

Global food and nutrition security to population stabilization:

Contributions of the developing world's livestock sector

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University of Melbourne, Australia, April 2017



ILRI
INTERNATIONAL
LIVESTOCK RESEARCH
INSTITUTE



Overview

Livestock and global food security

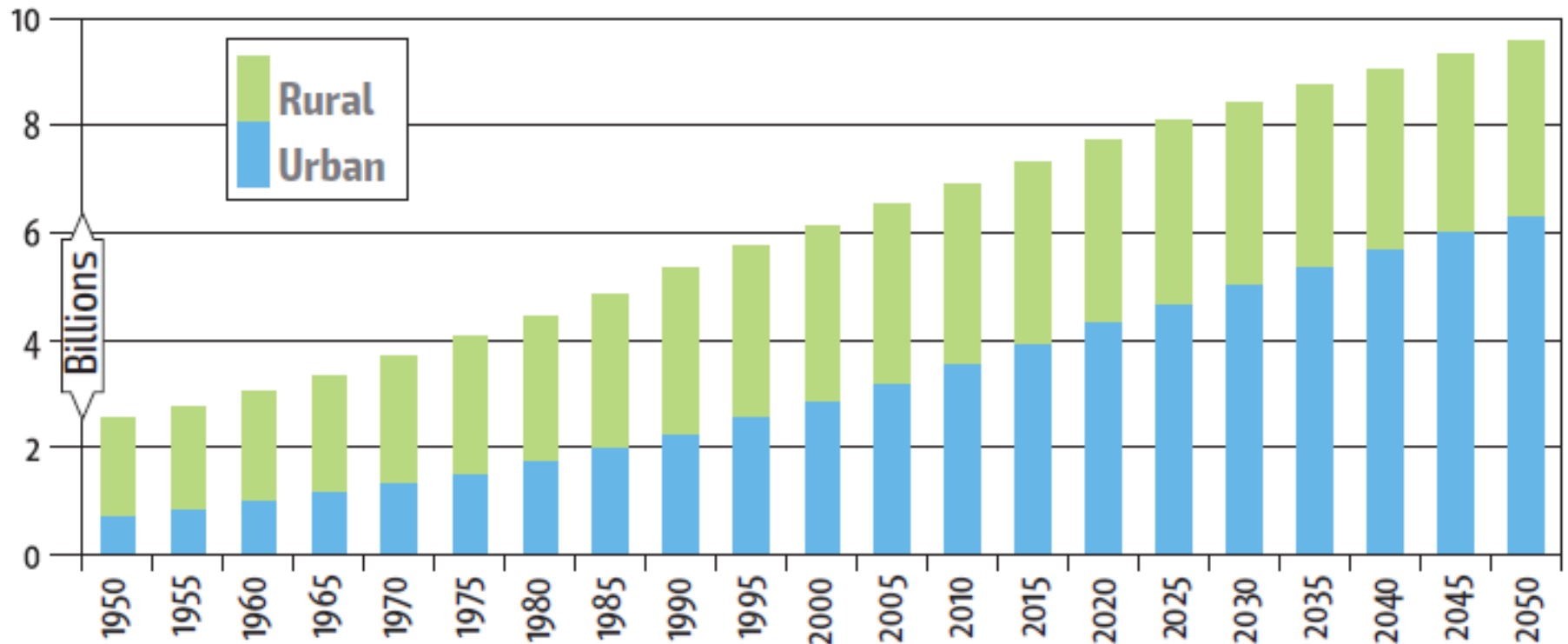
Issues of food and nutritional security

Many roles of livestock

Complexities and trade-offs for the future



Growth in global urban and rural populations to 2050



Source: UN, 2015.

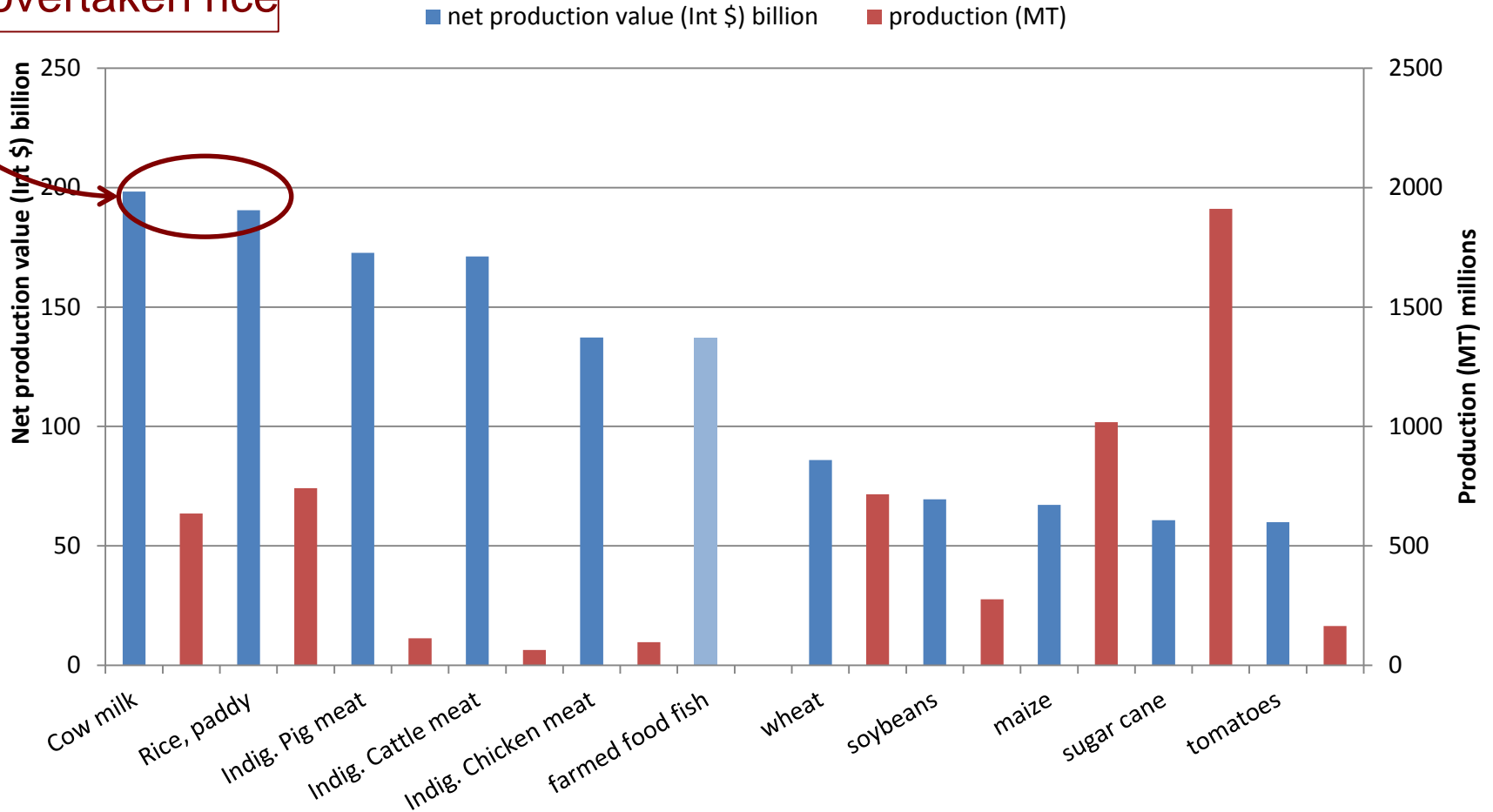
Image from: FAO. 2017. The future of food and agriculture – Trends and challenges. Rome



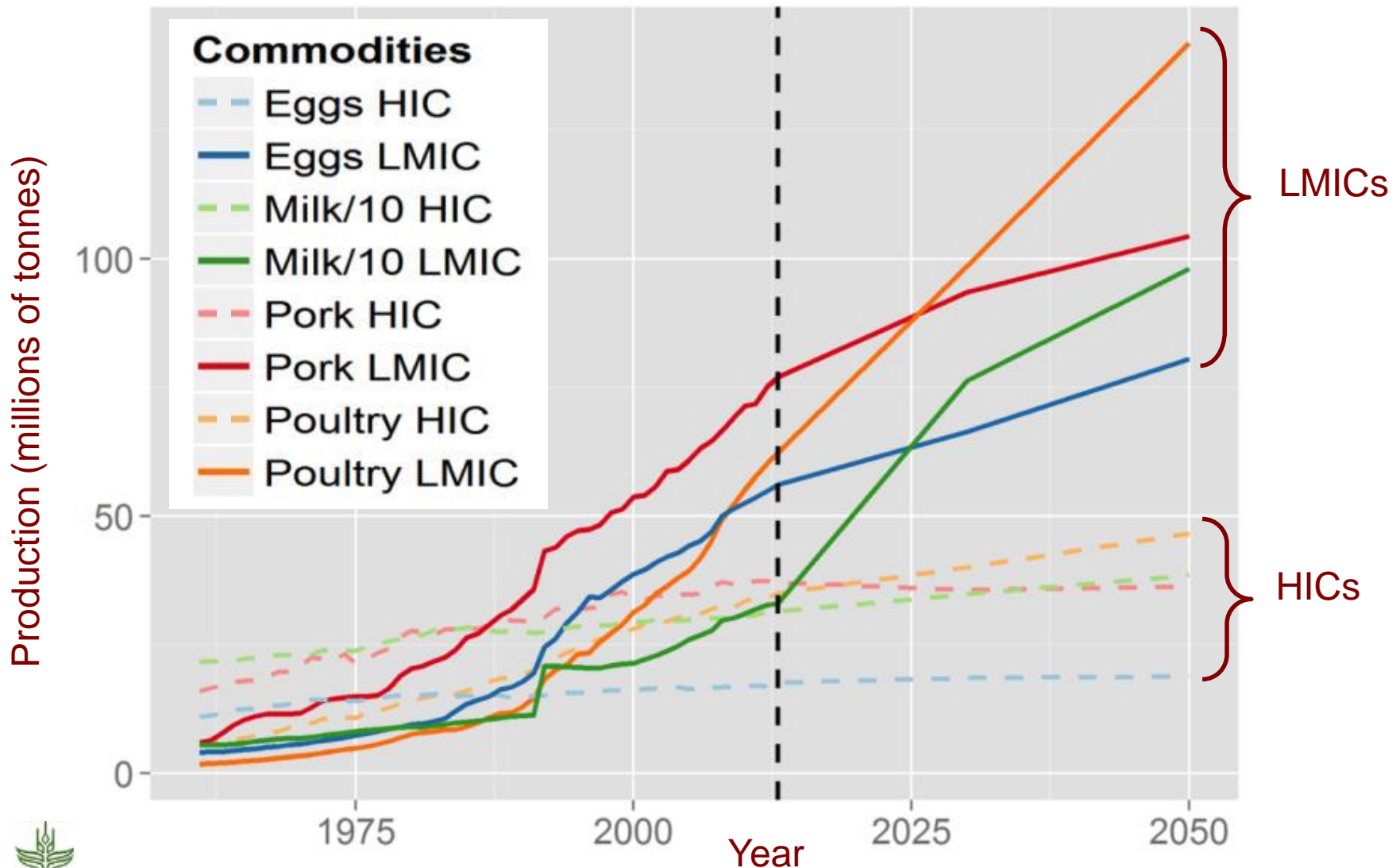
Livestock and global food security

Animal-source foods are valuable: 5 of 6 highest value global commodities (total value of these 5=US Int \$715

Cow milk has overtaken rice



Demand for animal-source foods



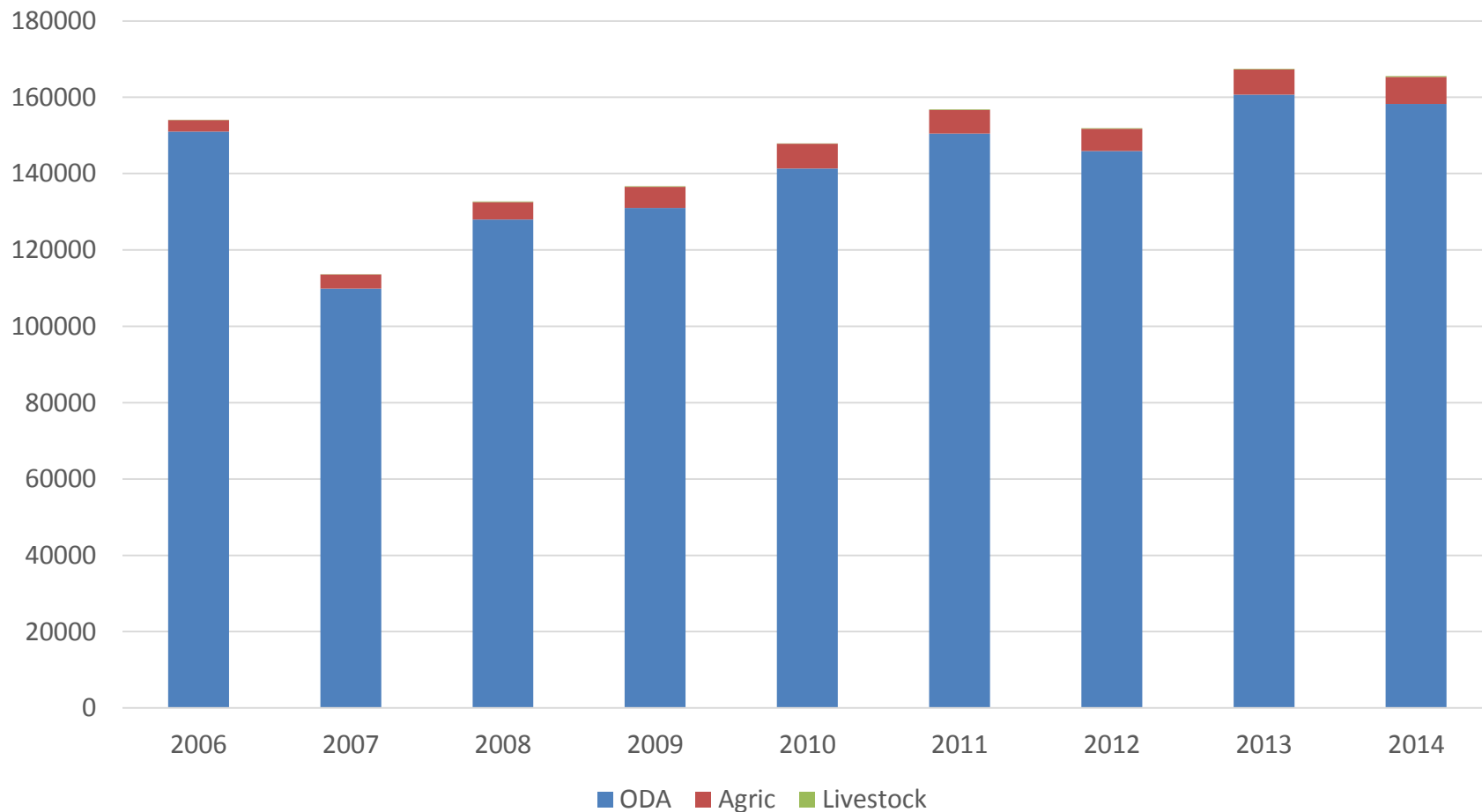
Smallholders still dominate livestock production in many countries

Region (definition of 'smallholder')	% production by smallholder livestock farms					
	Beef	Chicken meat	Sheep/goat meat	Milk	Pork	Eggs
East Africa (≤ 6 milking animals)				60-90		
Bangladesh (< 3ha land)	65	77	78	65		77
India (< 2ha land)	75	92	92	69		71
Vietnam (small scale)					80	
Philippines (backyard)		50			35	

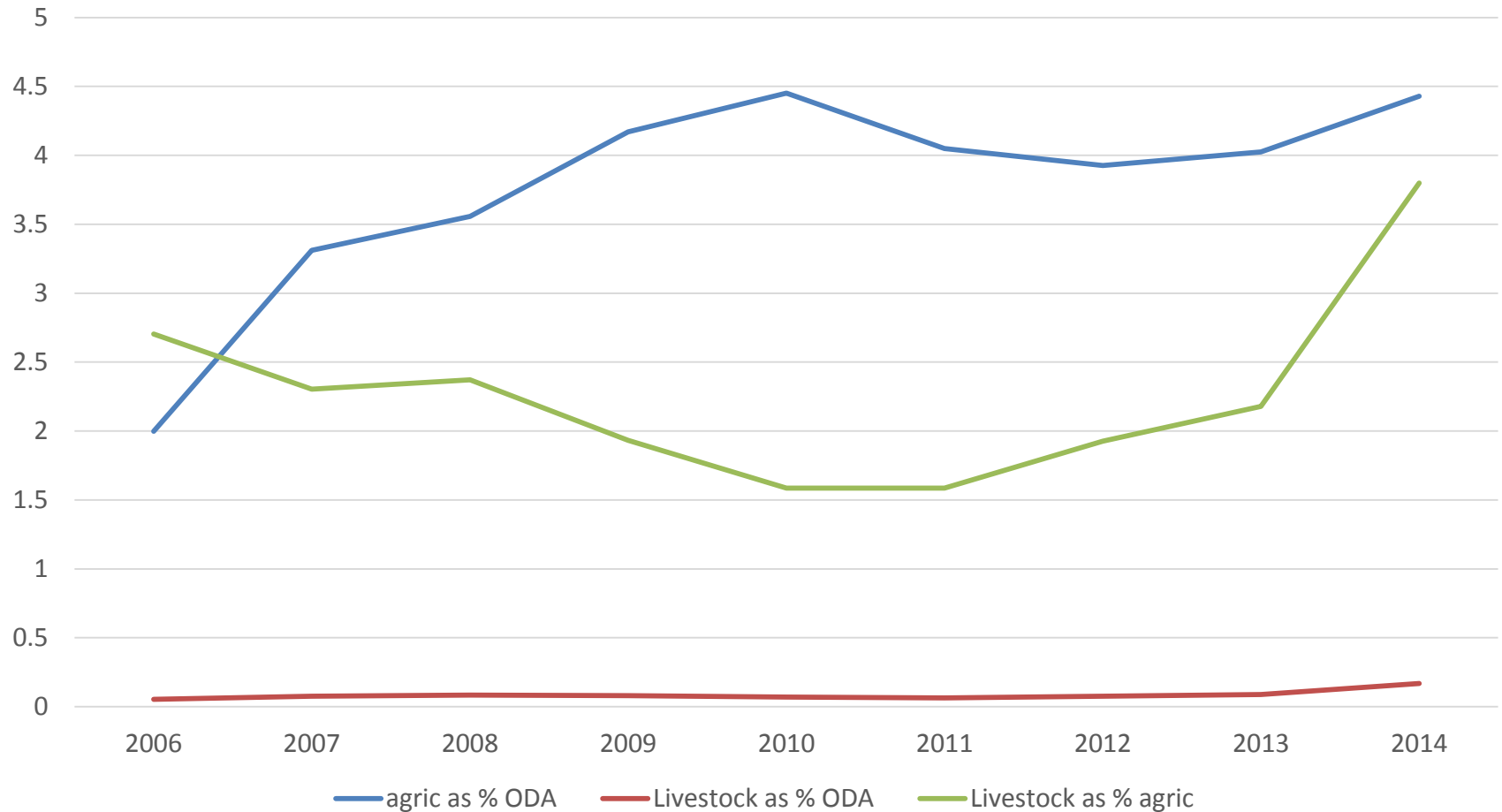
Livestock: 40% of agricultural GDP and growing



Total ODA disbursements to developing countries, USD million



Percentage of ODA disbursements for agriculture and livestock



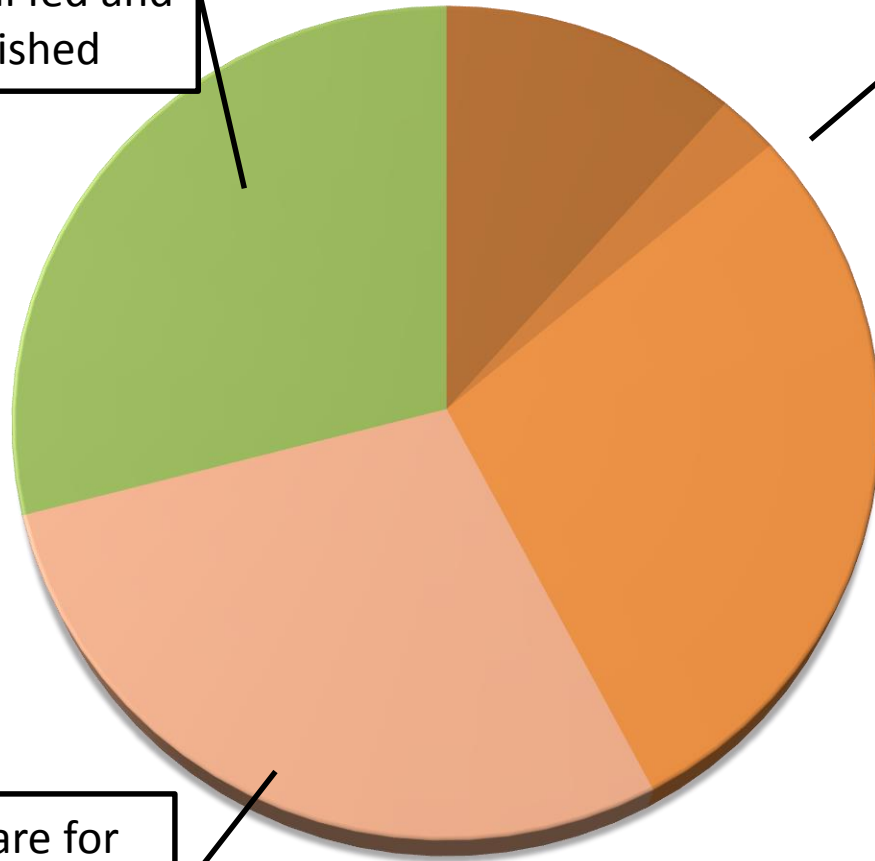


Issues of food and nutritional security

Nutritional divides among 7 billion people today

Less than one third well fed and nourished

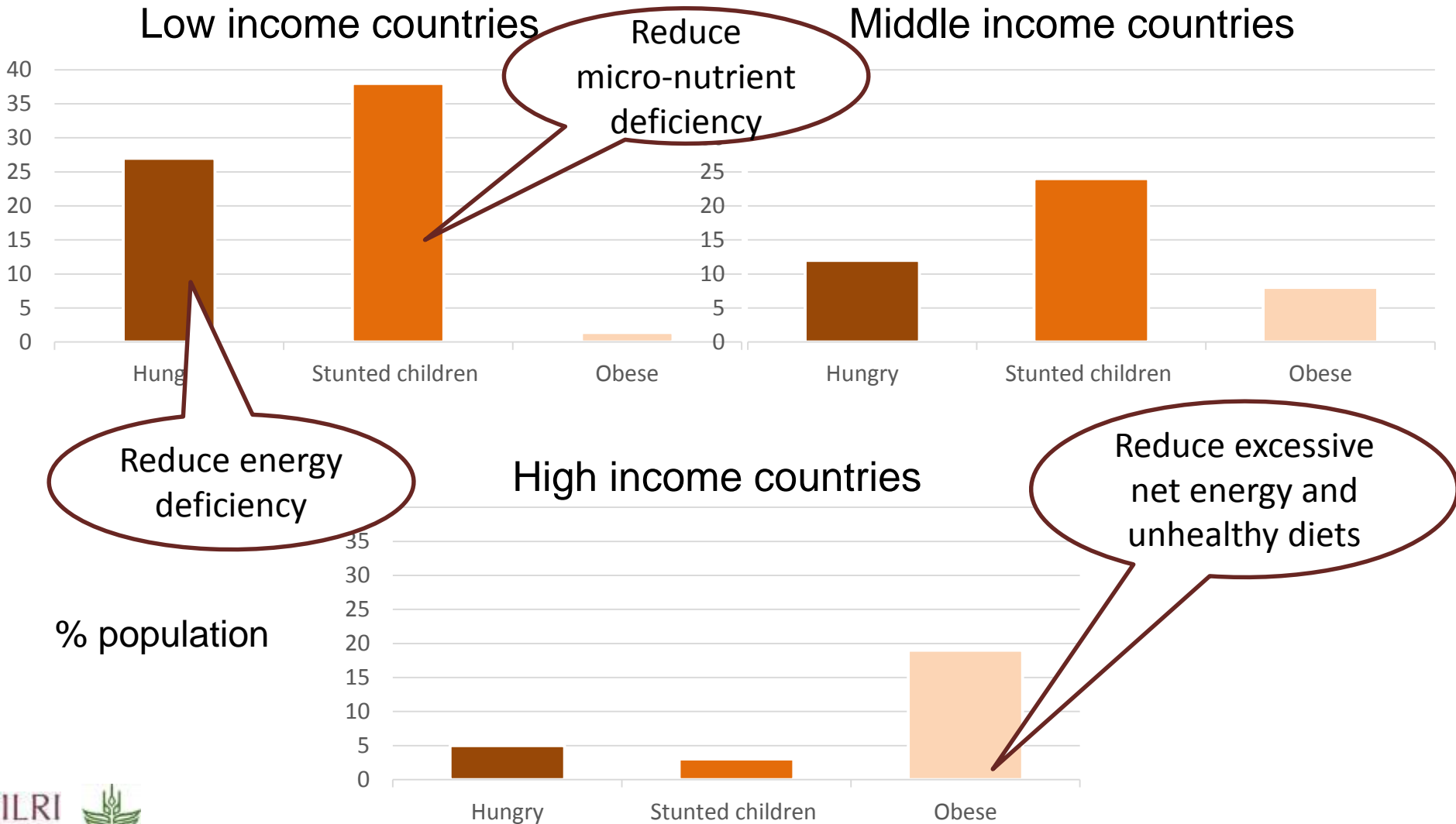
11% of GNP lost annually in Africa and Asia from poor nutrition



- Hungry people
- stunted children
- insufficient nutrients
- overweight/obese
- balanced diets

Healthcare for obesity economic cost: \$2 trillion

Diverse nutritional status demands diverse solutions



Food and nutrition security

Availability

Utilization

Accessibility

Stability

'.....all people at all times have physical, social and economic access to safe and nutritious food that meets their dietary needs for an active and healthy life.....'





Many roles of livestock

Food and nutrition security: Animal-source foods contribute to global food and nutrition

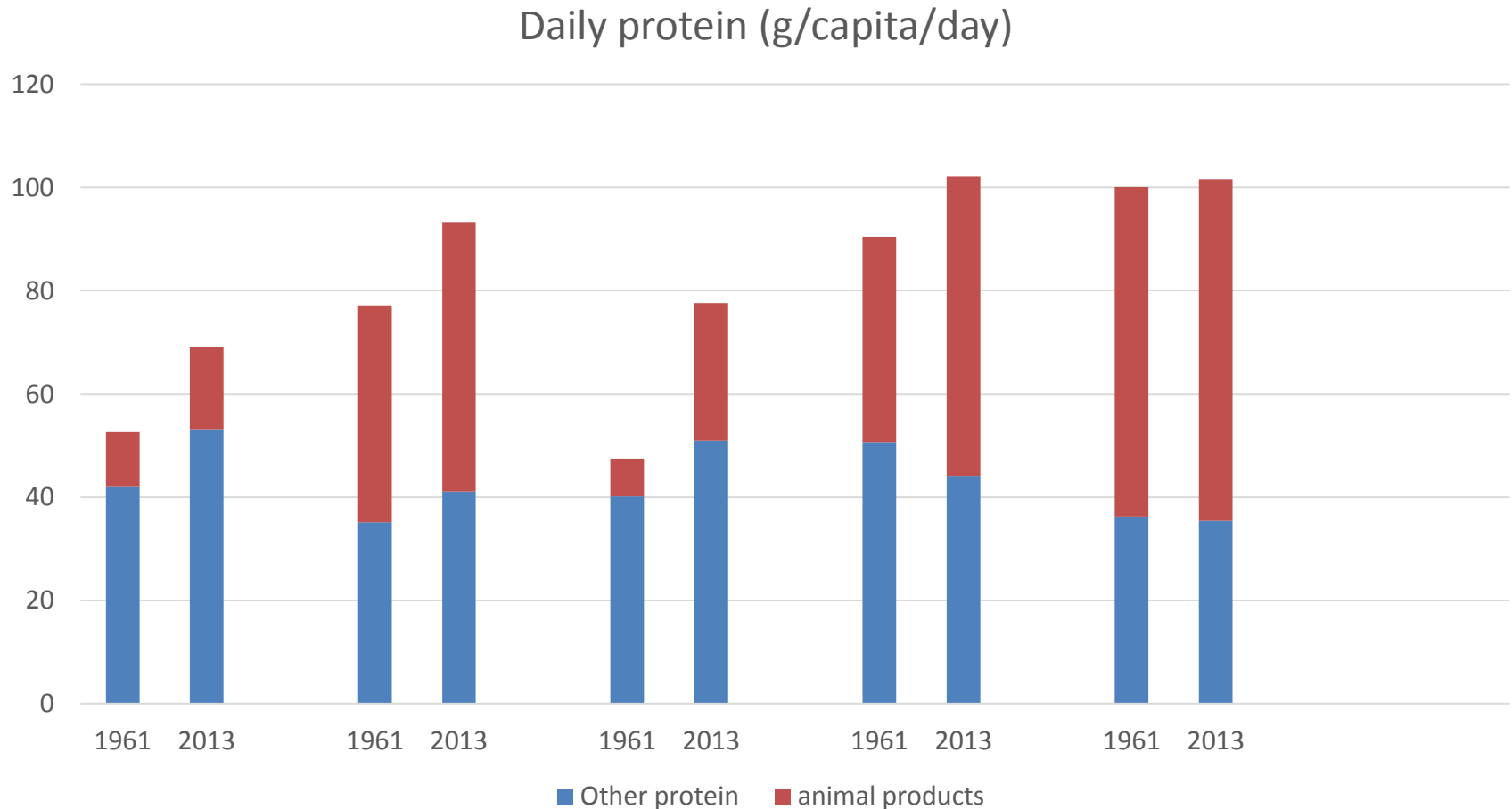


Balanced nutrients

Enough food

Diet diversity

Animal products provide 40% of global daily protein supply (18% of total kcal)



■ Other protein ■ animal products

Africa

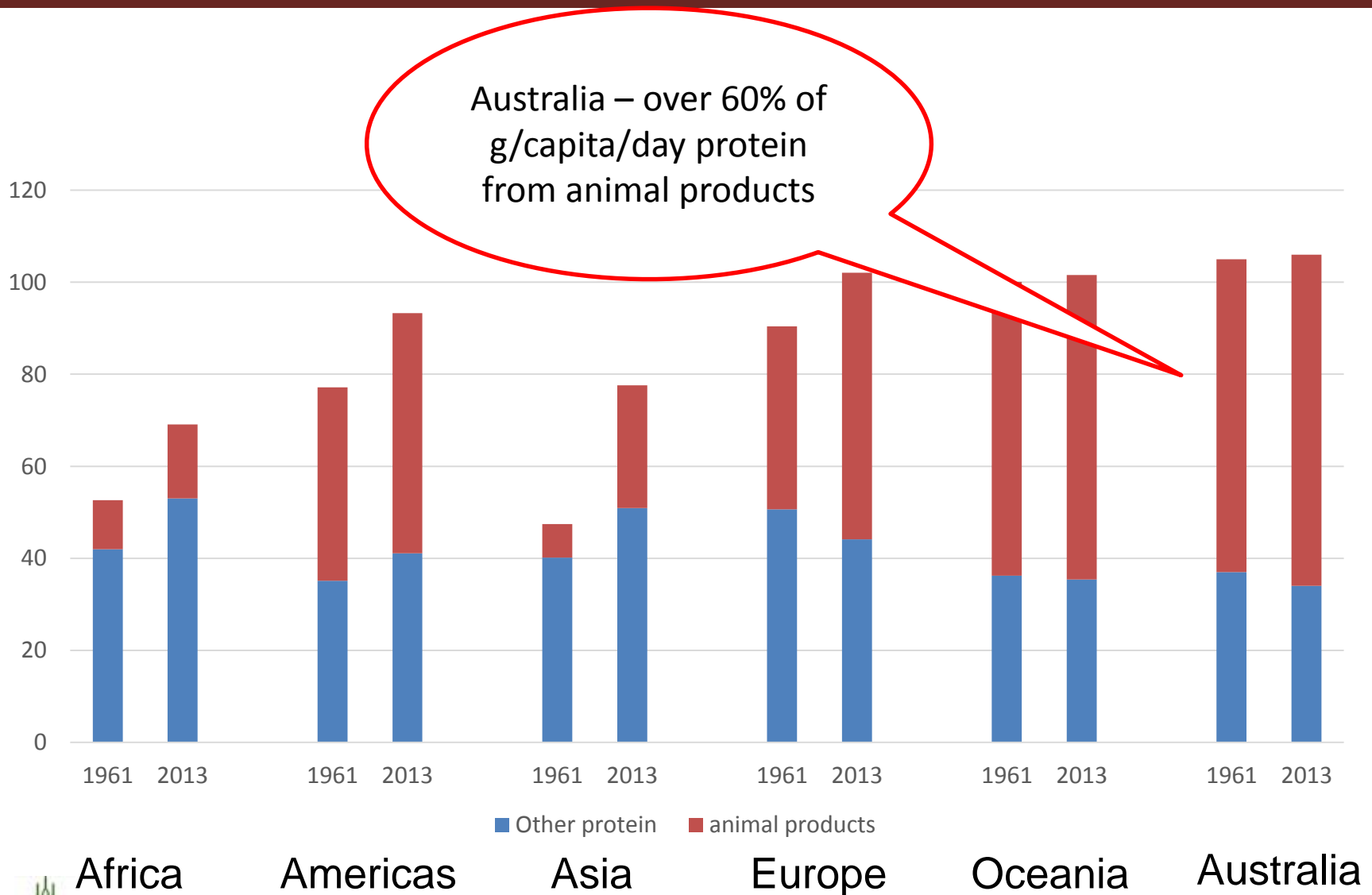
Americas

Asia

Europe

Oceania

Animal products provide 40% of global daily protein supply (18% of total kcal)



Balanced nutrition: The critical and unique roles of animal-source foods

Animal-source foods

- High density of macro- and micro-nutrients per 100 g
- Contain essential nutrients difficult or impossible (e.g. vitamin B12) to find in other foods
- Contain micronutrients in biological forms enabling easier uptake into the body (bioavailability)
- Better digestibility and biological value of proteins, with amino acid profile matching human needs
- Contain lower levels of anti-nutrient factors (i.e. compounds that interfere with absorption of nutrients)

Hidden hunger (missing nutrients)

- E.g.: stunted children in Malawi lacked amino acids that are deficient in plant foods

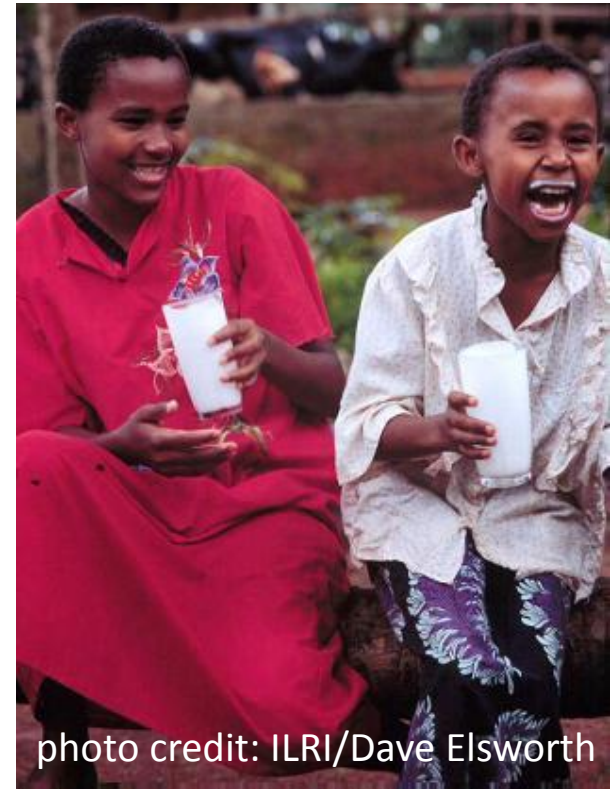


photo credit: ILRI/Dave Elsworth

Livestock-derived foods enhance the nutrition of mothers & of infants in the first 1,000 days of life

Milk: improves children's growth, prevents stunting

Meat: improves long-term cognitive ability

Livestock interventions improve

- production, incomes, expenditure
- nutrient composition and diets
- nutritional outcomes in children and women

But:

Diseases associated with livestock-derived foods

- Disproportionate burden for children under 5
- Pregnant women more vulnerable to foodborne diseases



Evidence

In Ethiopia

- Cow ownership reduced stunting by 6–13%

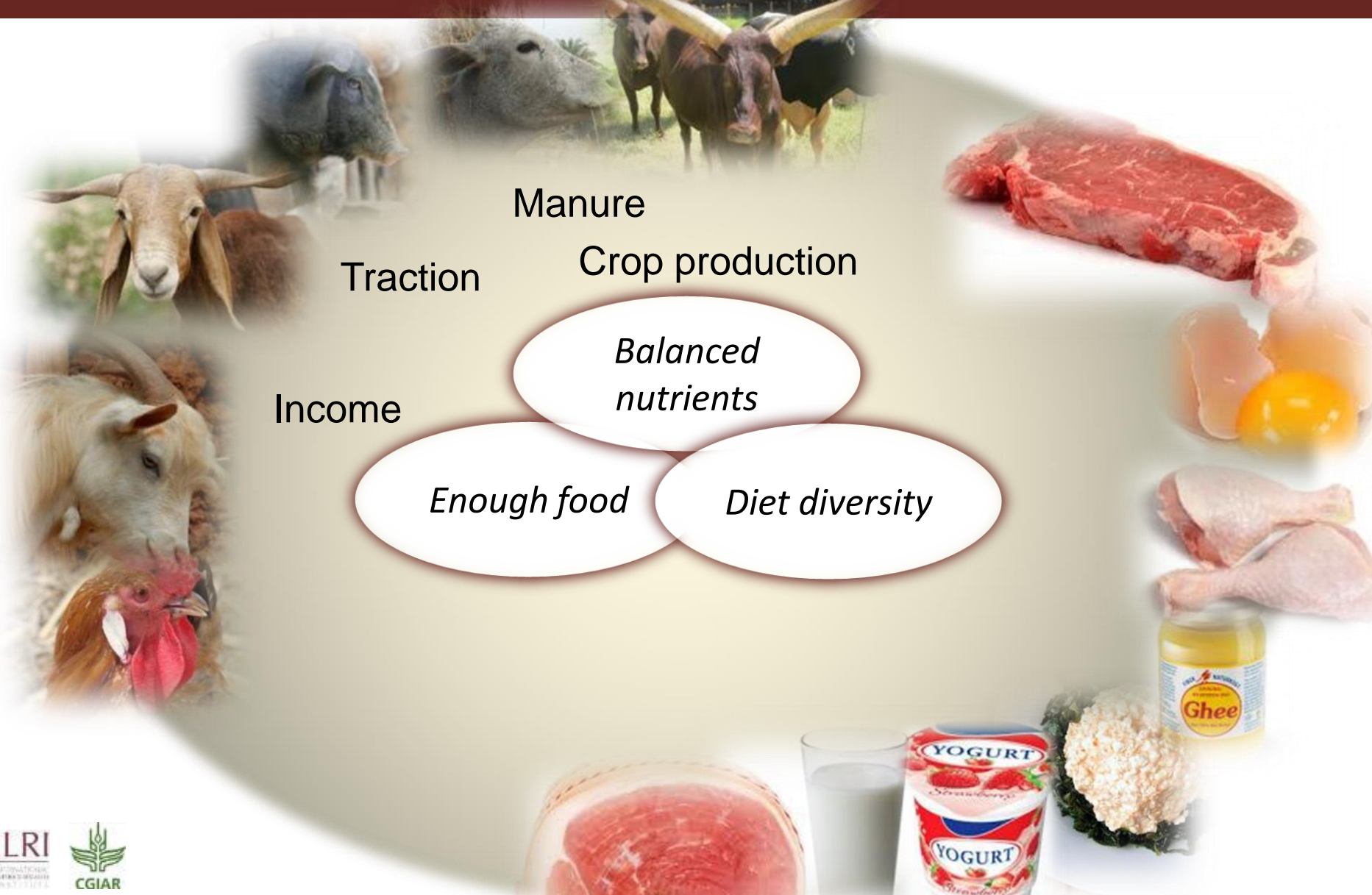
In millennium development village clusters

- Households with livestock are more likely to consume animal-source foods
- Linking animal-source food consumption with anthropometric measures is complex and influenced by other variables

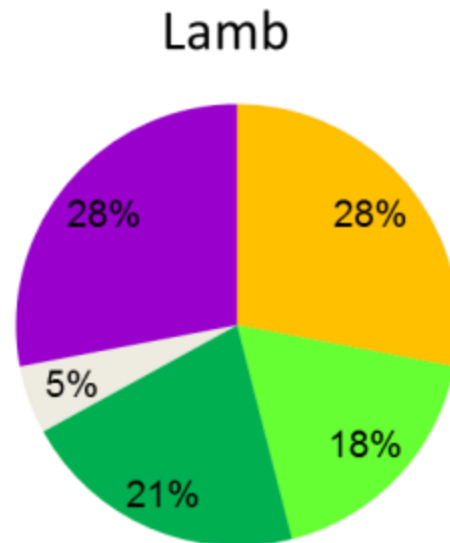
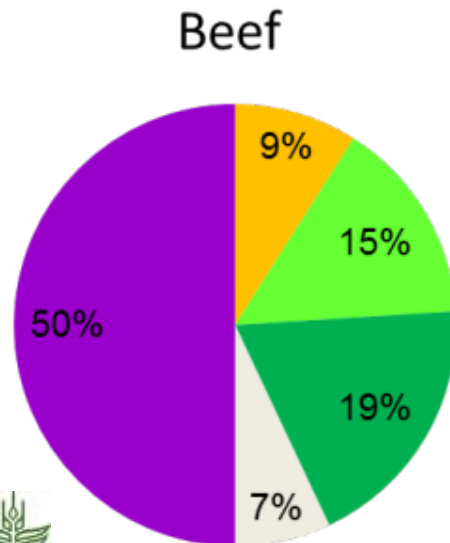
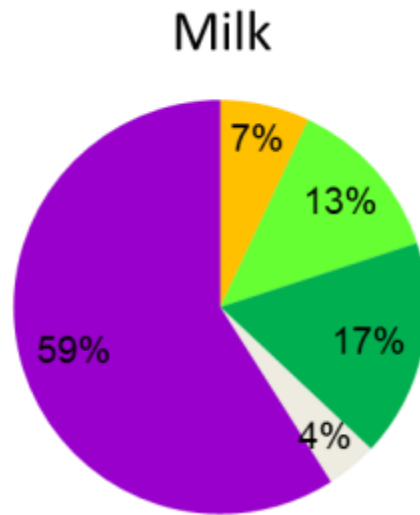
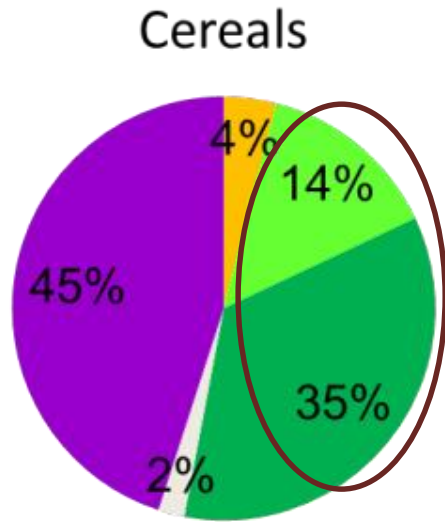


photo credit: ILRI/Apollo Habtamu

Food and nutrition security: Livestock contribute to crop production



At least half the cereals in the world can *only* be produced with animals in the farm system



Developing-country mixed crop-livestock systems, most of them smallholders, supply a large proportion of **cereal and livestock** products

- agro-pastoral
- mixed extensive
- mixed intensive
- other
- developed countries

Soil fertility: 23% of nitrogen for crop production
in crop-livestock systems comes from manure



In Europe as much as 38% of the
nitrogen inputs come from manure

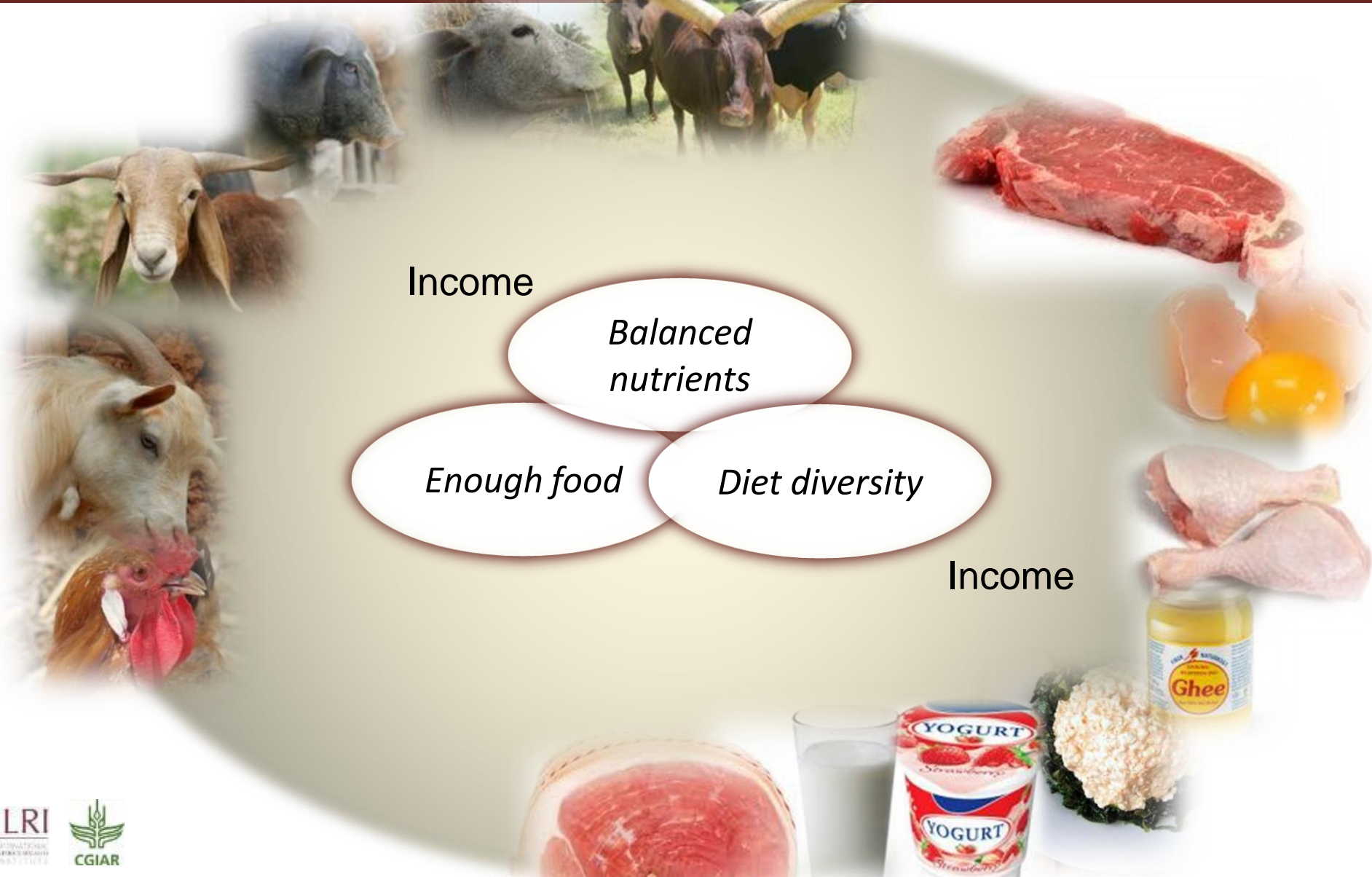
Animal traction remains essential for crop production, especially in Africa

15% farms in southern Africa
and 81% in northern Africa
depend on traction for ploughing

A photograph showing a man in a blue shirt and dark pants plowing a field with two oxen. The oxen are harnessed together and pulling a wooden plow. The field is dark brown soil, and the background shows a dry, open landscape with a single tree and distant hills under a clear sky.

7 million oxen are the main source of power
for tilling soil in the Ethiopian highlands

Food and nutrition security: Livestock provide income to purchase nutritious food



Livestock generate income, some of which is spent on food

Income—*value of meat, milk, eggs*

- Market value of animal-source foods in Africa in 2050 estimated as USD151 billion
- Milk and eggs provide a steady (daily) income stream

Income—*employment*

- 700,000 employed in the dairy sector in Kenya
- Major opportunities for youth

Income—*animals*

- Important to manage ‘lumpy’ expenditures (school and medical fees)
- Insurance against risks

Income used for food (2015)

Engel's law (economics):

'As income rises, the proportion of income spent on food falls, even if absolute expenditure on food rises.'

8 countries spent less than 10% of household income on food: Australia, Austria, Canada, Ireland, Singapore, Switzerland, UK, USA

9 countries spent more than 40% of household income on food: Algeria, Azerbaijan, Cameroon, Guatemala, Kenya, Kazakhstan, Nigeria, Pakistan, Philippines

Role of livestock in increasing income results in more diverse diets

Zambian households that received animals (via Heifer):

- Increased their dietary diversity via:
 - Direct consumption (1/3 more for dairy)
 - Increased expenditure on more food groups
- Decreased their poverty (from 78% to 59% below \$1.25/day for dairy cow recipients)
- Increased 'sense of security' and improvement in welfare

Beyond recipients

- Influence on local food markets (e.g. more affordable dairy)





Complexities
and trade-offs
for the future

Today's producers: Tomorrow's enterprises

750 million smallholder livestock producers are diverse:

- 1/3 will find alternate livelihoods
- 1/3 may or may not remain
- 1/3 will succeed at market-oriented livestock livelihoods

Opportunities to respond to food and nutrition security

Smallholders to smartholders:

To thriving enterprises, part of a vibrant, productive and resilient food system . . . with particular opportunities for women and youth



photo credit: ILRI/ Camille Hanotte

Competition for land and grains? Maybe not!

6 billion tonnes dry feed

Could be eaten by humans
14%

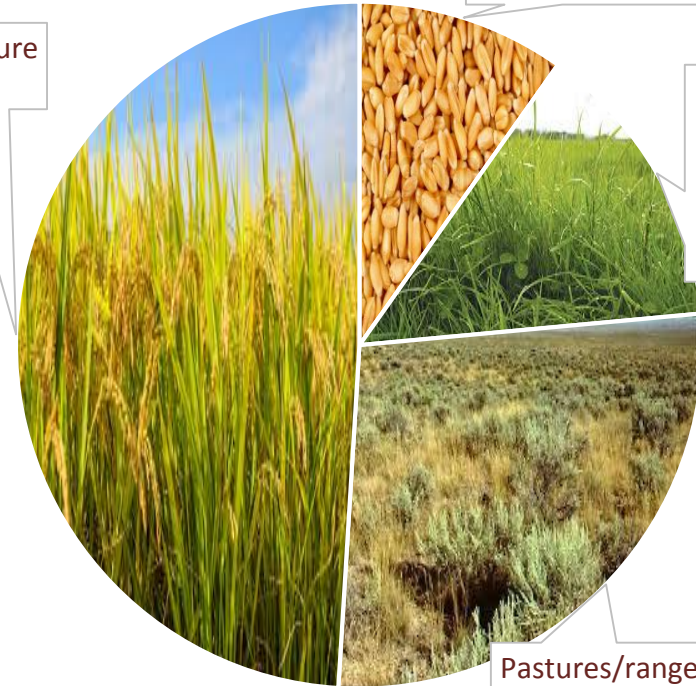


Inedible by humans
86%

5 billion ha global agricultural area

Feed production
10%

Crop agriculture
49%



Grassland that could be converted for crops
14%

Pastures/rangelands - not suitable for crops
27%

Latest for 1 kg boneless meat:
2.8kg human-edible food for ruminants
3.2kg human-edible food for monogastrics

Trade-offs and opportunities in responding to future demand

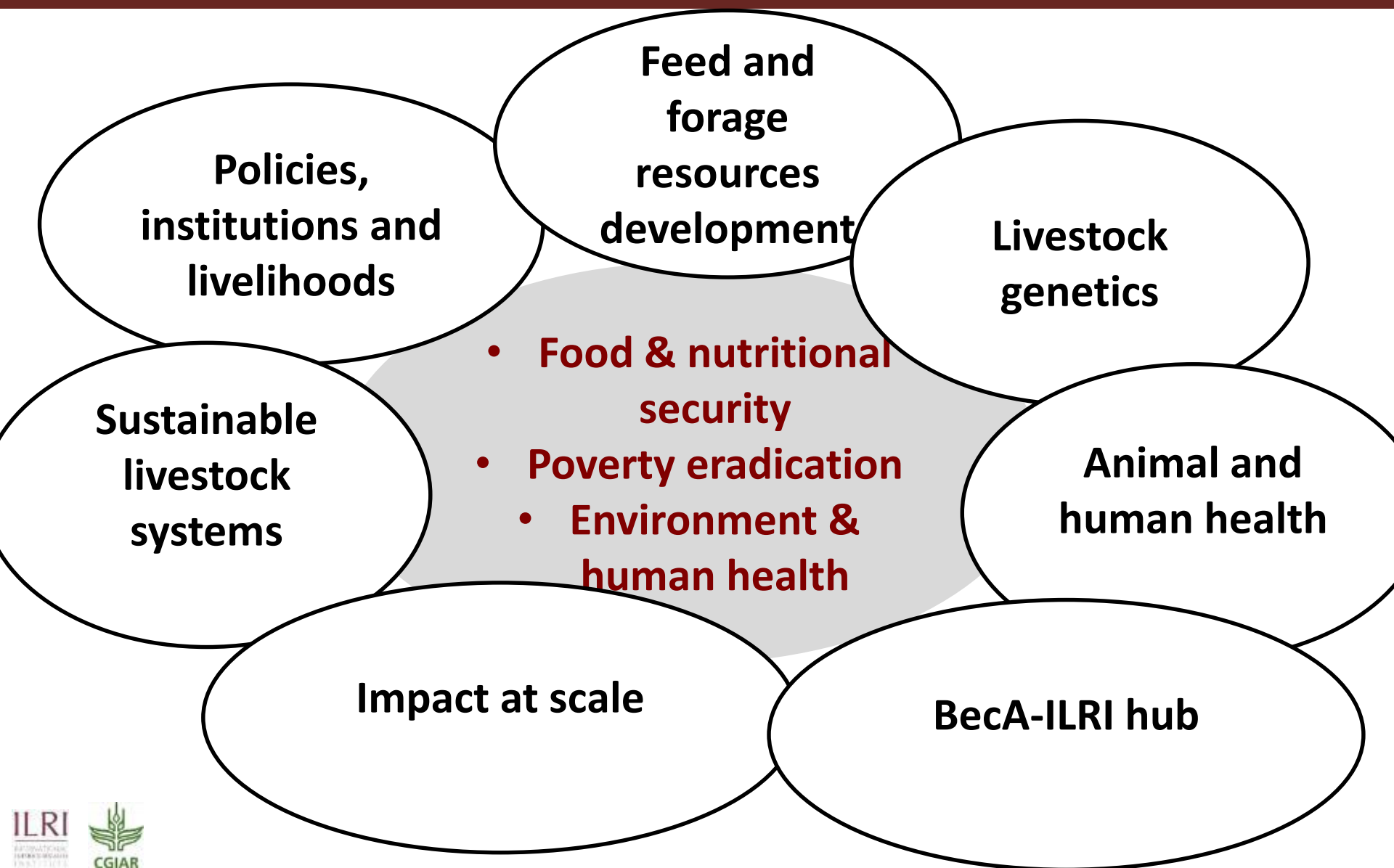
- Livestock contribute to GHG emissions but are also one of the key ways to reduce future emissions
- Livestock production is intimately linked to the environment
- Transforming markets present new opportunities for safe food

3 interlinked principles:

- Improve resource use efficiency
- Strengthen resilience
- Improve social equity/
responsibility outcomes



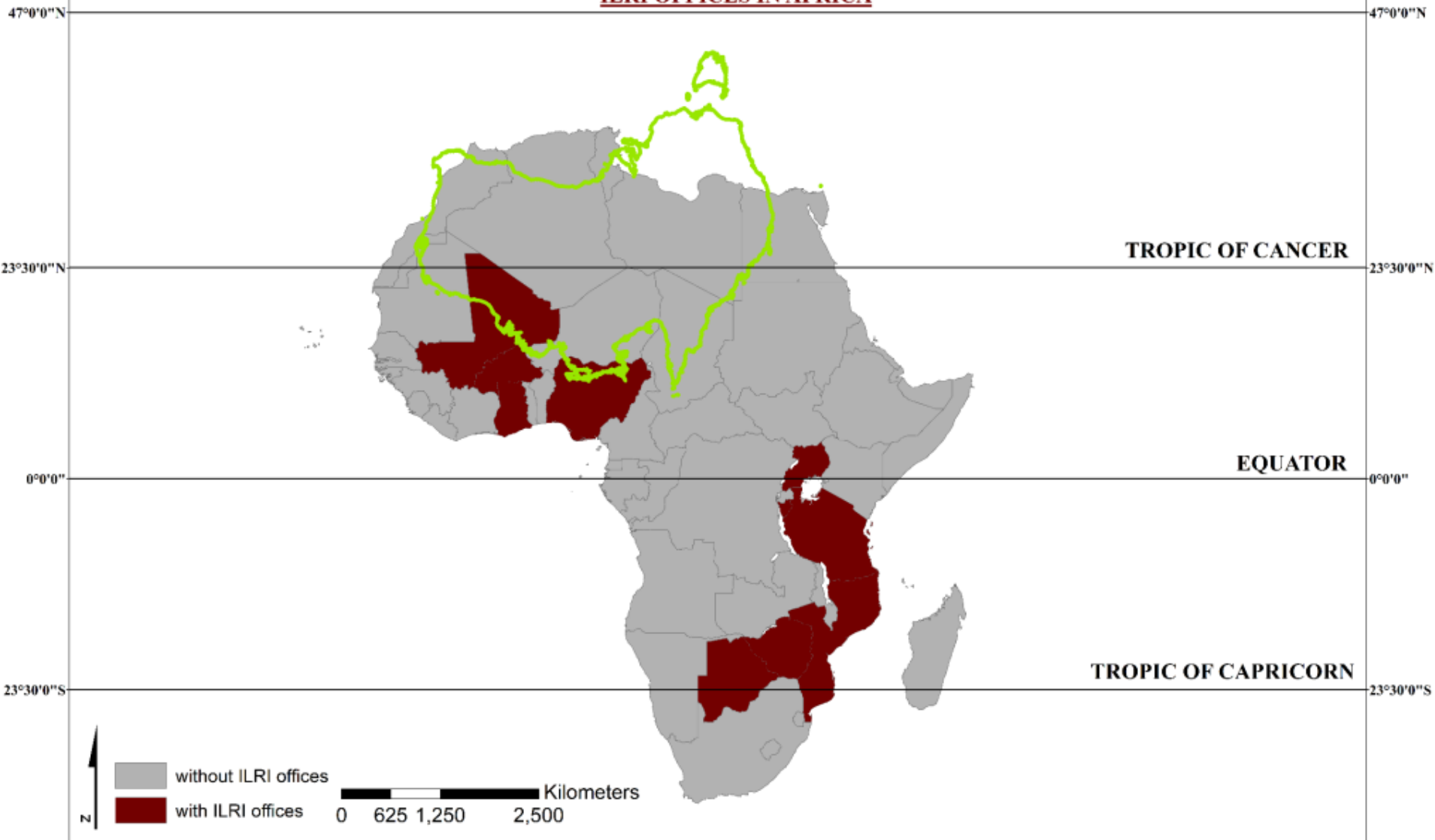
Research for development solutions



ILRI offices



ILRI OFFICES IN AFRICA



TROPIC OF CANCER

EQUATOR

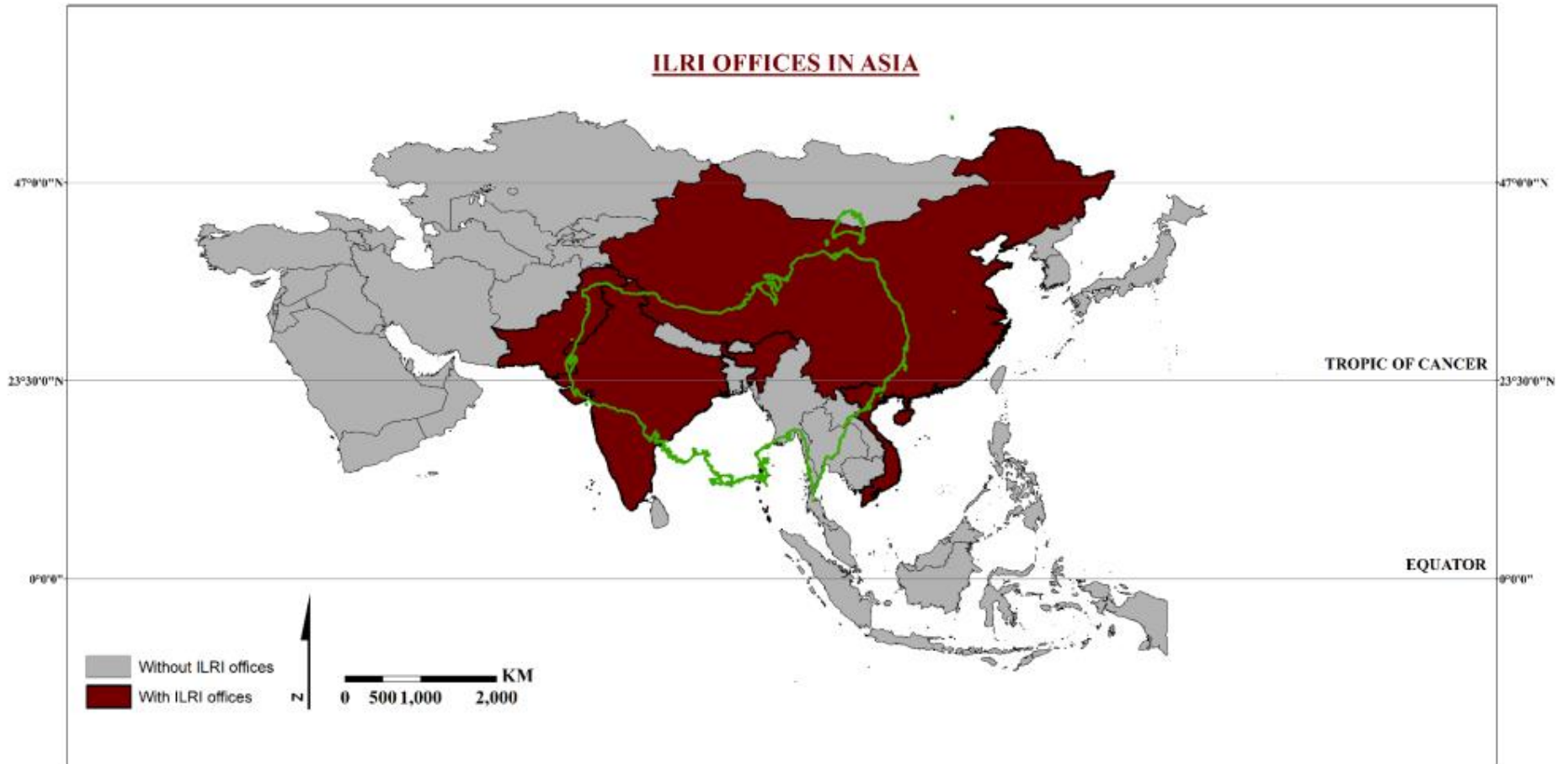
TROPIC OF CAPRICORN

without ILRI offices

with ILRI offices

0 625 1,250 2,500 Kilometers

ILRI OFFICES IN ASIA



Map by Catherine Pfeiffer and Samuel Itheria, ILRI

Peter Doherty on international livestock research and ILRI

The idea behind ILRI was always to bring the best available science to African livestock problems.

With modern technology, the power of that approach has been enormously enhanced.

It's essential that Africa gets that food production right as its economies continue to develop.

One of the things that contributes most to food production is having a good science base.

Promoting human well-being by increasing the availability of food is perhaps the most important issue facing us.

Over the years, ILRI has trained more than 8,000 young scientists, many from Africa and many from other developing regions.

This has made a substantial contribution to building a science base within the developing world.

better lives through livestock

ilri.org

ILRI thanks all donors and organizations who globally supported its work through their contributions to the **CGIAR system**

Patron: Professor Peter C Doherty AC, FAA, FRS

Animal scientist, Nobel Prize Laureate for Physiology or Medicine–1996

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