



From Pastures to Policy: Livestock Practices for Regenerative Agriculture

Reimagining resilient livestock food systems from farm to fork

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University of Pennsylvania*

CGIAR System Board Chair and Professor Extra-Ordinary, University of Pretoria

Gogo Mahembe's 1-hectare farm

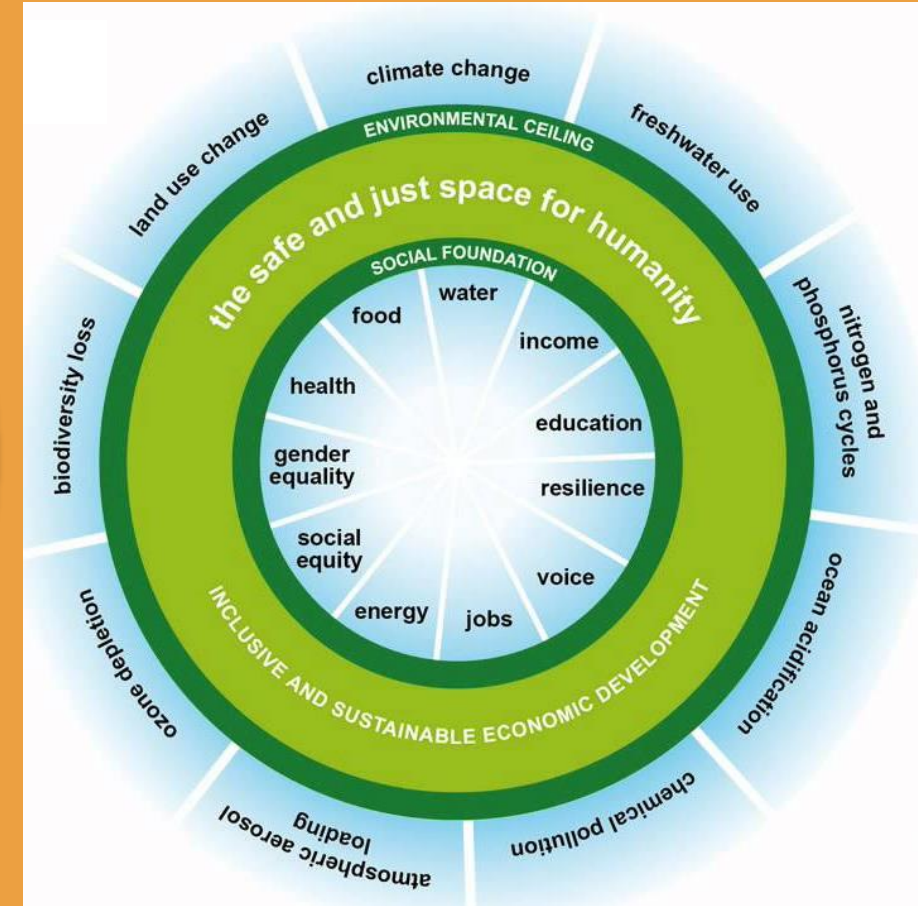
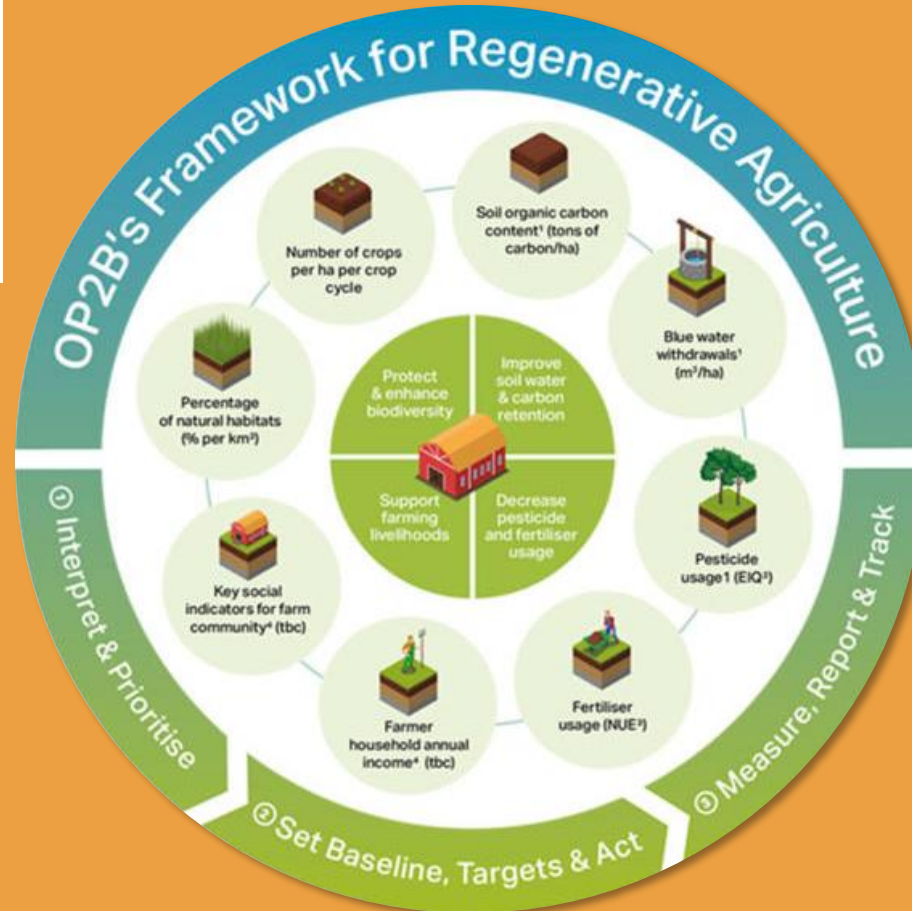


Lindiwe the.....



- Farmer
- Academic
- Researcher
- Policy Advisor
- Governance specialist
- Integrated systems transformer

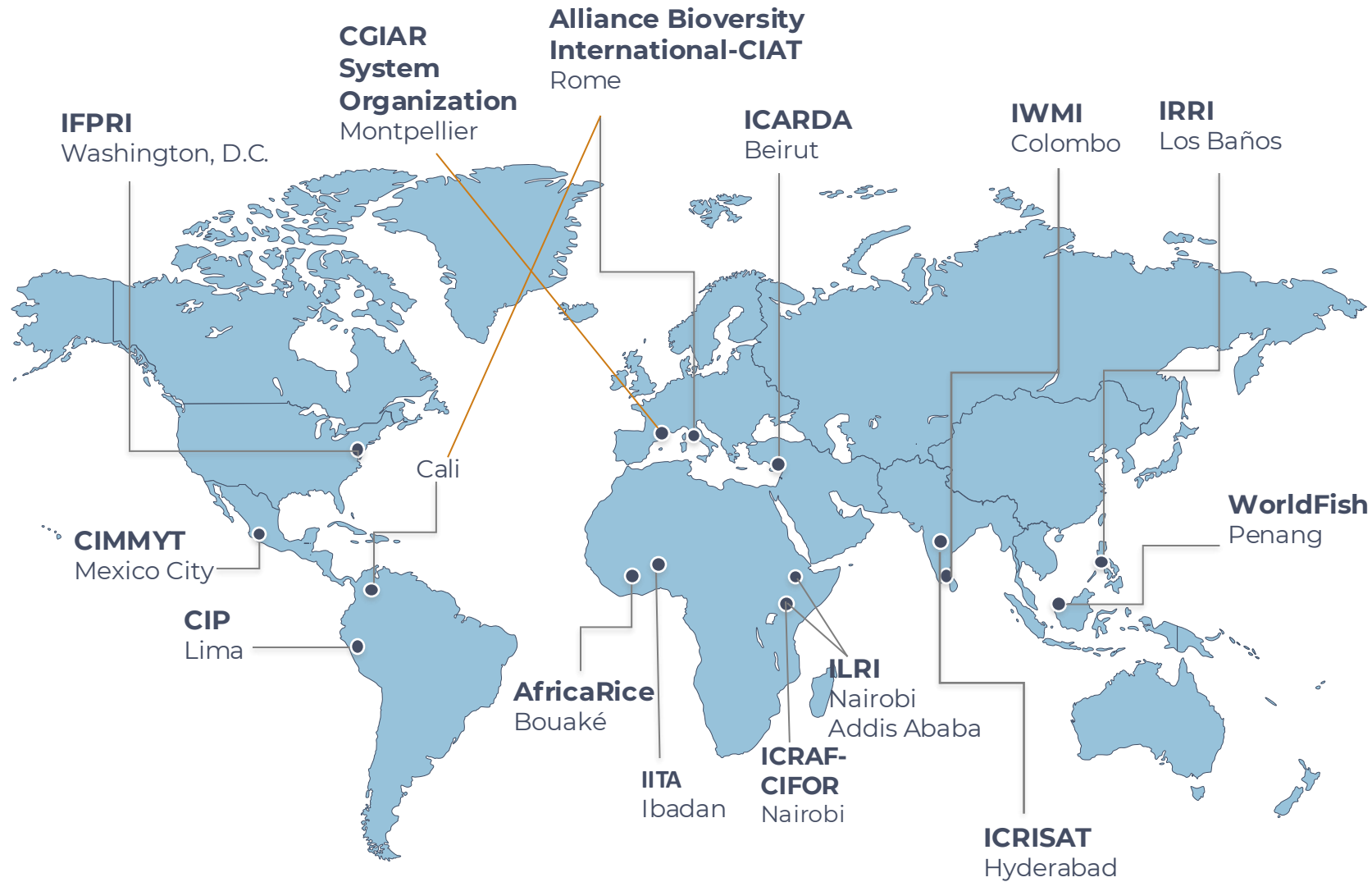
The evolution of Sustainable Agriculture



CGIAR: Global mandate, local presence



Better lives through livestock



CGIAR Vision

A world with sustainable and resilient food, land, and water systems that deliver diverse, healthy, safe, sufficient, and affordable diets, and ensure improved livelihoods and greater social equality, within planetary and regional environmental boundaries.

Regenerative Agriculture

A holistic land management approach that aims to improve soil health, increase biodiversity, and sequester carbon, ultimately leading to more resilient and productive farms and ecosystems.

Biodiversity, collective
& landscape actions



Diverse cropping &
livestock systems
integration



Soil health



Water Stewardship



Collective & landscape actions





Re-imagining farming and livestock production from farm to fork: *the challenges and opportunities our food systems face*

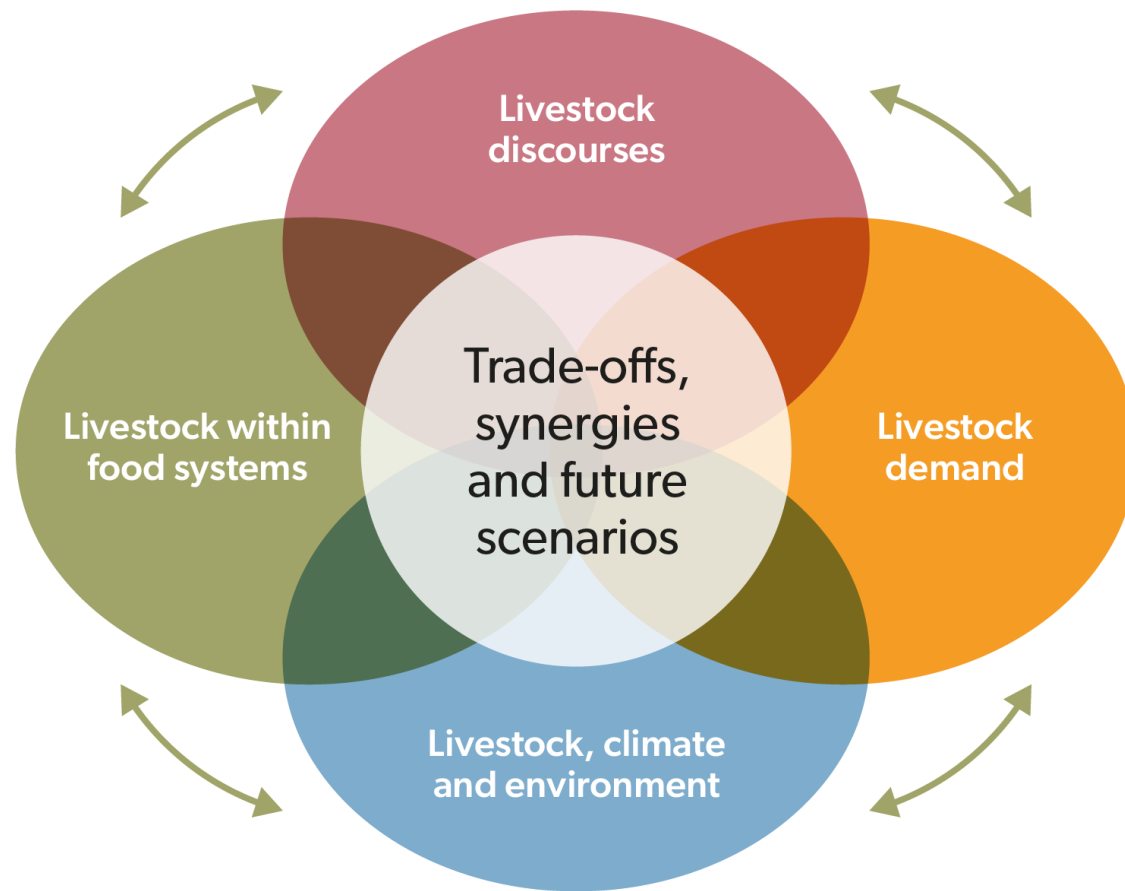
International Livestock Research Institute

ILRI's Vision

Peoples' lives in low- and middle-income countries are improved through livestock science that contributes to equitable and resilient livestock systems in order to deliver food systems transformation with climate and environmental benefits.



Strategic challenges facing livestock



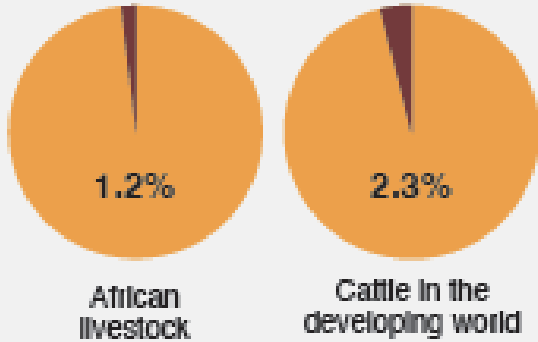
CGIAR
2030
RESEARCH AND
INNOVATION
STRATEGY

Transforming food,
land, and water systems
in a climate crisis

1. Livestock Discourses

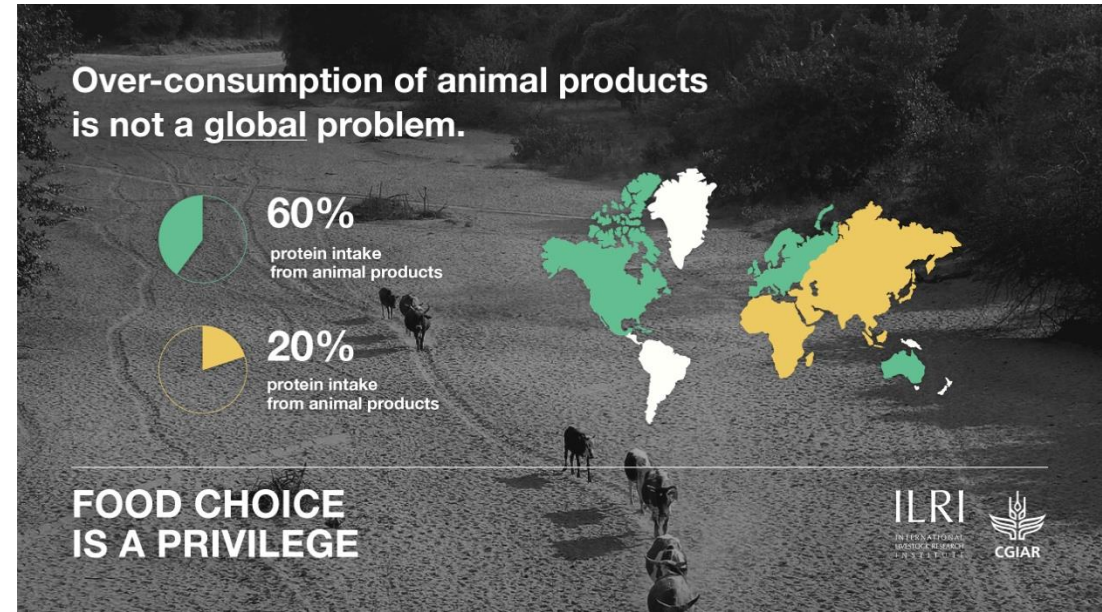
Climate and Livestock

Global GHG emissions



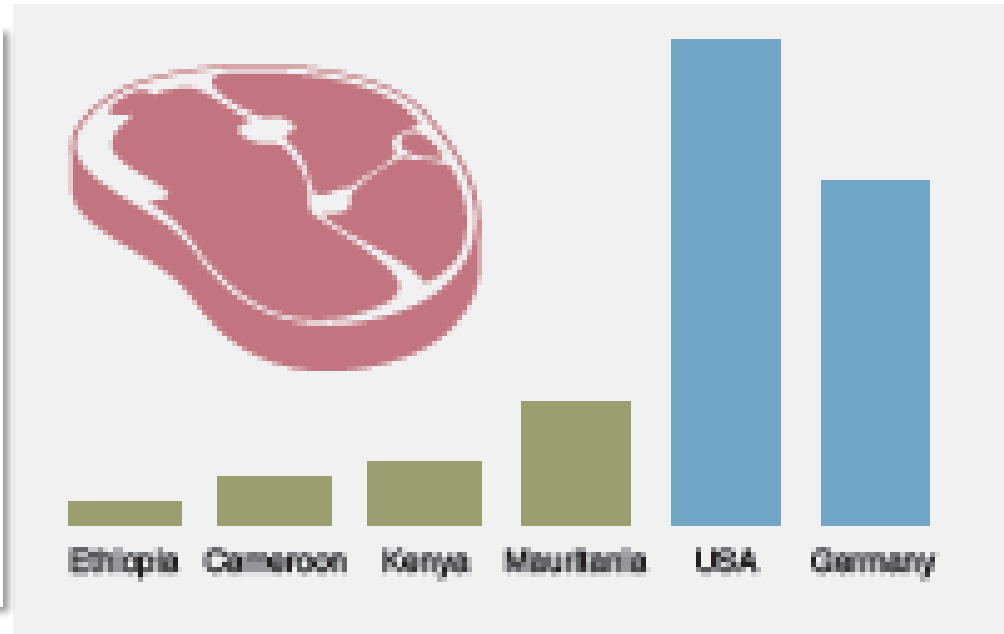
African livestock are responsible for approximately 1.2% of global GHG emissions; and cattle in the developing world for 2.3% of agriculture related GHG emissions.

Consumption patterns



AFRICA
COP28: Rich countries must commit more climate finance for adaptation of African livestock sector, say experts
Investments necessary to sustain fastest-growing population on planet, write African leaders, scientists and experts

By DTE Staff
Published: Tuesday 28 November 2023



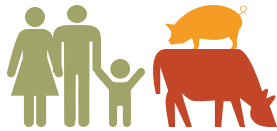
2. Importance of livestock in global food systems



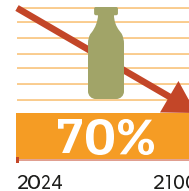
Livestock sustains the livelihoods of **1.7 billion** people globally



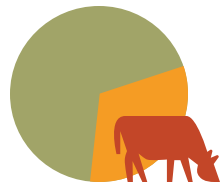
Micronutrients in animal source foods are essential for young children and pregnant women



60% of rural households in developing countries rely on livestock for economic security.



Climate change seriously threatens livestock productivity. Reduction in milk and meat production in African and Asian countries may exceed 50 or even 70% under high-emission scenarios by 2100.



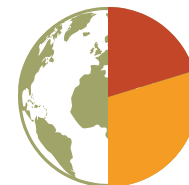
Livestock contributes **40%** of total agriculture GDP (on average). In Africa, it can range from 20-80%.



Foodborne diseases cost around **\$110 billion** a year in lost productivity and medical expenses.



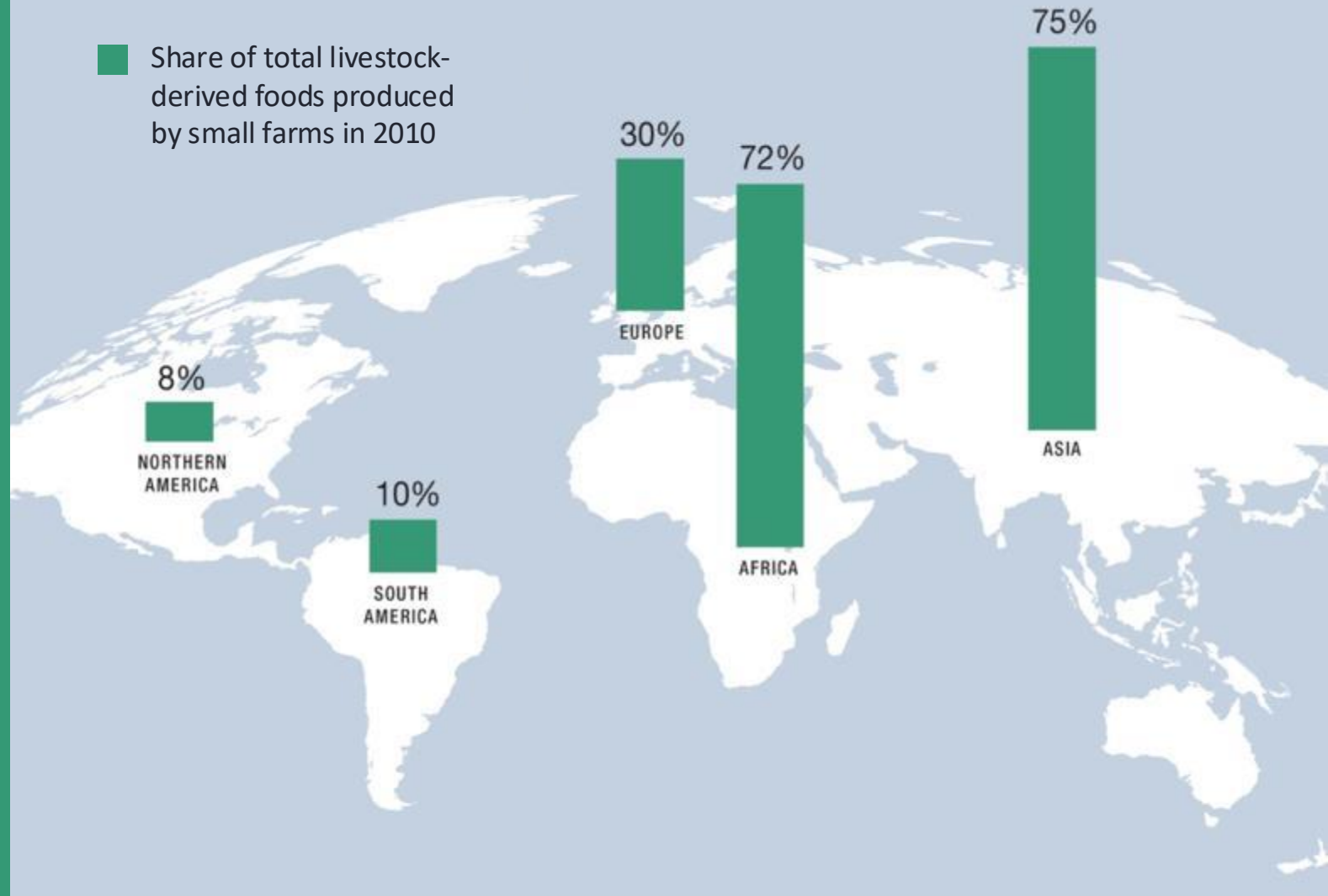
More than **1.2 million** deaths per year result from antimicrobial resistance.



Just over half the earth's surface is classified as rangelands. Of this, **21%** is not suitable for any other agricultural production system than livestock.

Smallholder farmers currently provide most of the meat, milk and eggs AND staple cereals in LMICs

- **1.7 billion people** derive some livelihood from livestock; over half a billion depend on livestock
- **Livestock are fundamental** to many economies; provide income, jobs, and supporting risk mitigation
- Livestock are the basis for **farm sustainability**, integrated livestock-food farms make food crop farming even possible for many in the Global South – circular bioeconomy in action!



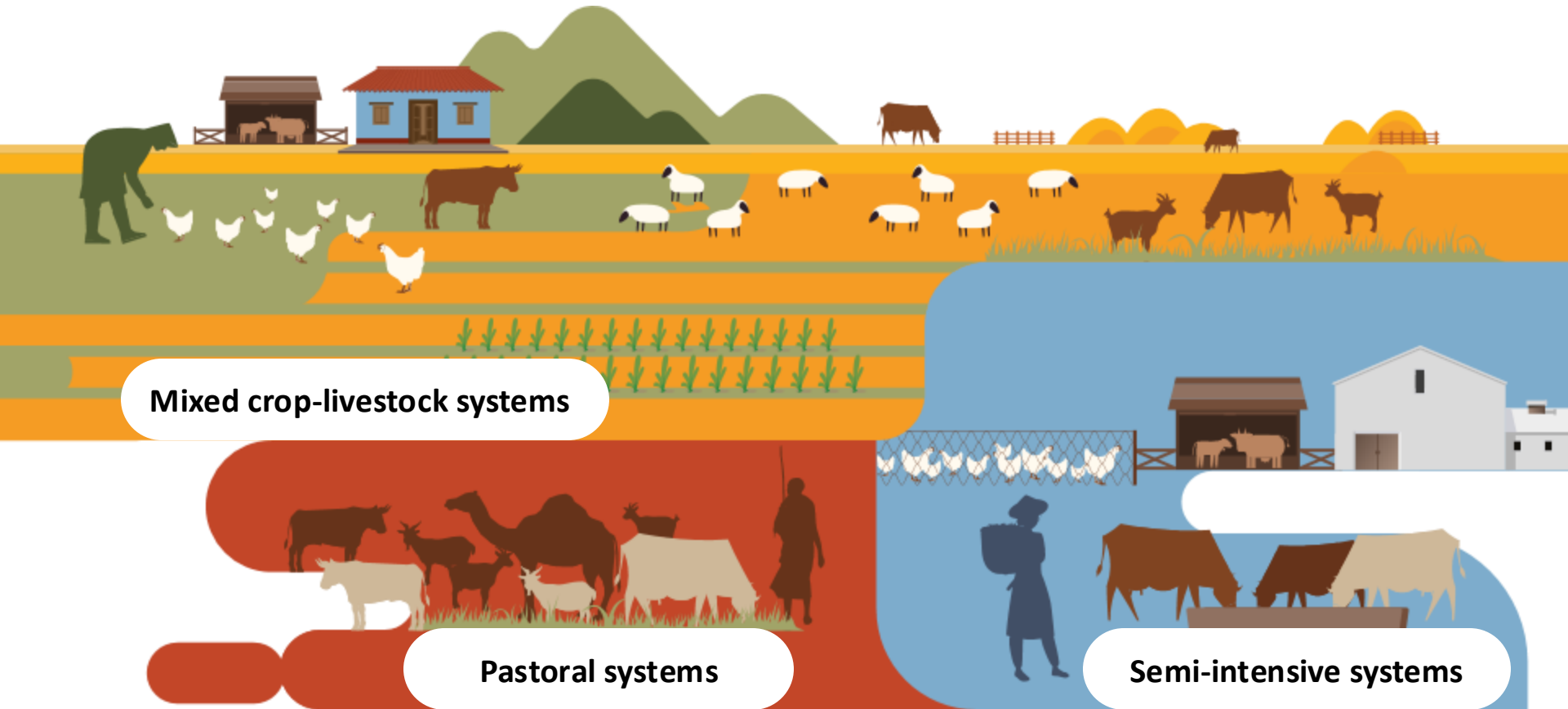
Farms of less than 20 hectares provide:

Nearly 50% of the world's livestock and cereals, and close to 70% of the livestock and cereals in emerging and developing economies

Did you know...

Livestock are integral to 'circular bioeconomy' which is the basis for most livestock production in LMICs

Diversity of livestock systems in LMICs



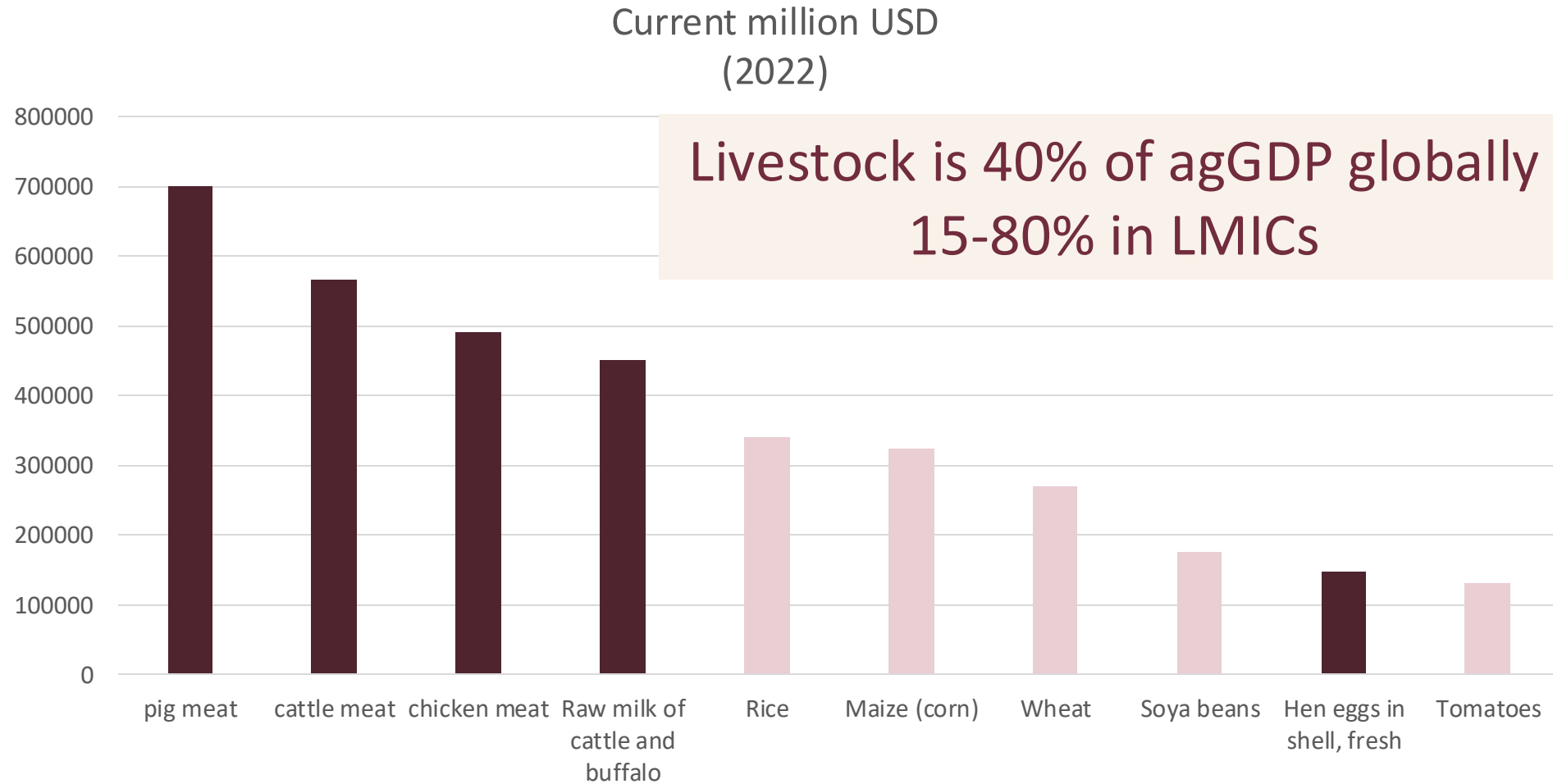
Mixed crop-livestock systems

Pastoral systems

Semi-intensive systems

Each livestock system for different commodities (milk, meat, eggs) has different pathway to sustainability

3. Livestock Demand: Global commodity values 2022: animal source foods, five of the top ten (value USD2.5 trillion)



4. Climate change – Smallholder farmers and livestock keepers face many risks



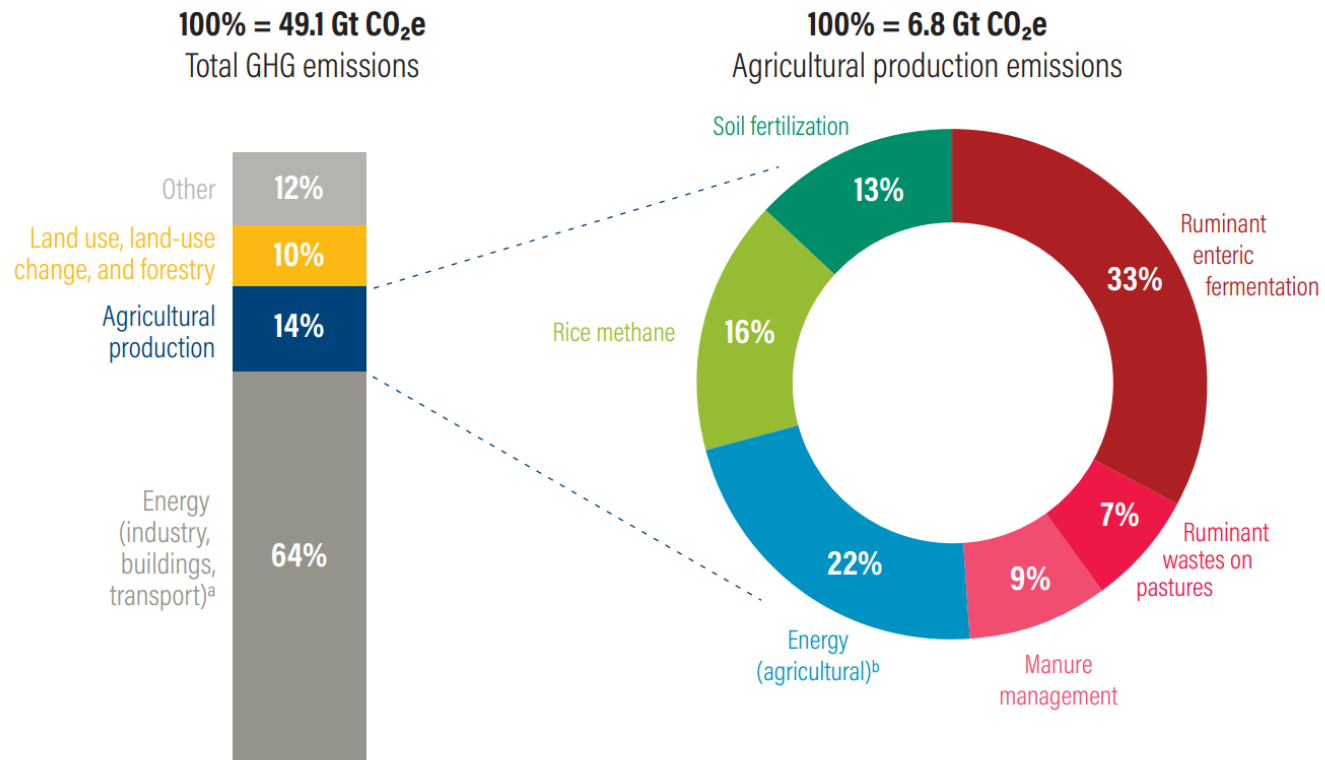
- Pests and disease
- Cost of inputs
- Prices received for products
- Market risk
- Storage risk – loss of quality and health risks (e.g., Aflatoxins)
- Climatic risk
- Conflicts over resources (Herder-farmer), including insecurity (Sahel, Horn of Africa).



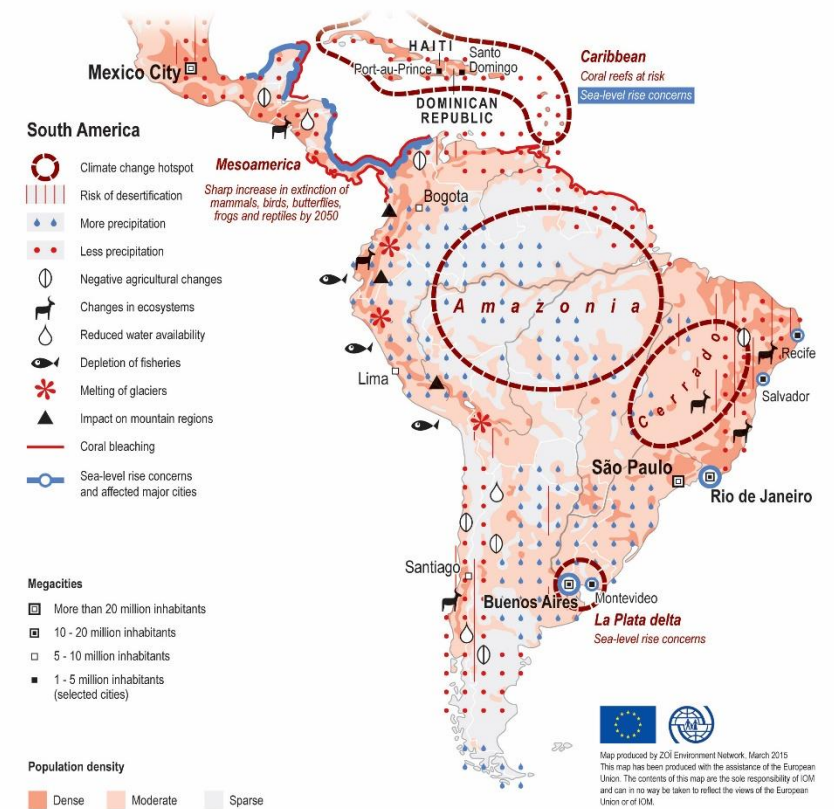
Risk, especially climate risk remains a huge disincentive for investments into technology to improve productivity.

Agriculture and climate change

Important cause

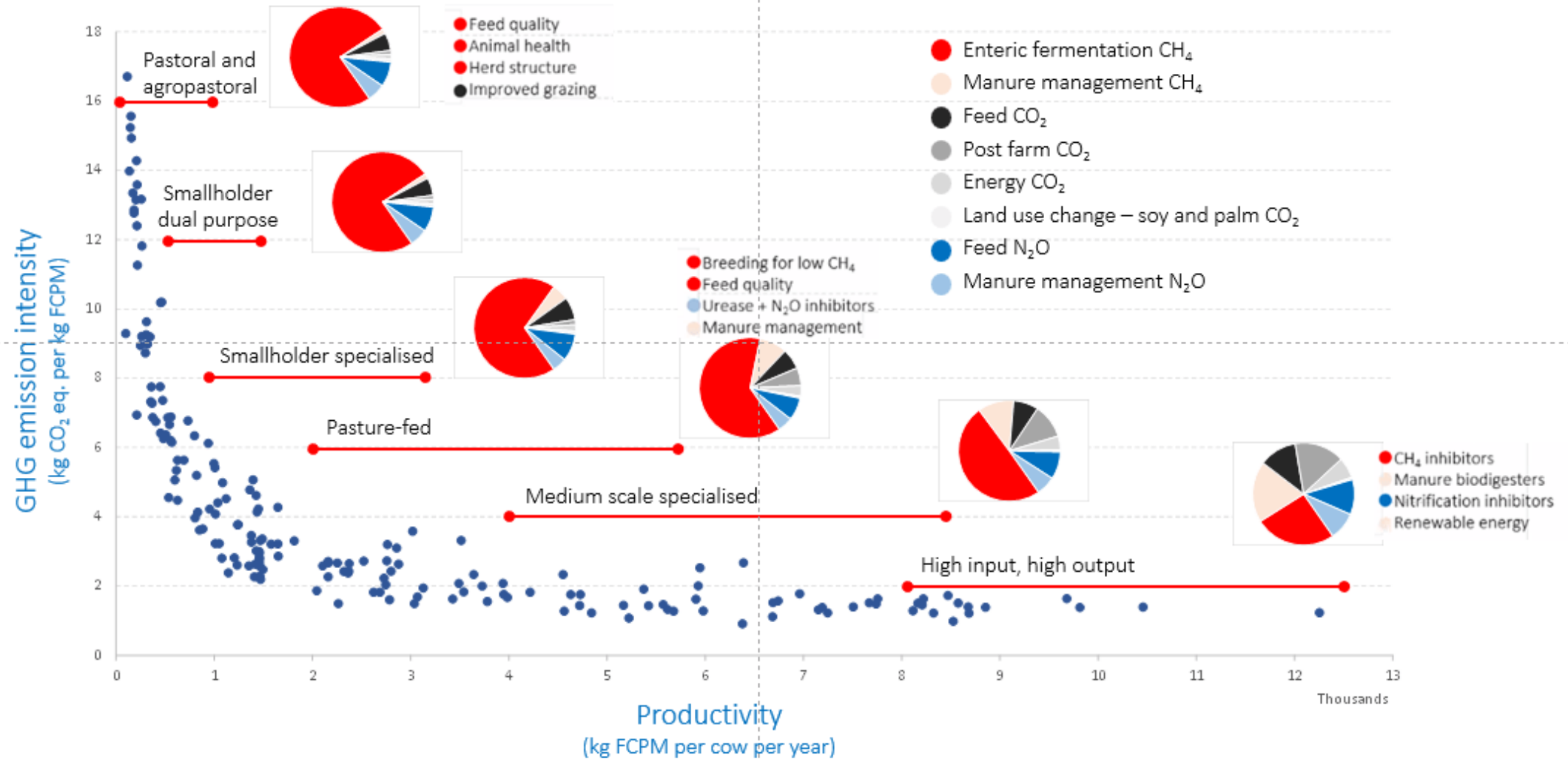


Heavily affected



(Searchinger et al., 2019)

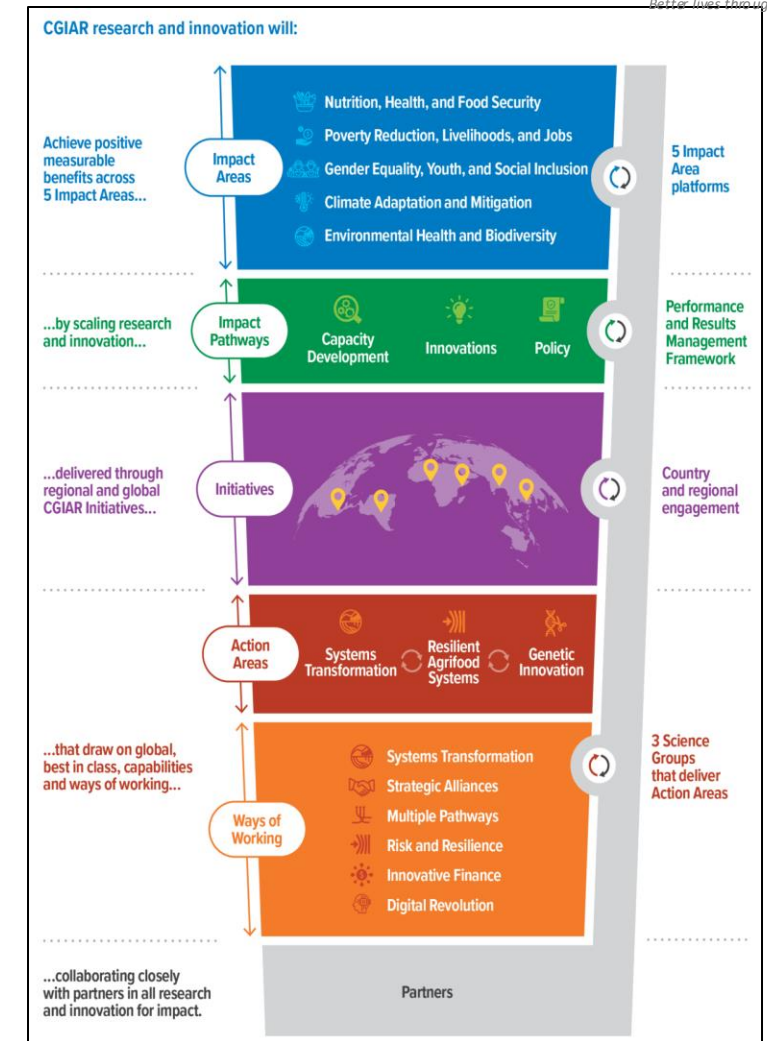
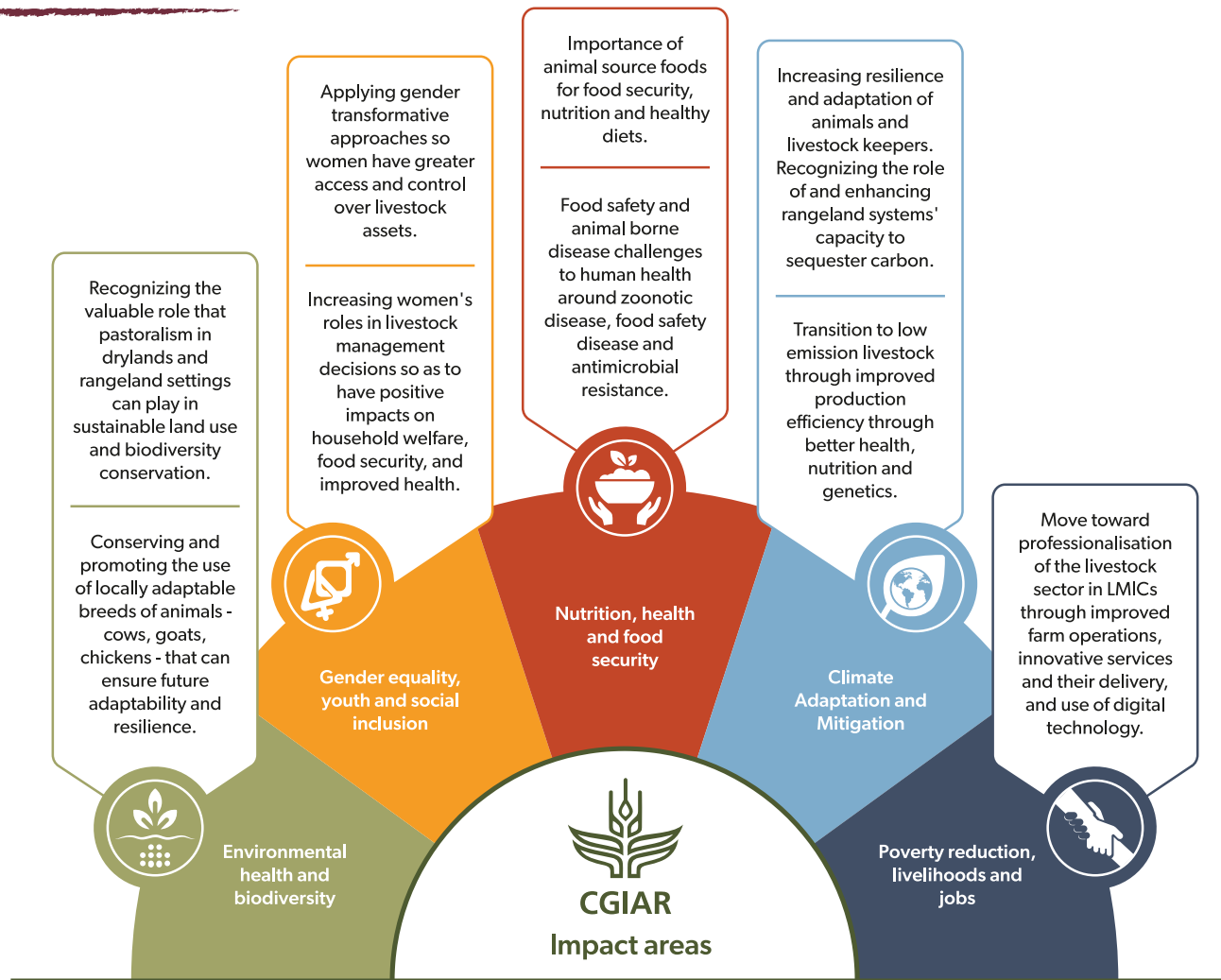
Opportunities to mitigate emissions from livestock



Livestock contribution to CGIAR impact areas



Better lives through livestock





Better lives through livestock

**All flesh is grass
We need to nurture
animals, plants and
nature, in turn they
will nourish us**

- Gordon McClymont

*Agriculturist, Humanitarian, Educator, and Foundation
Dean of the Faculty of Rural Science 1956-1976*





Learn more about the strategy

ILRI Corporate Strategy 2024-2030:
Unlocking sustainable livestock's potential through research for better lives and a better planet

On CGSpace here: <https://hdl.handle.net/10568/141813>
Two page version: <https://hdl.handle.net/10568/141905>

VISION FOR ADAPTED CROPS AND SOILS



The vision for adapted crops and soils: how to prioritize investments to achieve sustainable nutrition for all

Jeffrey E. Herrick [✉](#), Cary Fowler, Lindiwe Majele Sibanda, Rattan Lal & Anna M. Nelson

Nature Plants 10, 1840–1846 (2024) | [Cite this article](#)

766 Accesses | 5 Altmetric | [Metrics](#)

The Vision for Adapted Crops and Soils (VACS) is a global movement, launched in 2023, to improve human nutrition in the face of a changing climate and degraded lands. VACS emphasizes an integrated approach to investments in crops and soils, concentrating on the potential of traditional and indigenous ‘opportunity crops’. VACS also addresses priorities, including climate change and drought, biodiversity, soil fertility, gender equality and women’s empowerment, water, sanitation and health.

Vision for Adapted Crops and Soils (VACS) addresses a set of interconnected problems

Unhealthy **diets** are undermining health and development

Soils are depleted and highly reliant on inputs

Climate change is and will continue to affect crop production



Food security fundamentally depends on fertile soils and adapted crops. You just don't have food security without those two things. Poor, degraded soils and unadapted crops will never, never provide for food security.

*- Dr. Cary Fowler, Special Envoy for Global Food Security
Office of Global Food Security, US State Department*





Signing Ceremony of the Memorandum of Understanding between the Food and Agriculture Organization of the United Nations (FAO) and the International Maize and Wheat Improvement Center (CIMMYT) on the

**CGIAR/CIMMYT - FAO Partnership
to advance the Global Vision for Adapted Crops and Soils**

Monday, July 8, 2024

The Vision for Adapted Crops and Soils



A movement to achieve a resilient food system grounded in diverse, nutritious, and climate-adapted crops grown in healthy soils.

Opportunity Crops (Annuals/Biennials)



VACs opportunity Crops for Africa: indicative list

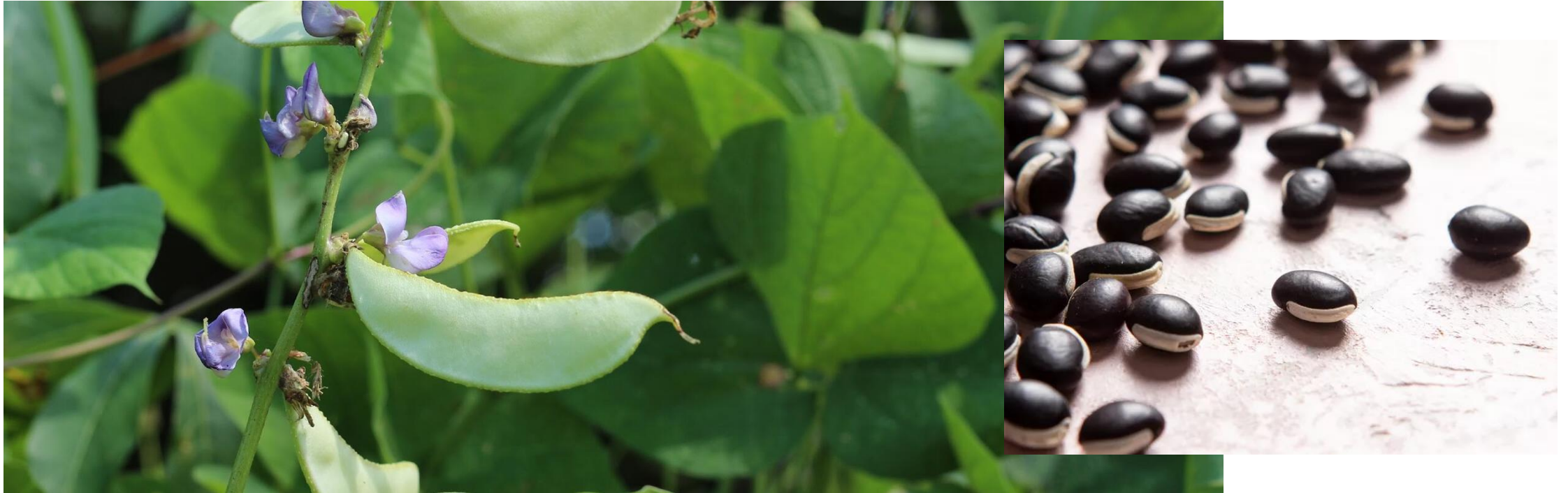
Crop Group	Common Name	Latin Name
Cereals	● Teff	<i>Eragrostis tef</i>
	● Fonio	<i>Digitaria exilis</i>
	● Pearl Millet	<i>Cenchrus americanus/Pennisetum glaucum</i>
	● Finger Millet	<i>Eleusine coracana</i>
	Oats	<i>Avena sativa</i>
	● Sorghum	<i>Sorghum bicolor</i>
	Barley	<i>Hordeum vulgare</i>
	● African Rice	<i>Oryza glaberrima</i>
Roots & Tubers	Enset	<i>Ensete ventricosum</i>
	● Cocoyam/Elephant Ear	<i>Xanthosoma sagittifolium</i>
	● Yams	<i>Dioscorea spp.</i>
	● Cassava	<i>Manihot esculenta</i>
	● Taro (Colocasia)	<i>Colocasia esculenta</i>
	● Sweet Potato	<i>Ipomea batatas</i>
Fruits	● African Locust Bean	<i>Parkia biglobosa</i>
	African Custard Apple	<i>Annona senegalensis/squamosa</i>
	Miracle Berry	<i>Synsepalum dulcificum</i>
	● Desert Date	<i>Balanites aegyptiaca</i>
	Wild Loquat	<i>Uapaca kirkiana</i>
	Breadfruit	<i>Artocarpus altilis</i>
	Jackfruit	<i>Artocarpus heterophyllus</i>
	● African Jujube	<i>Ziziphus jujuba/mauritania</i>
	Cooking Banana	<i>Musa × paradisiaca</i>
	● Bushmango	<i>Synsepalum dulcificum</i>
	● Plantain	<i>Musa balbisiana</i>
● Baobab	<i>Adansonia digitata</i>	
Vegetables	Black Jack	<i>Eragrostis tef</i>
	Gourd species (Bottle, Luffah, Bitter)	<i>Digitaria exilis</i>
	Ethiopian Mustard	<i>Brassica carinata</i>
	Spider Plant	<i>Cleome gynandra</i>

● Climate-crop models developed by AgMIP, evidence synthesis performed by Havos.AI

● Models currently being developed by AgMIP and Havos.AI, with results forthcoming

Crop Group	Common Name	Latin Name	
Vegetable (cont.)	● Moringa/Drumstick Tree	<i>Avena sativa</i>	
	● African Nightshade/Gboma	<i>Sorghum bicolor</i>	
	Jute Mallow	<i>Hordeum vulgare</i>	
	● African Eggplant	<i>Solanum aethiopicum</i>	
	● Amaranth/Joseph's Coat	<i>Amaranthus spp.</i>	
	● Pumpkin	<i>Xanthosoma sagittifolium</i>	
	● Okra	<i>Abelmoschus esculentus/caillei</i>	
	● Watermelon/Egusi	<i>Citrullus lanatus/mucosospermus</i>	
	Legumes	African Yam Bean	<i>Sphenostylis stenocarpa</i>
		Kersting's Groundnut	<i>Macrotyloma geocarpum</i>
Lupin		<i>Lupinus albus</i>	
● Lablab/Bonavist		<i>Lablab purpureus</i>	
● Fenugreek		<i>Trigonella foenum-graecum</i>	
Fava Bean		<i>Vicia faba</i>	
● Grass Pea		<i>Lathyrus sativus</i>	
Lentils		<i>Artocarpus altilis</i>	
● Mung Bean/Green Gram		<i>Vigna radiata</i>	
Chickpea		<i>Cicer arietinum</i>	
Peas		<i>Pisum sativum</i>	
Bambara Groundnut	<i>Vigna subterranea</i>		
● Pigeon Pea	<i>Cajanus cajan</i>		
● Cowpea	<i>Vigna unguiculata</i>		
Nuts, Seeds & Oilseeds	Safflower	<i>Carthamus tinctorius</i>	
	Flax	<i>Linum usitatissimum</i>	
	Macadamia	<i>Macadamia ternifolia</i>	
	● Shea	<i>Vitellaria paradoxa</i>	
	● Allanblackia/Tallow Tree	<i>Allanblackia floribunda</i>	
	● Sesame	<i>Sesamum indicum</i>	
	● Cashew	<i>Anacardium occidentale</i>	
● Groundnut	<i>Arachis hypogea</i>		

The Lab Lab Bean – a multi-purpose African bean



Banned in colonial Kenya by the British to promote industrial french beans for export , Lab-lab bean is now making a comeback: high in nutrients and health values for humans and a nutritious and climate smart forage species for animals



Better lives through livestock



The economic health of a country, and so the standard of civilization which it will support, rests on the fertility of its soils and the resultant productivity of its pasture, livestock, and crops.

- *Gordon McClymont*

*Agriculturist, Humanitarian, Educator, and
Foundation Dean of the Faculty of Rural Science
(1920-2000)*