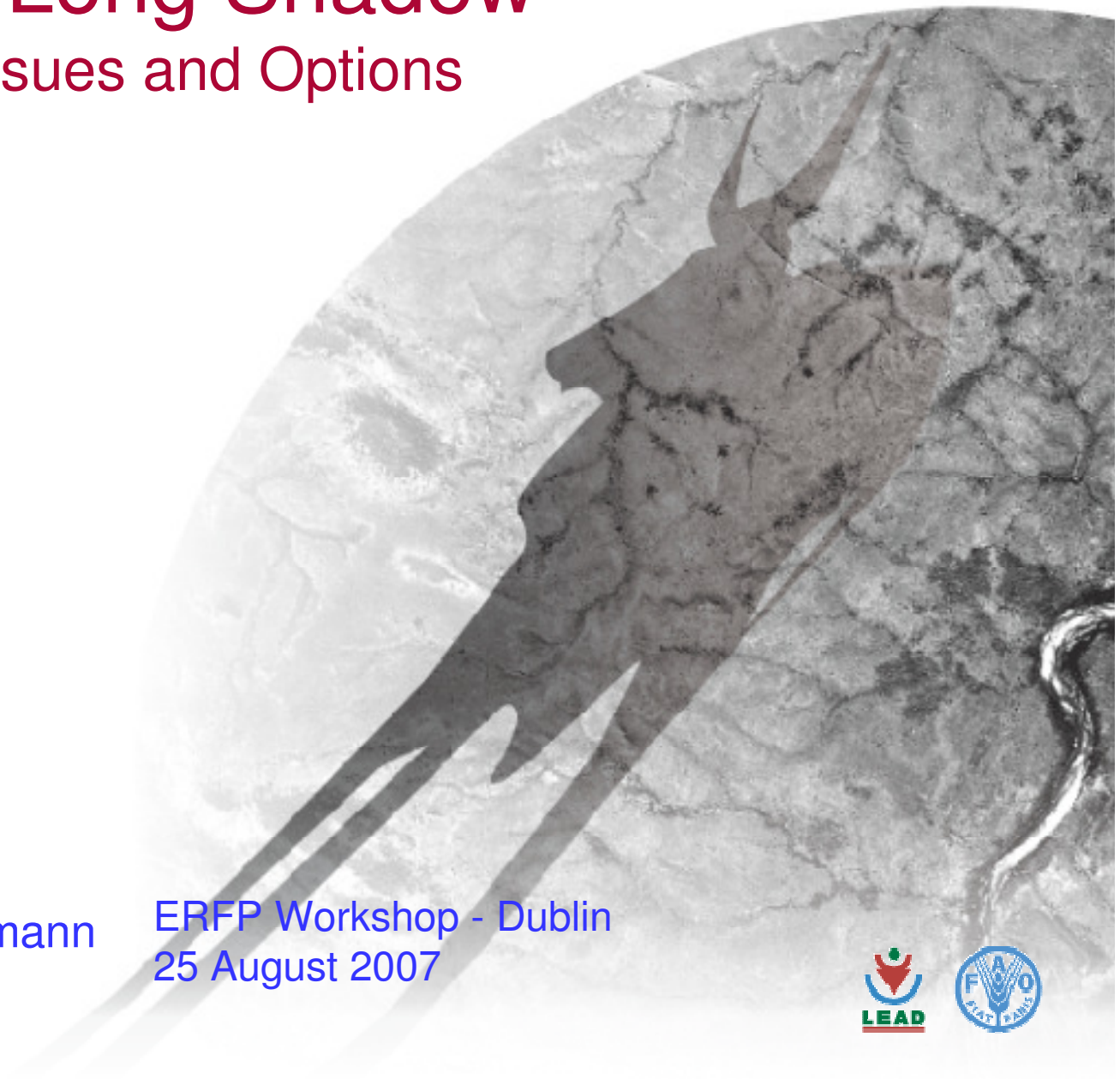
Livestock's Long Shadow

Environmental Issues and Options



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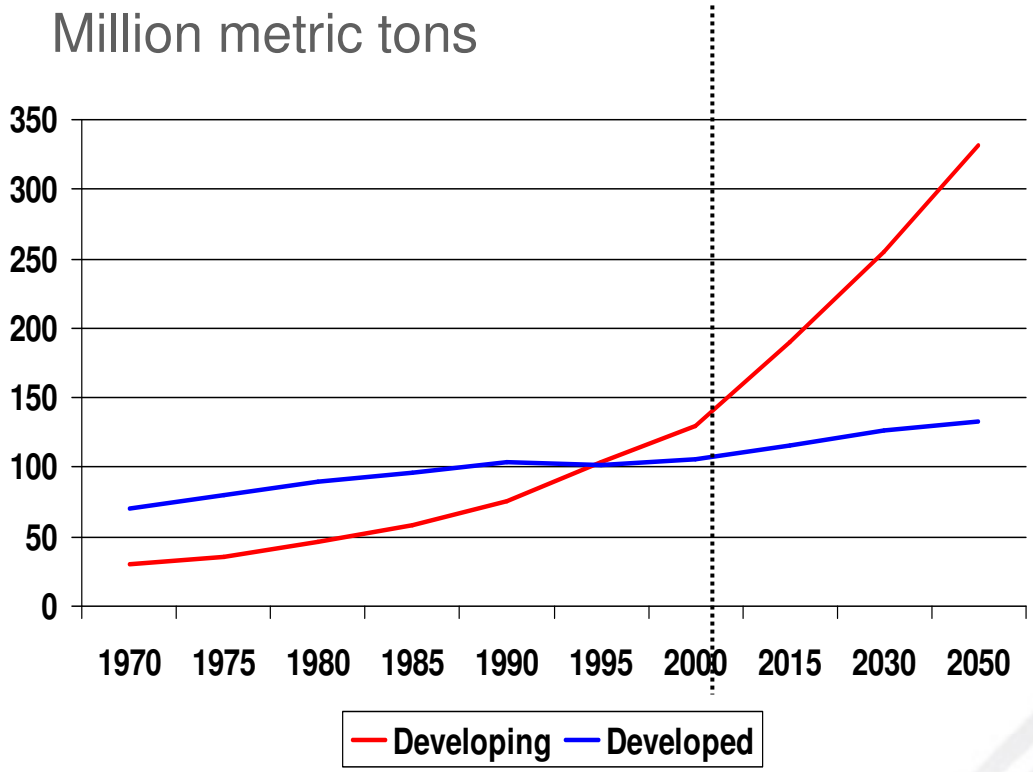
Drivers of the Livestock Sector

- Demand Drivers
  - Population growth: + 50 % by 2050 globally; slowing down in East Asia, still strong elsewhere in developing countries
  - Income growth: strong in E and S Asia, NENA and SS Africa picking up
  - Urbanization: more than 80 % of population growth occurs in cities of developing countries

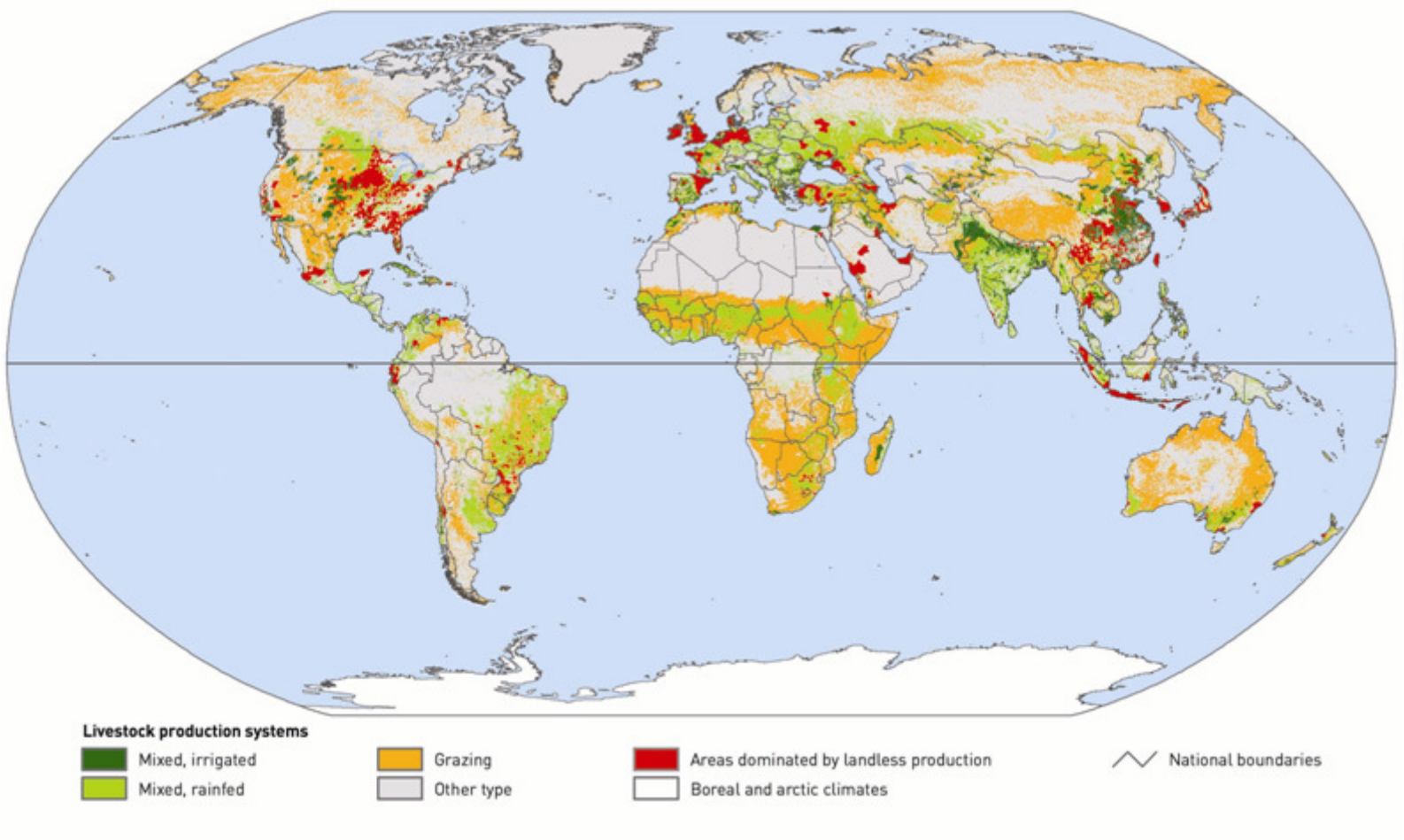
- Supply Drivers
  - Cheap grain: decreasing prices over the past four decades
  - Technological change: genetics, feeding, transport
  - Cheap energy: substantial externalities
  - Policy environment: incentive frameworks, market and credit regulation, sanitary standards, labour and environmental policies

Broad trends: soaring output and underlying structural changes



- Growing intensities
- Increasing scales
- Vertical integration/longer food chains
- Geographic shifts / geographic concentration

Estimated distribution of livestock production systems



Quantification of environmental impacts: approach

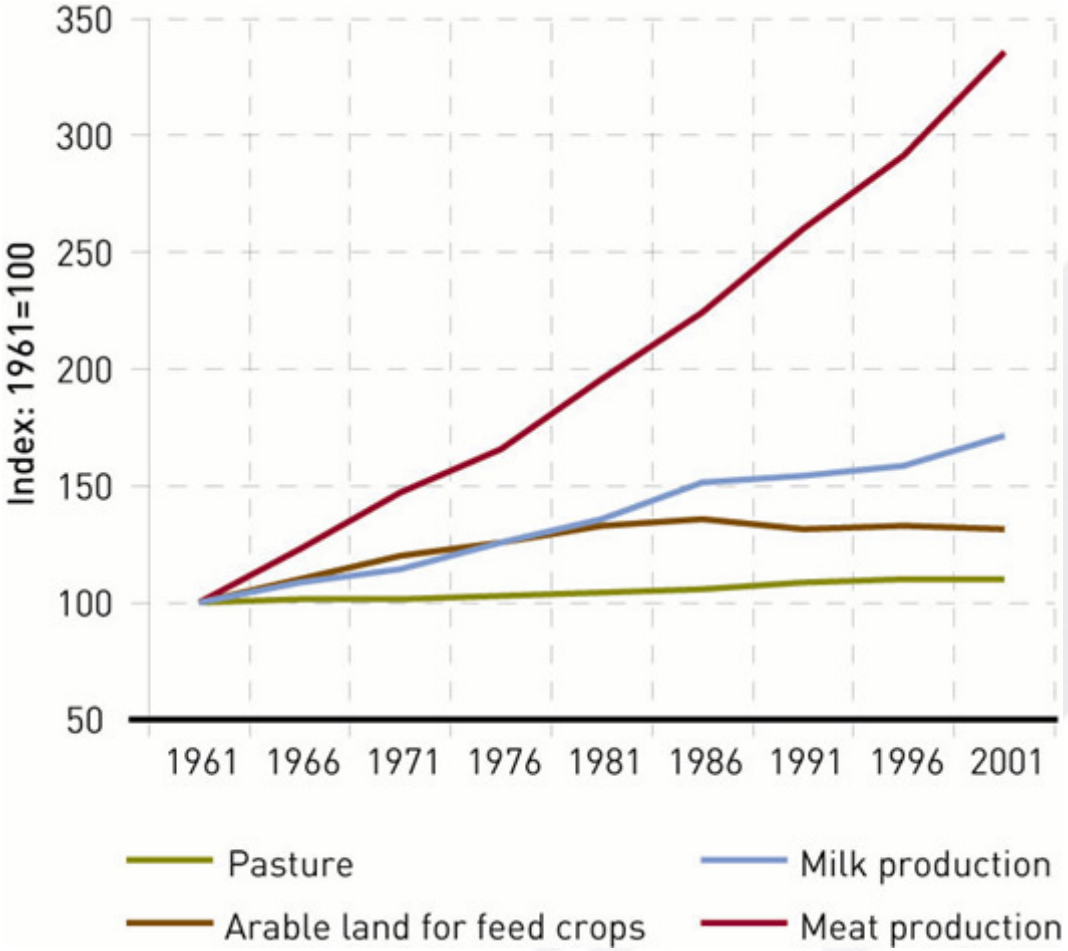
- Global issues:
  - land use
  - climate change
  - water resources
  - biodiversity
- Analysis of impacts using a food chain approach (from feed production to product)
- Identification of technical and policy mitigation options

Review of impacts

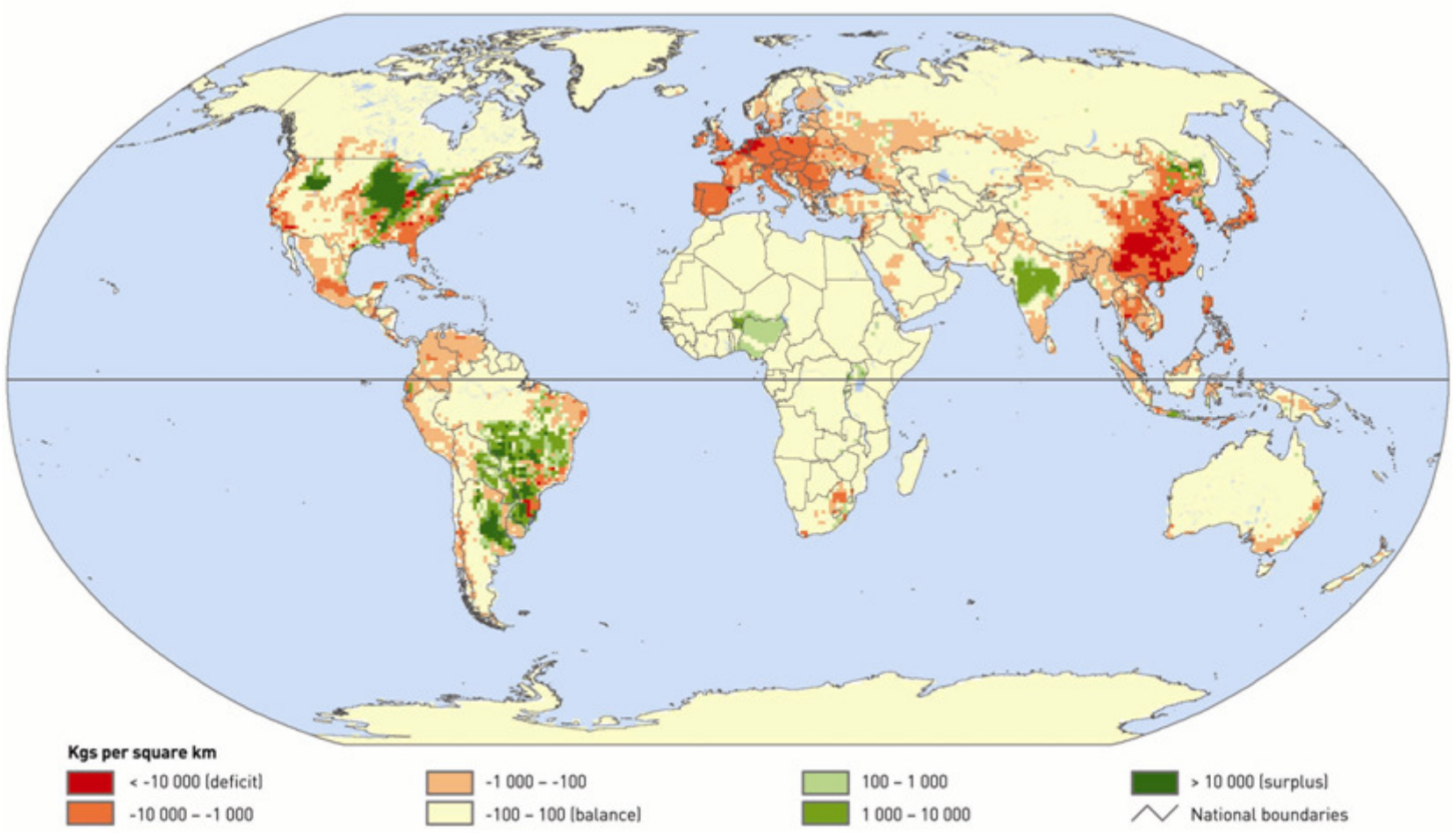
Land use

- Pastures: 3.4 billion hectares (26% of emerged lands)
  - wide range of production intensities
  - marginal land frontier is exhausted
  - 20% of rangeland are estimated to be degraded – UNEP (up to 73% in the drylands)
- 470 million hectares of arable land dedicated to animal feed production (ca. 33% of overall arable land)
- Geographical trends:
  - Intensification
  - geographical concentration
  - Increased reliance on transport

Trends in land-use area for livestock production and total production of meat and milk



Estimated feed surplus/deficit – soymeal (pig and poultry)



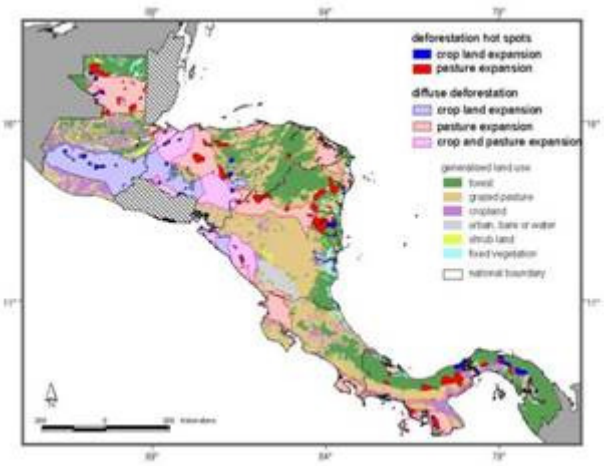
Review of impacts

Climate change

- 18% of anthropogenic GHG emissions are related to livestock (equivalent CO_2)
  - Deforestation: 35% of sector's emissions
  - Manure: 31% of sector's emissions
  - Enteric fermentation : 25% of sector's emissions
  - Feed production: 7% of sector's emissions

- Ammonia emissions

Livestock related land use change:
Deforestation in the Neotropics



~2.4 million ha/year
Forest → Pasture

~0.5 million ha/year
Forest → Feed crops

~2.4 billion tons CO_2

Livestock and Climate Change: Technical Mitigation Options

- Control of Land use change
- Conserve/restore C and N in cultivated soils
- Mitigate C loss from pasture soils
- Reduce enteric fermentation
- Improved manure management

Review of impacts

Water resources

- Livestock sector represents 8% of all entropic water use, 90% of which for feed production.
- Feed production: 15% of evapotranspiration in agriculture (irrigated)
- Overall pollution: hardly quantifiable but substantial at feed production, animal production and processing levels (nutrients, organic matter, antibiotics, pesticides)
- impact on water cycles

Livestock and Water: Technical Mitigation Options

- Improved water use efficiency
  - Irrigation efficiency
  - Water productivity
- Better waste management
  - Production stage: balance feed, phase feeding, supplements
  - Improved manure collection process
  - Manure storage and processing
  - Improved utilization of waste
- Land management
  - Adapted grazing systems, range improvements, critical periods
  - Improving livestock distribution

Review of impacts

(wild) Biodiversity

- Main mechanism habitats degradation/destruction:
  - deforestation
  - pollution
  - desertification
  - intensive agriculture
- Fishmeal production causing over-fishing

→ IUCN identifies livestock as one of the threats to 1699 endangered species (red list)

Livestock and Biodiversity: Technical Mitigation Options

Biodiversity loss often results from environmental degradation
→ Many options previously presented apply

Intensification

- Reduction of pressure on natural land and habitat
- Integrated agriculture: response to excessive chemical use
- Conservation agriculture: restore habitats

Combine local improvements with

→ Ecological infrastructure conservation/restoration at landscape level
→ Adoption of good agricultural practices

Hotspots of environmental impact

	Climate	Water	Biodiversity
Pasture and feedcrop expansion into natural ecosystems	+++	+	+++
Rangeland degradation	+++	++	++
Contamination in intensive production areas	+	+++	++
Intensive feedcrop agriculture	++	++	++

Underlying causes (i)

- Neglect of externalities
  - negative externalities, e.g. water and soil pollution, climate change, biodiversity losses, etc.
  - positive externalities, e.g. carbon sequestration, ecosystem diversity/biodiversity gains
- Inadequate pricing
  - At input level, e.g. land water
  - At output level, e.g. subsidies

Underlying causes (ii)

- Livestock production concentrates
  - The clustering of livestock close to feed outlets, consumption centres leads to nutrient overloads
  - Disruption of nutrient cycling
- Mismanaged grazing
  - lack of stewardship in marginal and remote areas

Principles for policy intervention (i)

- Get prices right: Inefficiencies in resource use, often increasing use and leads to misallocation of resources among competing uses (within and outside agriculture)

- Apply "Polluter pays, provider gets" principles
  - Payment for environmental services could be major tools
    - E.g. to shift to " service-oriented" grazing (making carbon sequestration, water and biodiversity protection a major purpose of extensive systems)
    - Water pricing to include water cleaning costs

Principles for policy intervention (ii)

- Seek livestock/ecosystem balances: Bring livestock in balance with surrounding land.
  - The need for intensification of production (without concentration)
  - Spatial planning of industrial systems
  - Intensification of crop-livestock systems
- Develop institutions for environmental stewardship
- The importance of liability
- The need to educate and inform

The social and health dimensions

Environmental policies should be designed and implemented in the context of social and health objectives:

- 1.3 billion people depend (partially or entirely) on livestock for their livelihoods
- The cultural dimension of livestock
- Livestock provide protein and micro-nutrients to many of the 830 million food insecure people
- Livestock contributes to health problems of the affluent (obesity, cancers, cardio-vascular diseases

Livestock Environment and Development Initiative (LEAD)

An Inter-institutional Initiative