# Importance of livestock production from grasslands for national and local food and nutritional security in developing countries

*Iain A Wight, Polly Ericksen, Andrew Mude, Lance W. Robinson and Jason Sircely*

International Grassland Congress

New Delhi, 20-24 November 2015

ILRI
INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE

CGIAR

# Overview

- The global livestock sector
- Contribution of animal source foods to nutrition and health
- The importance of rangelands in developing countries
- Some challenges in pastoral systems
- Opportunities for pastoral systems

# Economic opportunities in the livestock sector

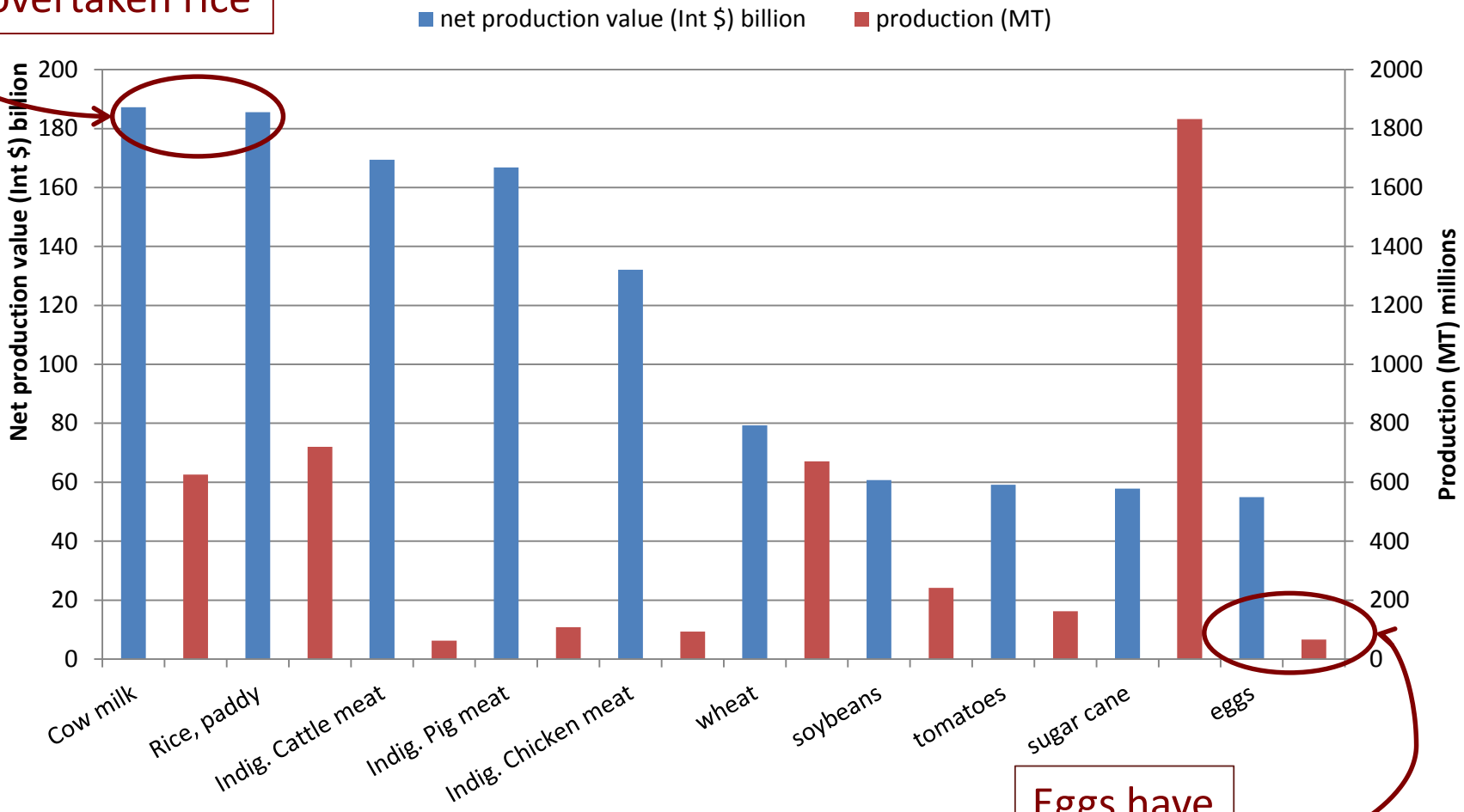
The 4 billion people who live on less than US$10 a day (primarily in developing countries) **represent a food market of about $2.9 trillion per year.** (Hammond *et al.* 2007)

- 37 billion domestic animals
- Asset value $1.4 trillion
- Employs 1.3 billion people

ILRI CGIAR

# 4 of 5 highest value global commodities are livestock

Cow milk has overtaken rice

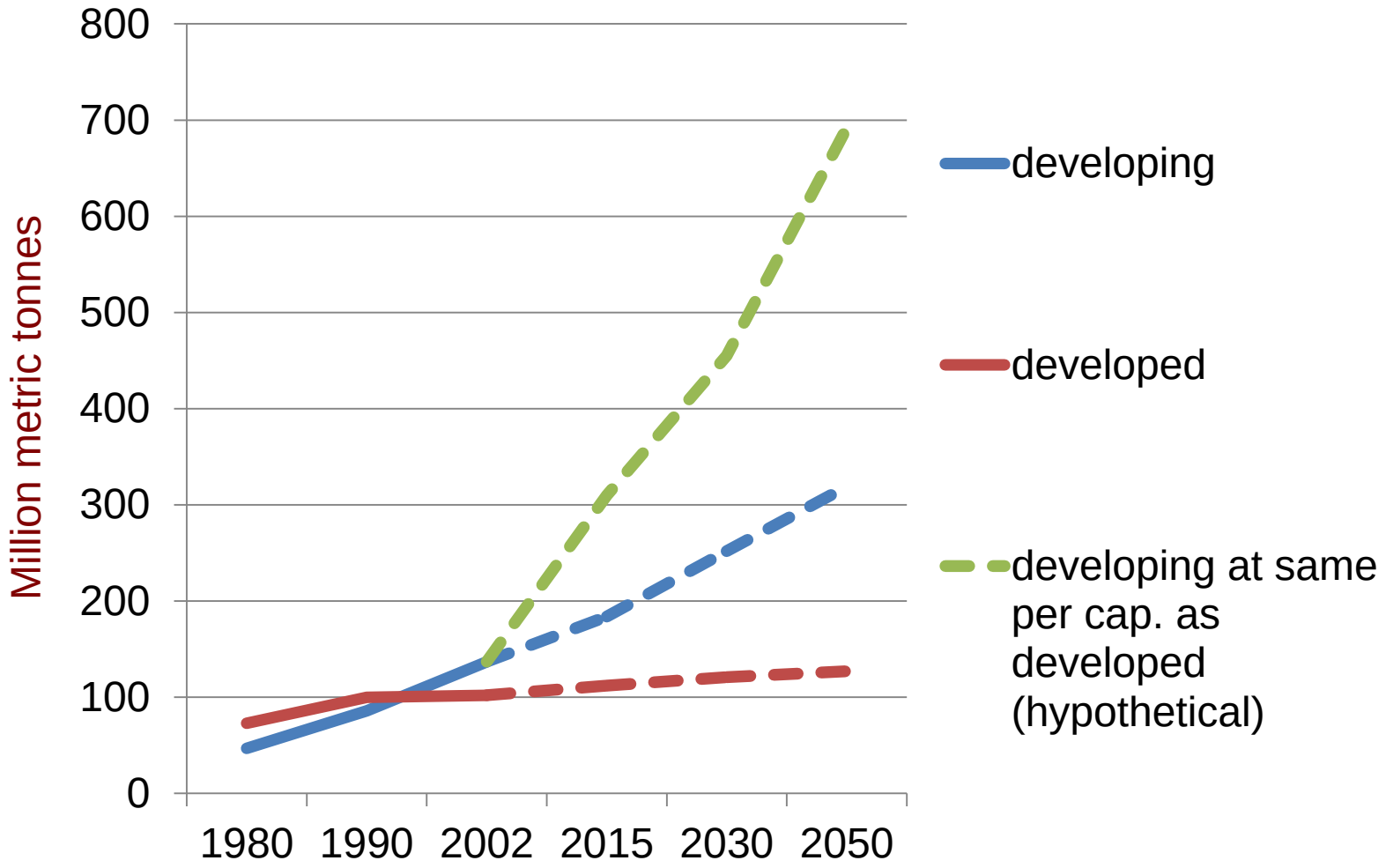



Eggs have displaced maize

*FAOSTAT 2014 (values for 2012)*

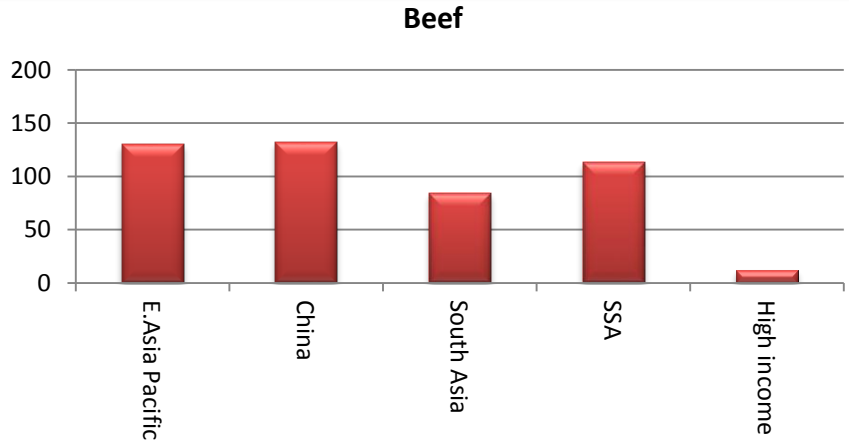
ILRI CGIAR

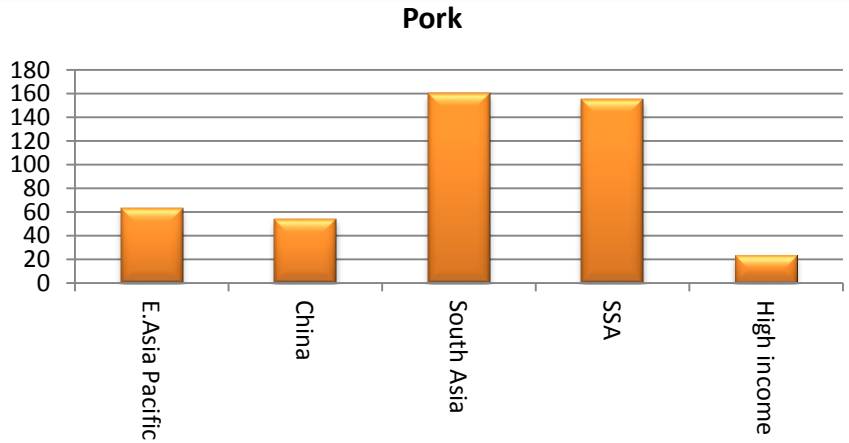
# Gains in meat consumption in developing countries are outpacing those of developed

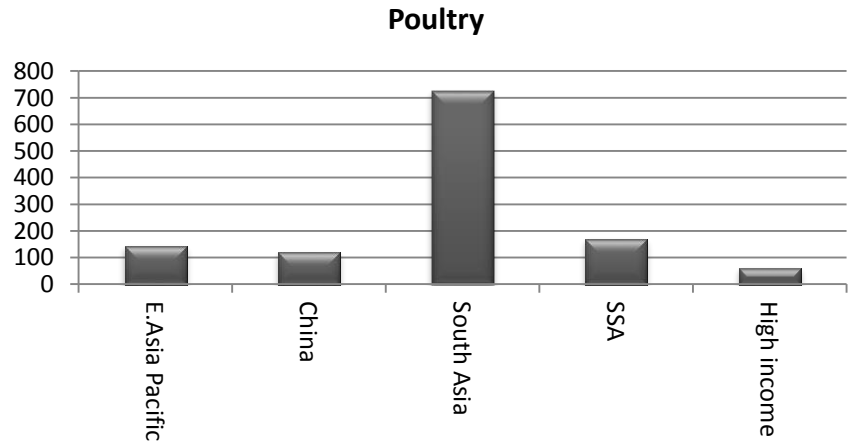


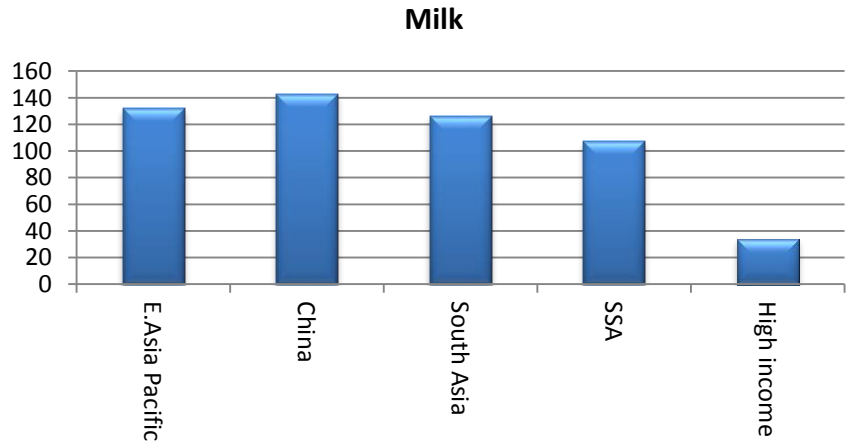

ILRI CGIAR

# % growth in demand for livestock products 2000 - 2030



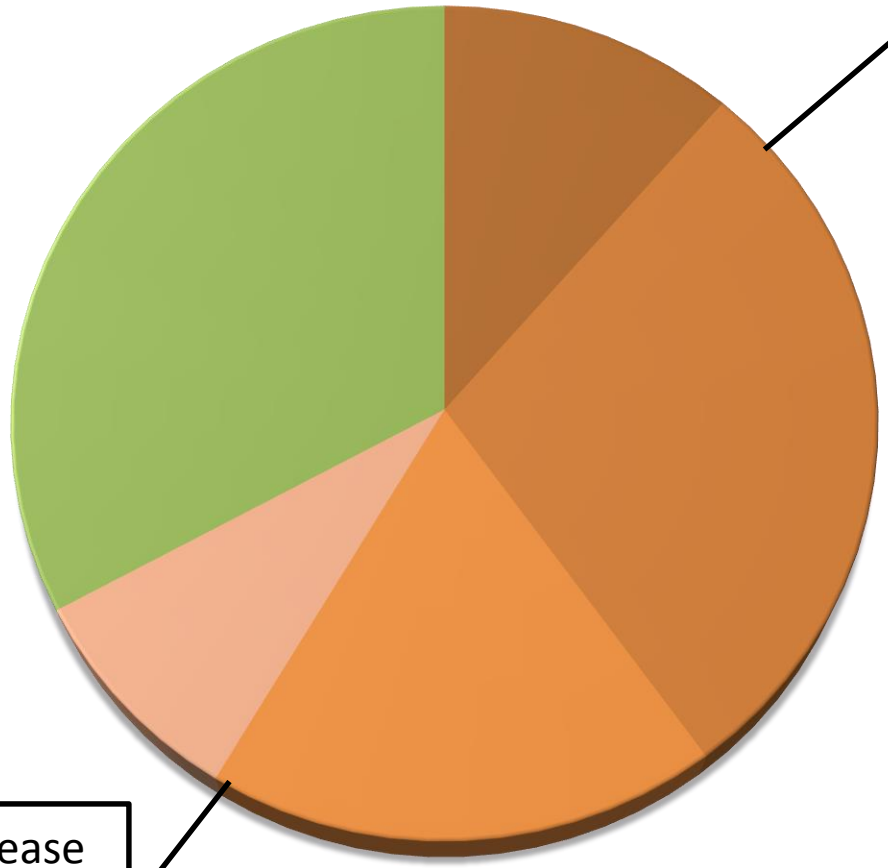




*Based on anticipated change in absolute tonnes of product comparing 2000 and 2030*



FAO, 2011

# Nutritional divides among 7 billion people today



11% of GNP lost annually in Africa and Asia from poor nutrition

**chronic hunger**

**inadequate diets**

**overweight**

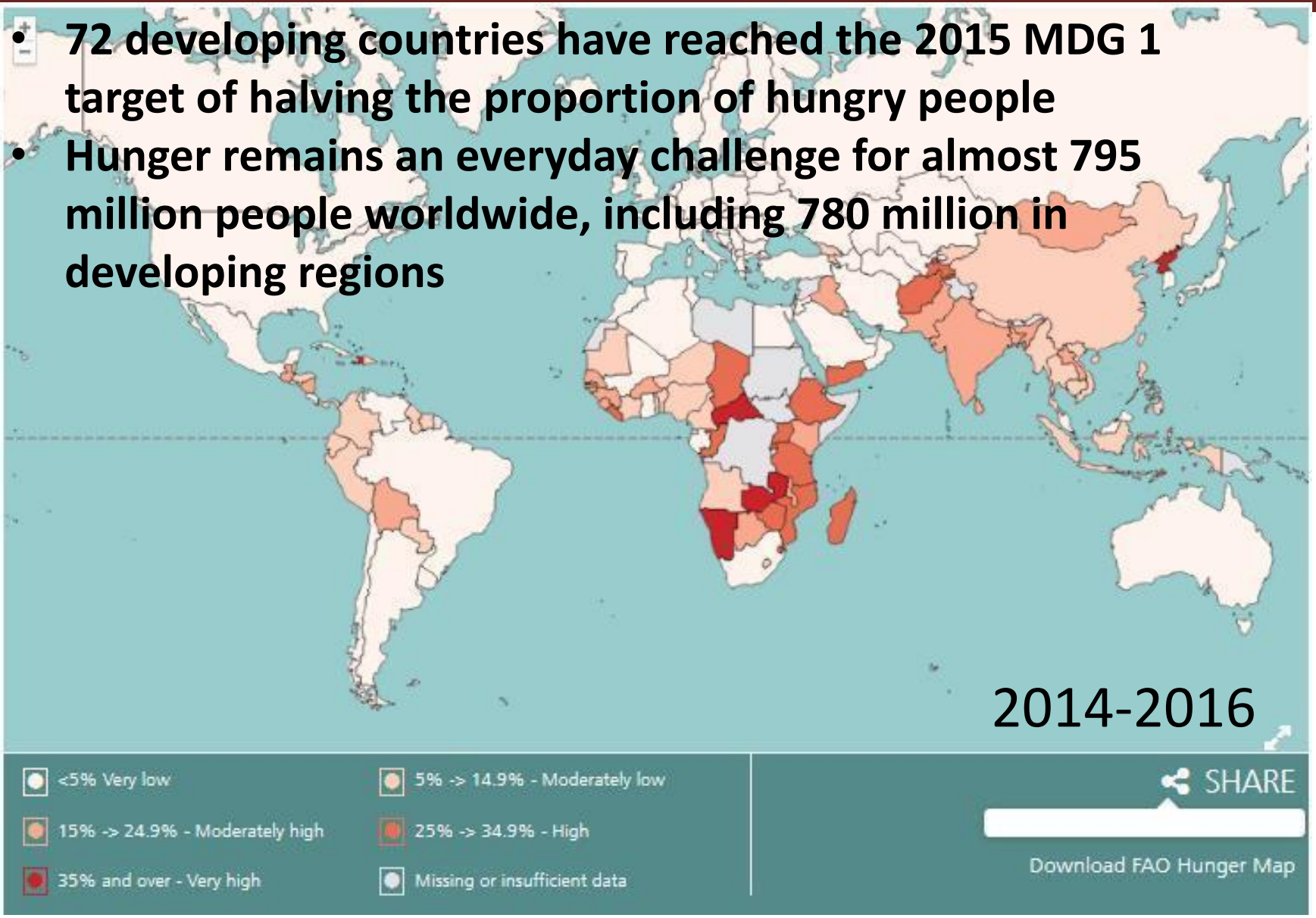
**obese**

**balanced diets**

Chronic disease likely to cost $35 trillion by 2030

# Food insecurity and under nutrition remain persistent

- **72 developing countries have reached the 2015 MDG 1 target of halving the proportion of hungry people**
- **Hunger remains an everyday challenge for almost 795 million people worldwide, including 780 million in developing regions**



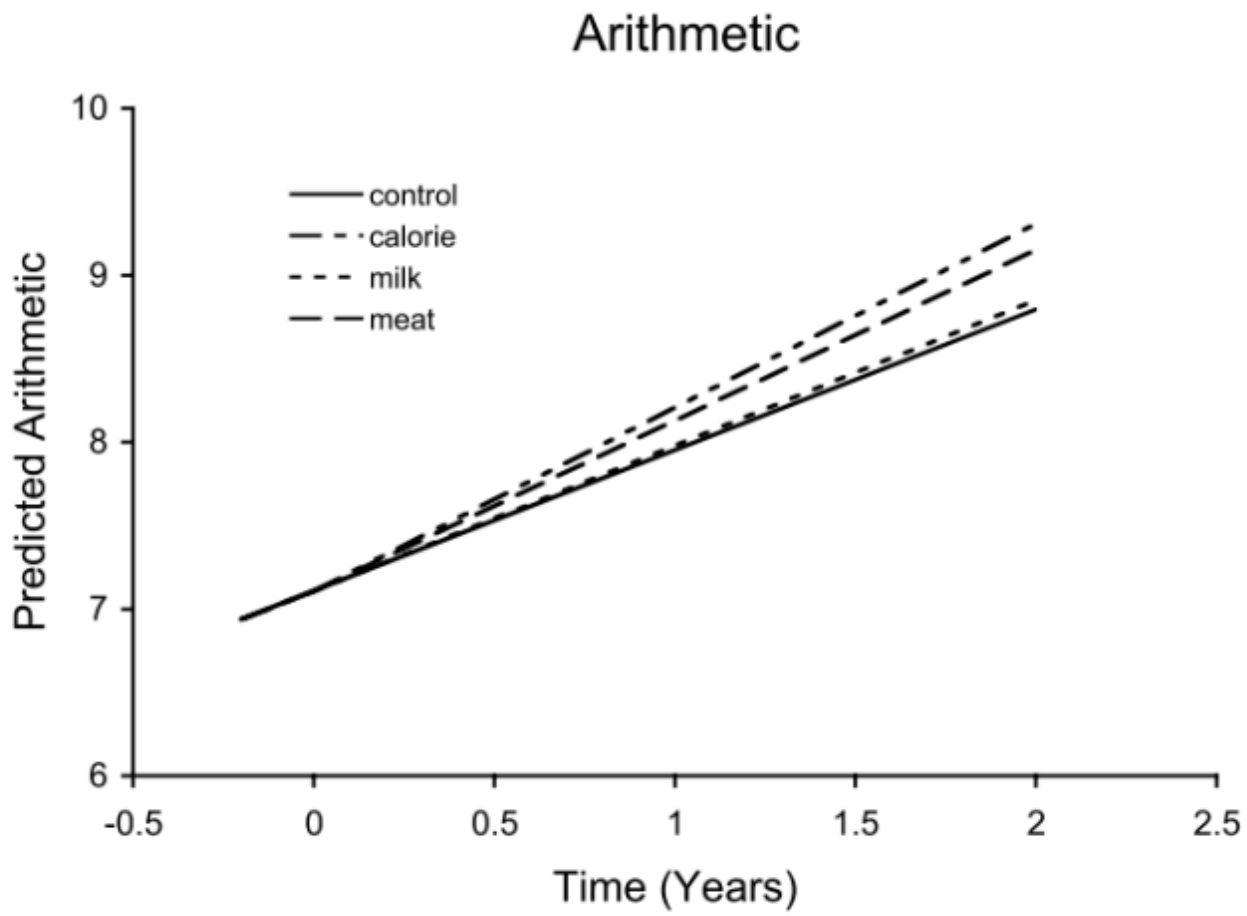

ILRI

# Importance of animal source foods

- Source of:
  - High biological value protein
  - Vitamins (e.g. Vit A, B6, B12)
  - minerals (e.g. calcium, iron, zinc)
  - Omega 3 fatty acids
- Enhance the effectiveness of uptake of other plant-based micronutrients
- Heath protection (e.g. lactoferrin in milk)

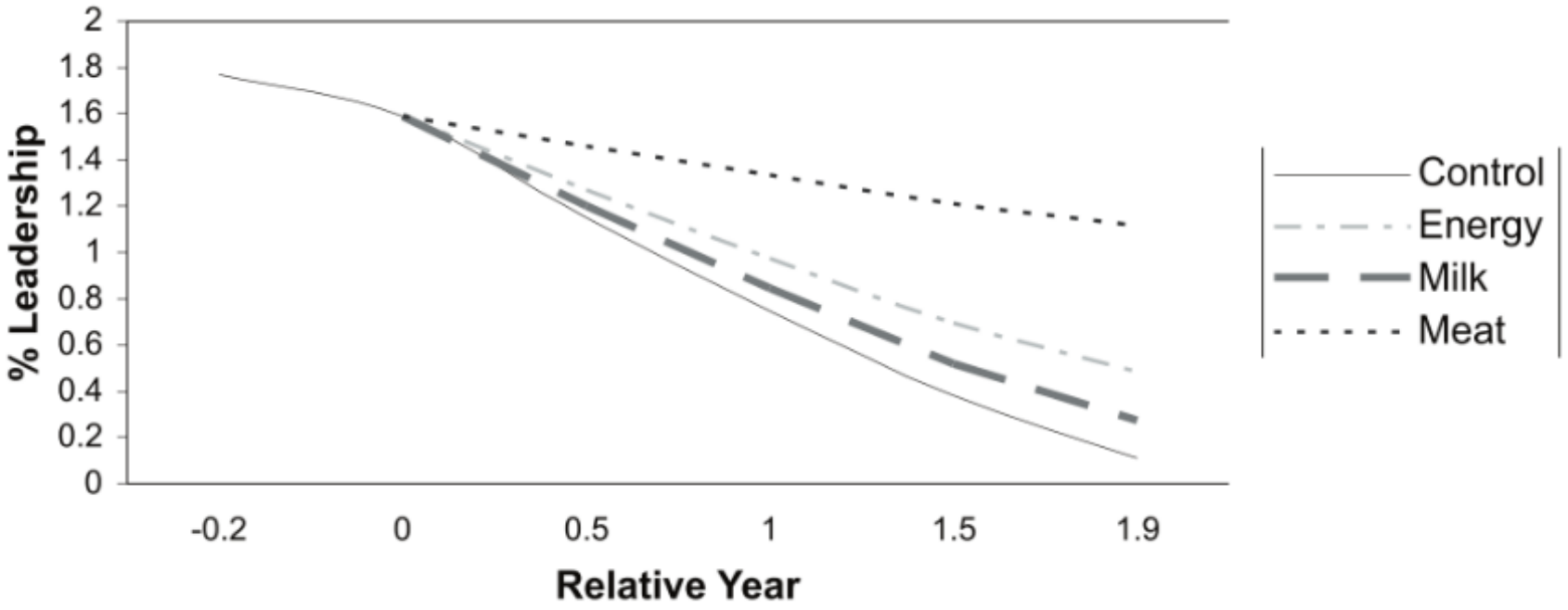
# Supplementation with meat increases arithmetic ability in school children

*Figure 3.*




ILRI CGIAR

# Supplementation with milk and meat increases leadership behaviour in school children



# Ranking of the most important causes of malnutrition among Somali pastoralists

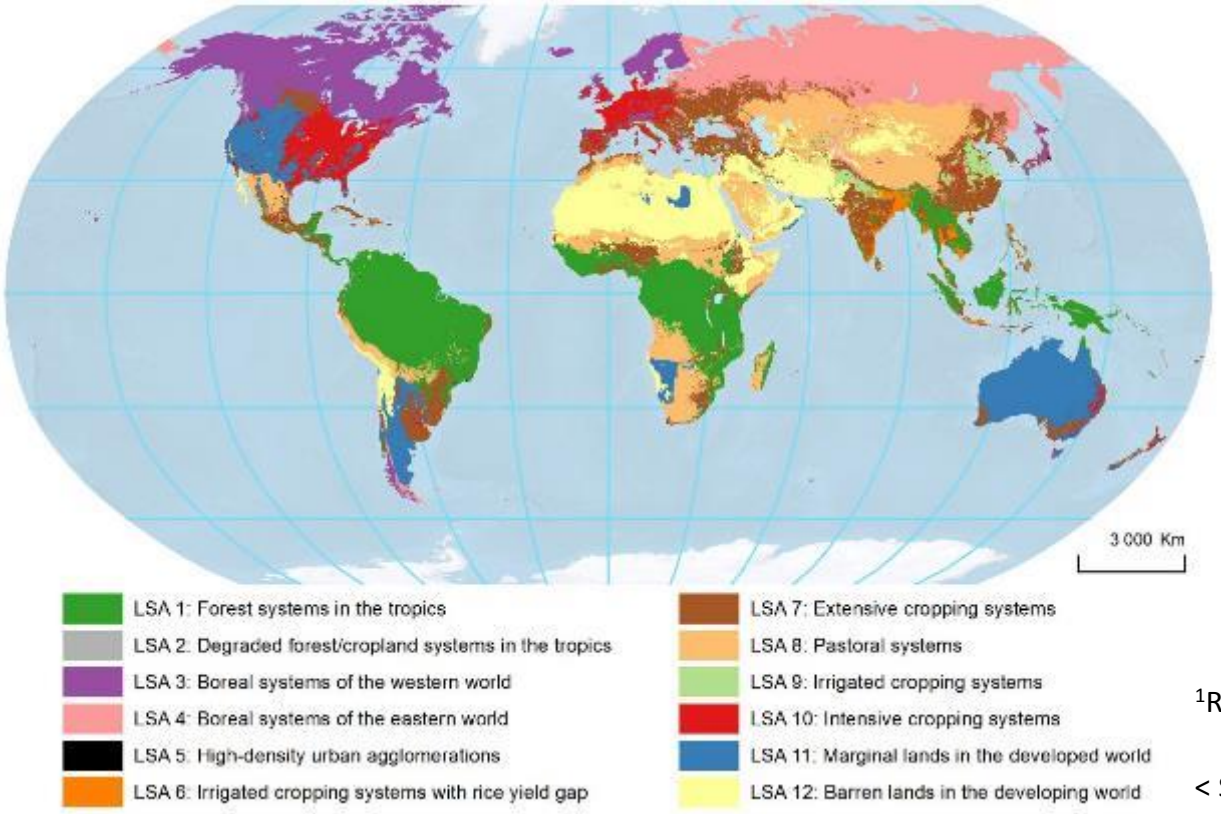
| Cause of malnutrition | Median rank (range) |
|---|---|
| Reduced milk/food availability | 1.5 (1-3) |
| Childhood infection | 1.5 (1-2) |
| Moving long distances | 2.5 (1-4) |
| Mother's work load, including separation from mother | 2.5 (1-3) |

Sadler and Cately, 2009

ILRI CGIAR

# Importance of pastoralism

- Grazing land covers 32M km$^2$ - ¼ of land surface
- Supports over 64M poor people[1]
  - 30M  of them in Sub-Saharan Africa




[1]Robinson et al., 2011

< $2/day

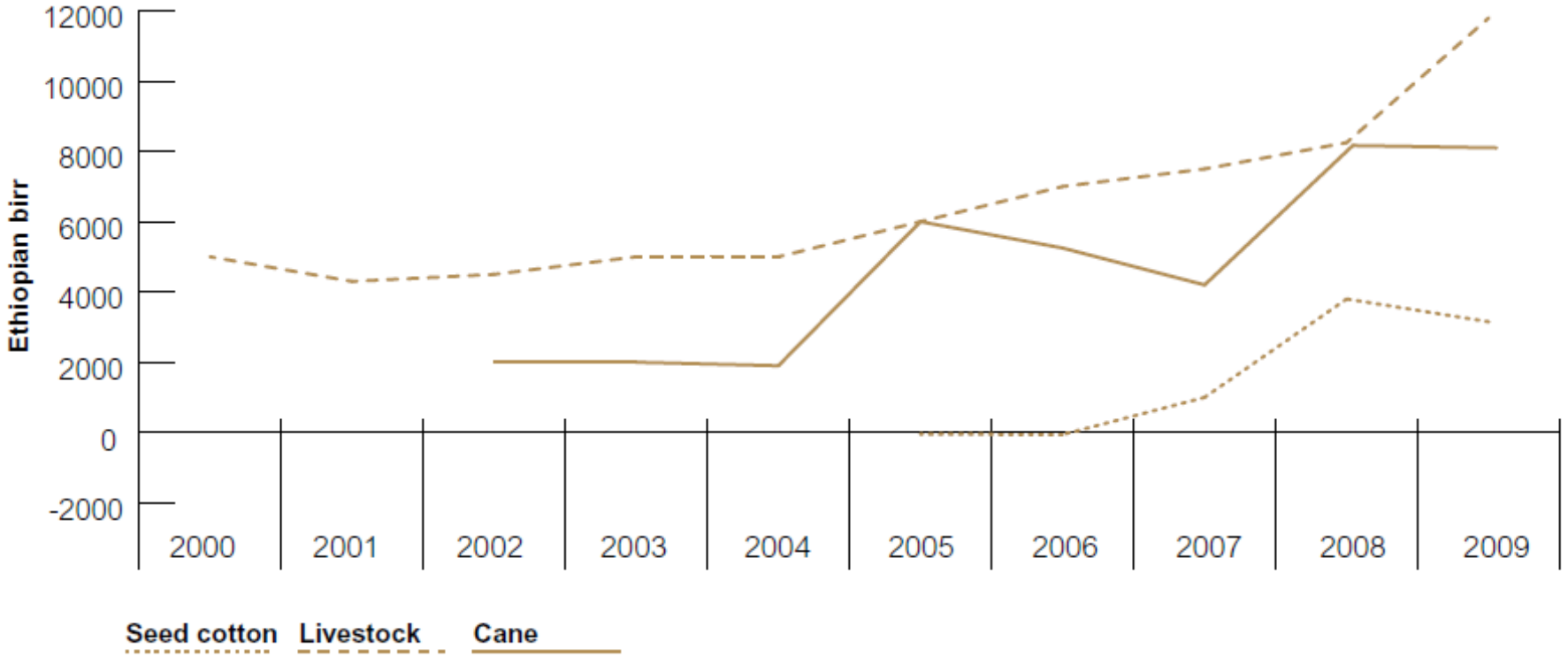
ILRI CGIAR

# Pastoralism

- Marginalized;
  - Economically
  - Socially
  - Politically
- Perceived as
  - Backward
  - Uneconomic
  - Environmentally degrading

ILRI CGIAR

# Revenue per hectare from livestock, cotton and sugar cane – Awash Valley, Ethiopia



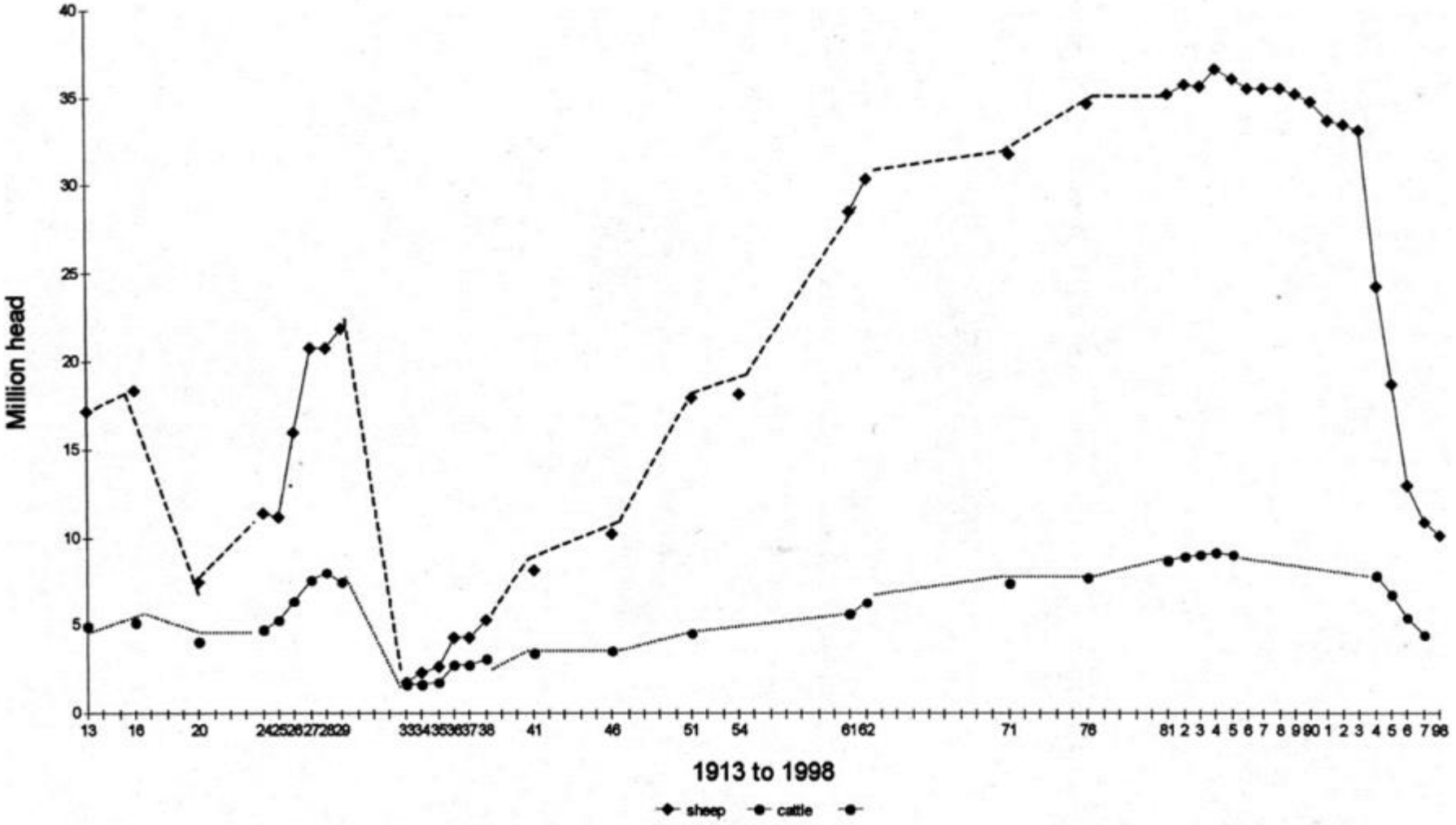

Behnke and Kerven, 2013

# Challenges in pastoral systems

- Aridity
- High Temperatures
- Low soil fertility
- Sharp seasonality
- Inter-annual variability
  - Droughts
  - Climate change
- Animal disease
- Markets
- Conflict/political disturbance

ILRI CGIAR

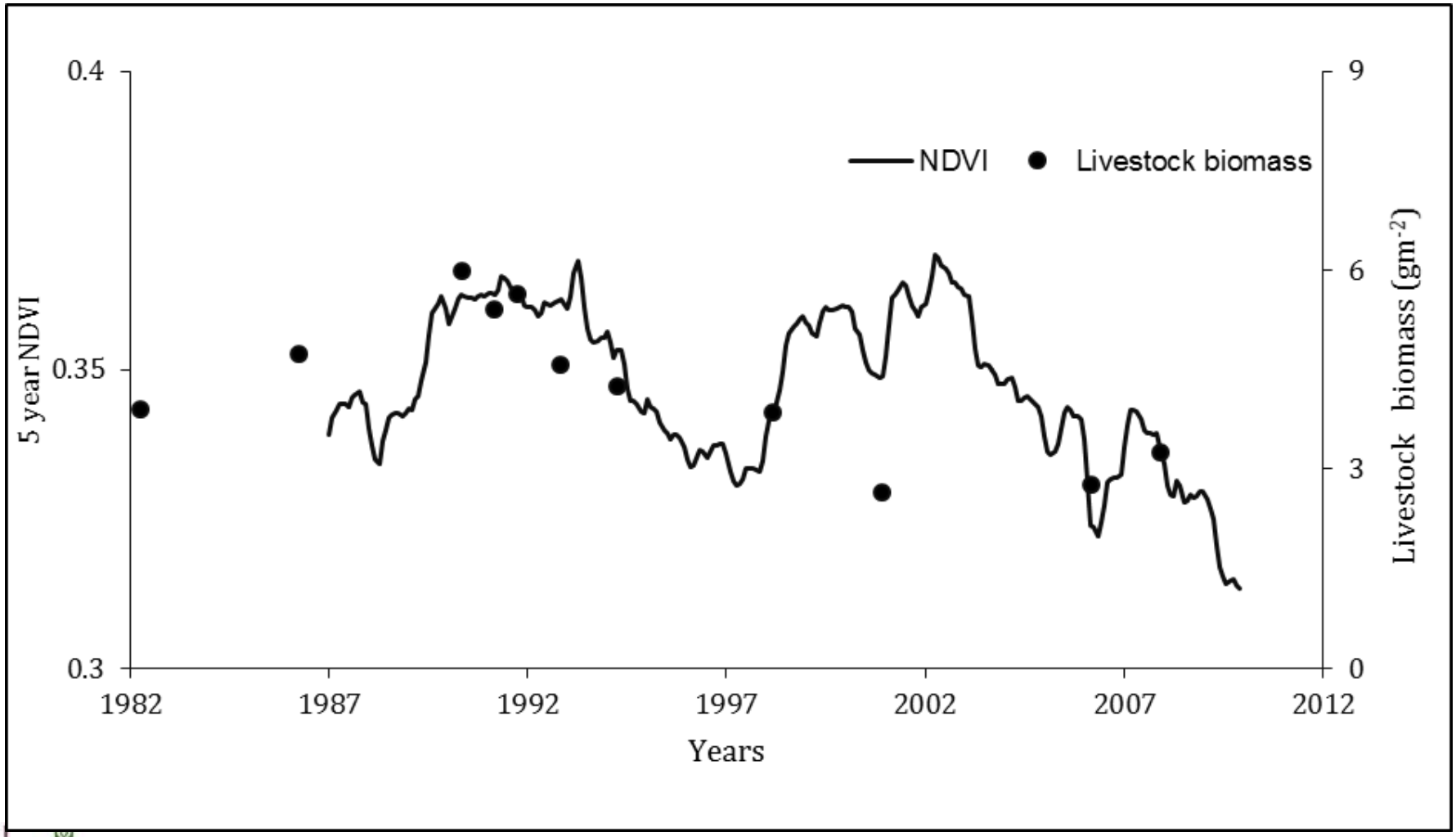
# Kazakhstan – Livestock numbers




Behnke 2003

ILRI CGIAR

# Total animal biomass and five year running average of NDVI, Kajiado district, Kenya



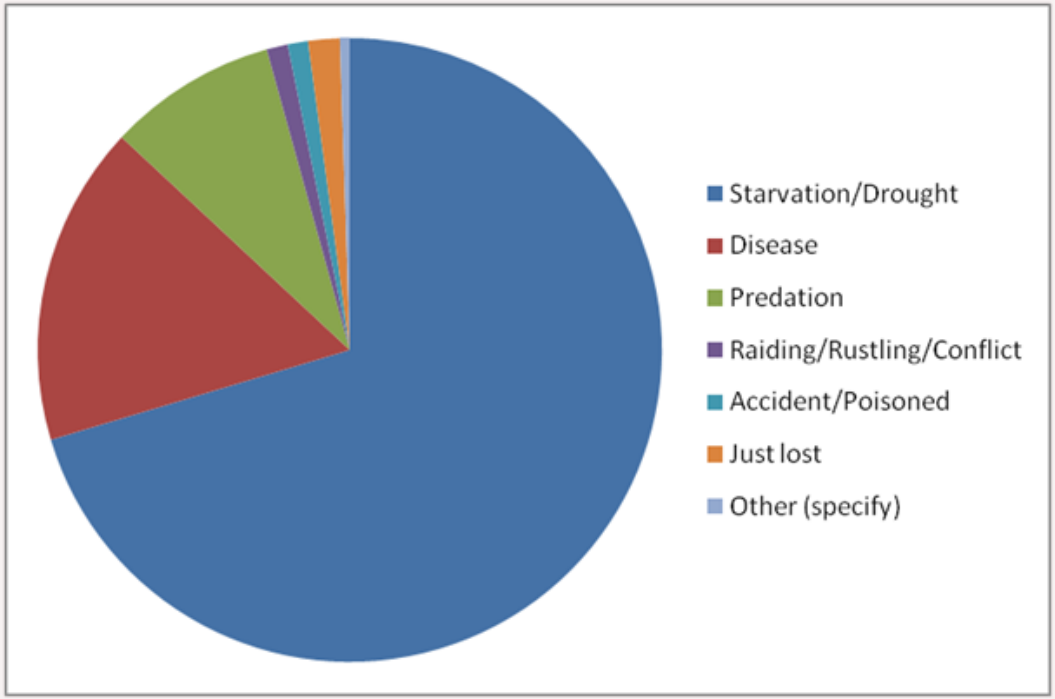
# Forage production projections for arid systems and semi-arid savannas in the Greater Horn of Africa

| | Area (millions km$^{2)}$ | Forage production (millions t/yr) | | |
|---|---|---|---|---|
| | | Baseline 2006-15 | Change 2016-25 | Change 2036-45 |
| **Hyper-arid to arid** | 2.68 | 4.38 | -0.07 | 0.07 |
| **Semi-arid savannas** | 1.97 | 3.18 | -0.06 | -0.01 |

Based on projections using G-Range model

ILRI CGIAR

# Cause of Livestock Mortality




- Drought is by far the leading cause of livestock mortality

ILRI CGIAR

# The costs of uninsured risk in Kenya

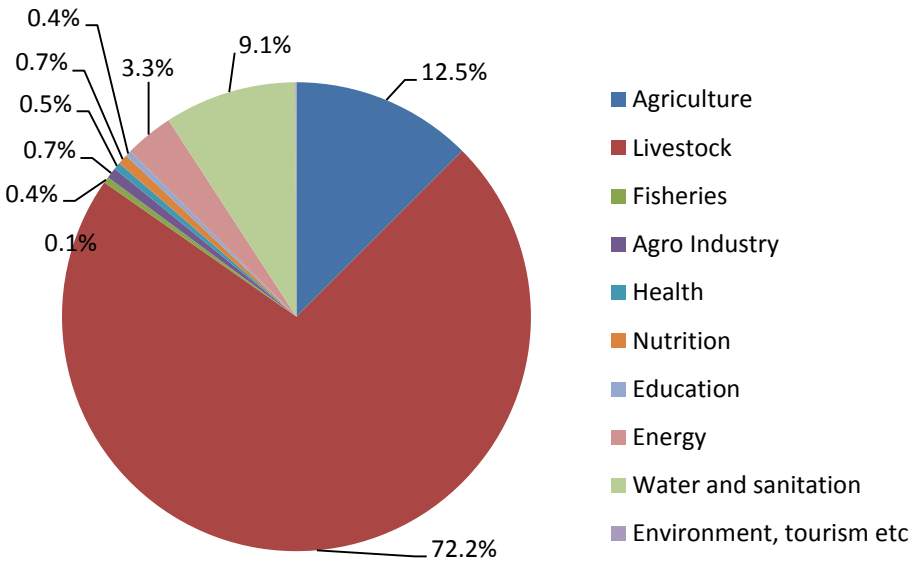
- **Systemic Drought exposure: 28 Droughts last 100 years, 4 in last 10 years**

- **Frequency and Intensity increasing**

- **2008 -2011: 4 consecutive years drought:**
  - Total value damages and losses US$ 12.1 billion
  - Agriculture US$ 1.51 billion (12.5%)
  - Livestock US$ 8.74 billion (72.2%)
  - 9% national livestock herd died – mostly cattle

- **Food Insecurity due to drought:**
  - 2009 = 3.8 million people
  - 2011 = 3.75 million people affected,
    - 1.8 million in marginal crop areas
    - 1.9 million people in marginal pastoral areas

**Total Value Drought Losses US$ 12.2 billion**




***This magnitude of drought damage and losses to agriculture and livestock cannot be financed out of GOK's budget and by the Donor community only.***

# What is Index Based Insurance?

- Policy holders paid based on external “index” that triggers payments to all insured clients
- Avoids problems that make traditional insurance unprofitable for small, remote clients:
- Suited for risks affecting a large number of people simultaneously and for which a suitable index exists.

  - No transactions costs of measuring individual losses
  - Preserves effort incentives (no moral hazard) as no single individual can influence index.

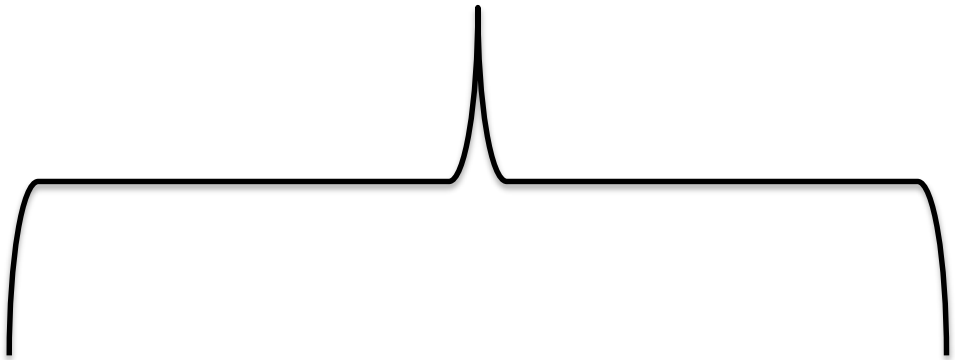
# Designing IBLI

- Based on satellite data on forage availability- NDVI , this insurance pays out when forage scarcity is predicted to cause livestock deaths in an area.

**DATA**
- Livestock Mortality
- Satellite data on forage availability

**Response Function**

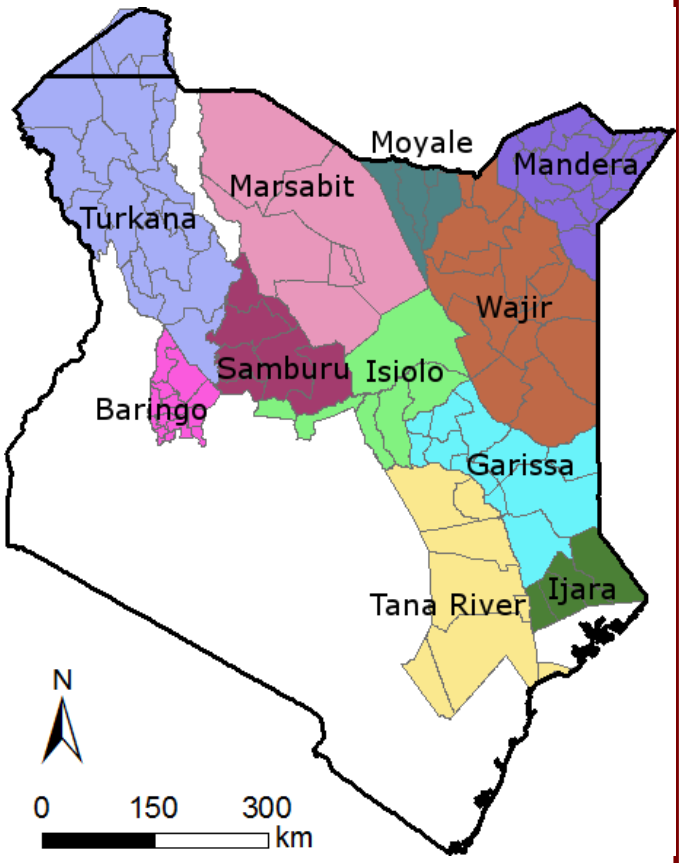
**Index**
- Predicted Livestock Mortality



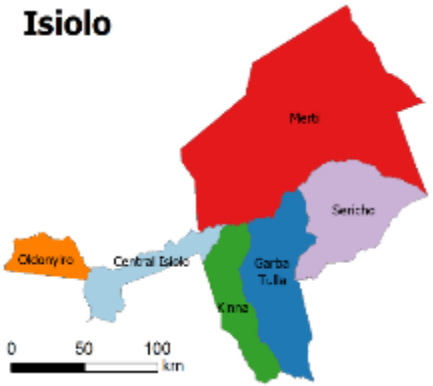
$$\mathbf{y} = \lambda(\mathbf{I}_T \otimes \mathbf{W}_N)\mathbf{y} + \mathbf{X}_{Int}^{S}\boldsymbol{\alpha}^{S} + \mathbf{X}_{Tr}^{S}\boldsymbol{\beta}^{S} + \mathbf{X}_{W}\boldsymbol{\gamma}^{S} + \boldsymbol{\varepsilon}^{S}$$

# IBLI Coverage

- First launched in Marsabit in January 2010
- Have developed contracts for all arid counties of Kenya
- Contract provision extended to Isiolo and Wajir in August 2013
- Also have a program in the Borana Zone of S. Ethiopia – launched in July 2012








# Implementing IBLI

- Implementation of IBLI is a joint effort between ILRI (with support of its technical and development partners), commercial underwriters and implementing partners on the ground (government, NGOs, CBOs etc).

## EXTENSION, MARKETING, SALES

# Results

- 33% drop in households employing hunger strategies
- 50% drop in distress sales of assets
- 33% drop in food aid reliance


ILRI CGIAR

# Mobility is the key to pastoral systems

- Movement of animals to take advantage of spatial and temporal variation in forage (and water)
- Allowing pastures to re-grow
- Easier to manage in private systems
- High transaction costs in communal systems
    - Need to be negotiated and maintained

# Mobility is the key to pastoral systems

- Traditional institutional arrangements are under threat from:
  - Population growth
  - Pressure to increase crop land
  - Legitimate desire for development and prosperity
- Need new pastoral land tenure arrangements
  - Facilitated negotiations
  - Livestock corridors
- These are crucial to any management approaches to maintain and improve net primary production in grasslands.

ILRI CGIAR

# Improving forage availability

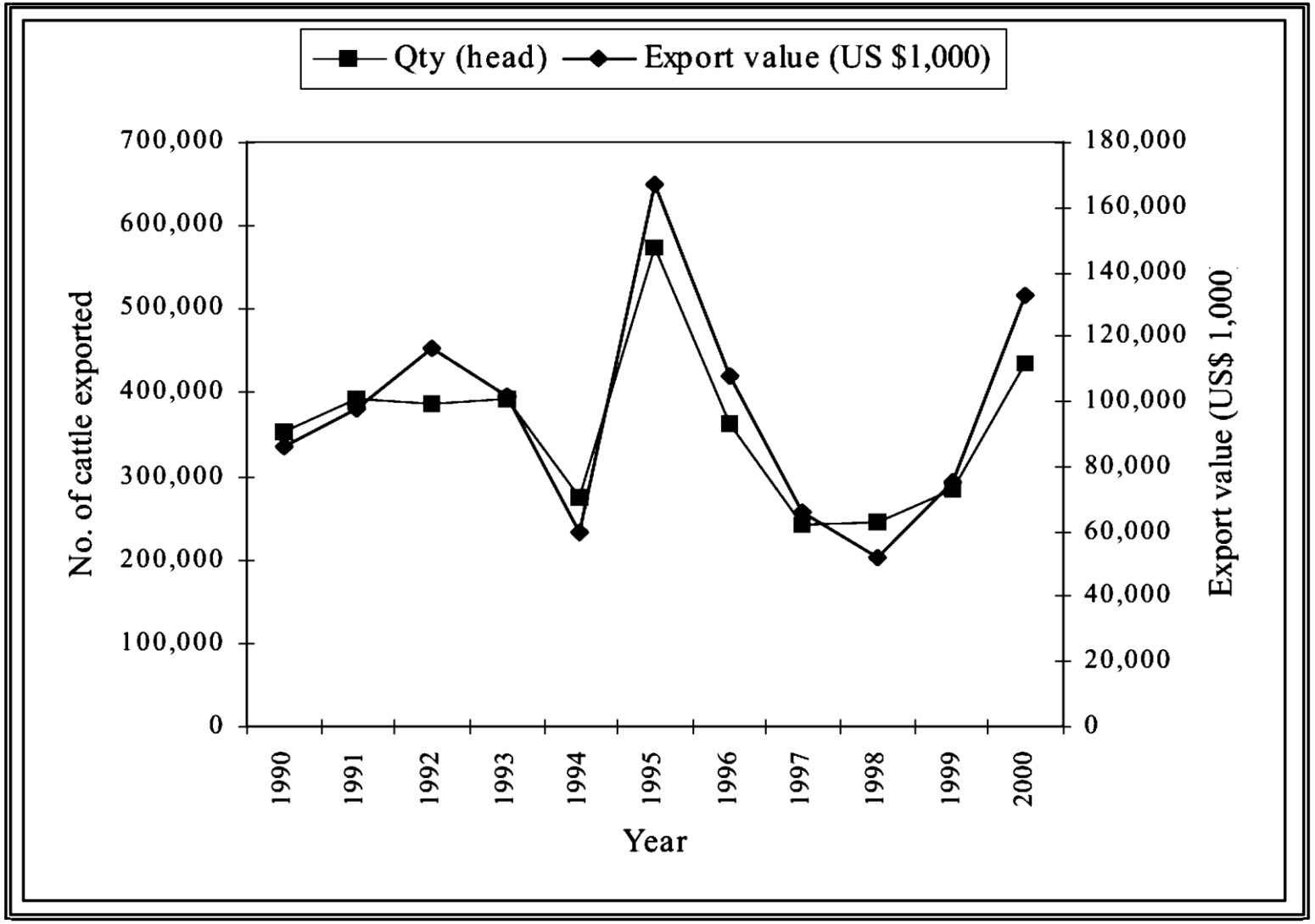
- Technical intervention to increase productivity (pasture improvement) and reduce variability of feed supply (forage conservation) have had mixed success
  - Lack of market pull
  - Insecurity of land tenure
  - Lack of availability of financial services and other inputs

# Livestock exports from Ethiopia

| Year | Live animals | Value (US $ '000) | Meat (t) | Value (US $ '000) |
|---|---|---|---|---|
| 2005-06 | 163,000 | 27,252 | 7,717 | 15,598 |
| 2006-07 | 234,000 | 36,507 | 7,917 | 18,448 |
| 2007-08 | 298,000 | 40,865 | 5,875 | 15,471 |
| 2008-09 | 150,000 | 77,350 | 6,400 | 24,480 |
| 2009-10 | 334,000 | 91,000 | 10,000 | 34,000 |
| 2010-11 | 472,000 | 148,000 | 16,877 | 63,200 |
| 2011-12 | 800,000 | 207,100 | 17,800 | 78,000 |
| 2012-13 | 680,000 | 150,000 | 16,500 | 68,000 |

ILRI CGIAR

# Cattle exports from Burkina Faso, Mali and Niger



# Stimulating fodder supply and makets

- Market demand is stimulating interest in fattening animals
- Lack of credit facilities and collateral for buying/growing fodder
- Insurance could provide a mechanism for using livestock as collateral and stimulate the market for credit and financial services
- Stimulate fodder markets

# Conclusions

- Pastoral systems have an important role to play in food and nutritional security
- Need to manage and mitigate the risks of variation in fodder supply
    - Index based insurance
- Market opportunities are increasing creating a demand for new technologies including fodder technologies (but also animal health and breeding)
- Land tenure systems need to be robust
    - Negotiated among stakeholders to ensure mobility

ILRI CGIAR

*better lives through livestock*

ilri.org

ilri.org
*better lives through livestock*
ILRI is a member of the CGIAR Consortium

Box 30709, Nairobi 00100 Kenya
Phone +254 20 422 3000
Fax +254 20 4223001
Email ilri-kenya@cgiar.org

ILRI has offices in:
Central America • East Africa
• South Asia • Southeast and East Asia
• Southern Africa • West Africa