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Animal Source Food Production and the Environment: Myths and Facts



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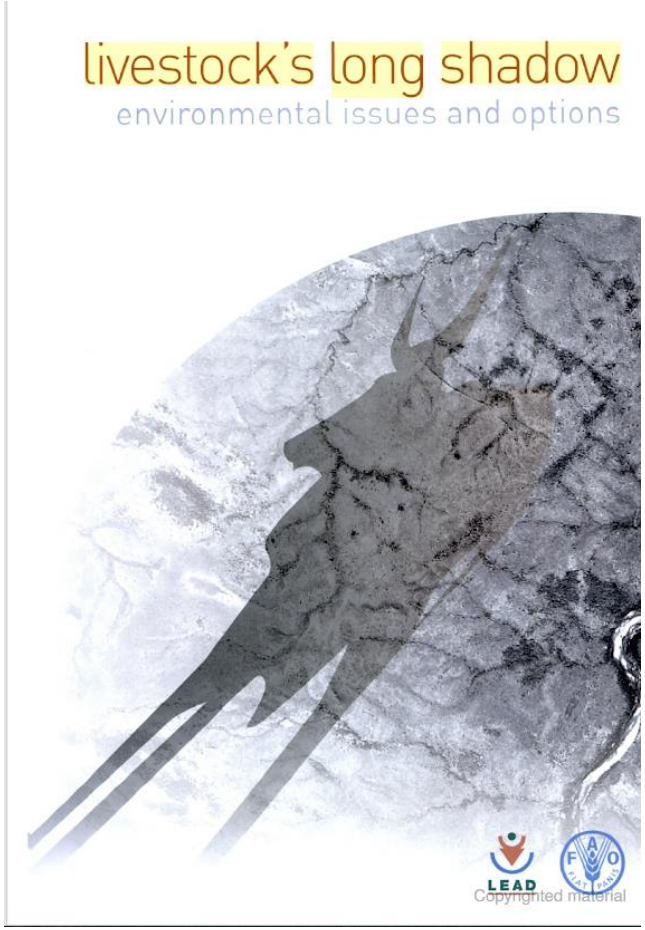
OUTLINE

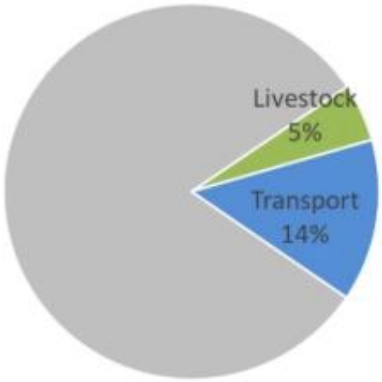
- Livestock's contribution to Greenhouse Gas
- Vegetarian Diets to Reverse Climate Change
- Land use – most ground for grazing
- Food vs. Feed
- Conversion of agricultural byproducts
- Other contributions to food security (power, fertilizer, etc.)
- Production Efficiency/Sustainable Intensification

LIVESTOCK VS. TRANSPORTATION

- 2006 publication suggests livestock account for 18% of all GHG emissions – more than all transportation!
- Widely criticized for methodology; transportation estimated from direct emissions whereas livestock estimates from direct and indirect emissions.
- Unfortunately most widely cited so misinformation persists - active and passive ignorance of the facts.

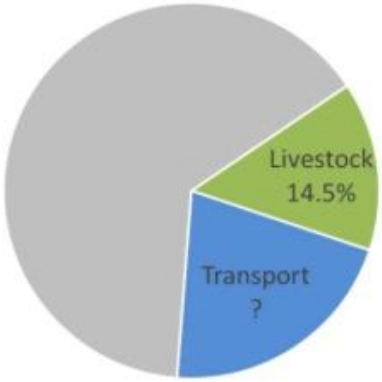


Direct emissions
(IPCC sectorial approach)



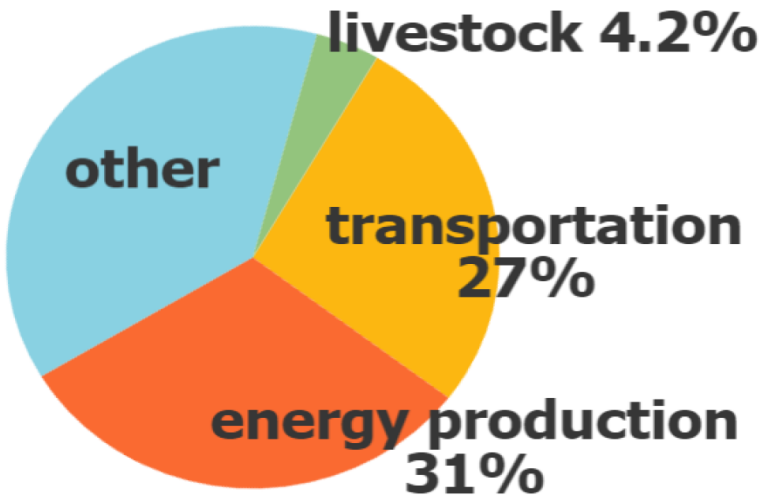
- Using IPCC estimates for direct emissions, livestock account for 5% vs. 14% for transportation
- Indirect emissions more difficult to obtain for transportation, so no direct global comparison

Life cycle emissions



Mottet and Steinfeld, 2018
http://news.trust.org/item/20180918083629-d2wf0

GREENHOUSE GAS EMISSIONS FROM DIFFERENT SECTORS IN THE US

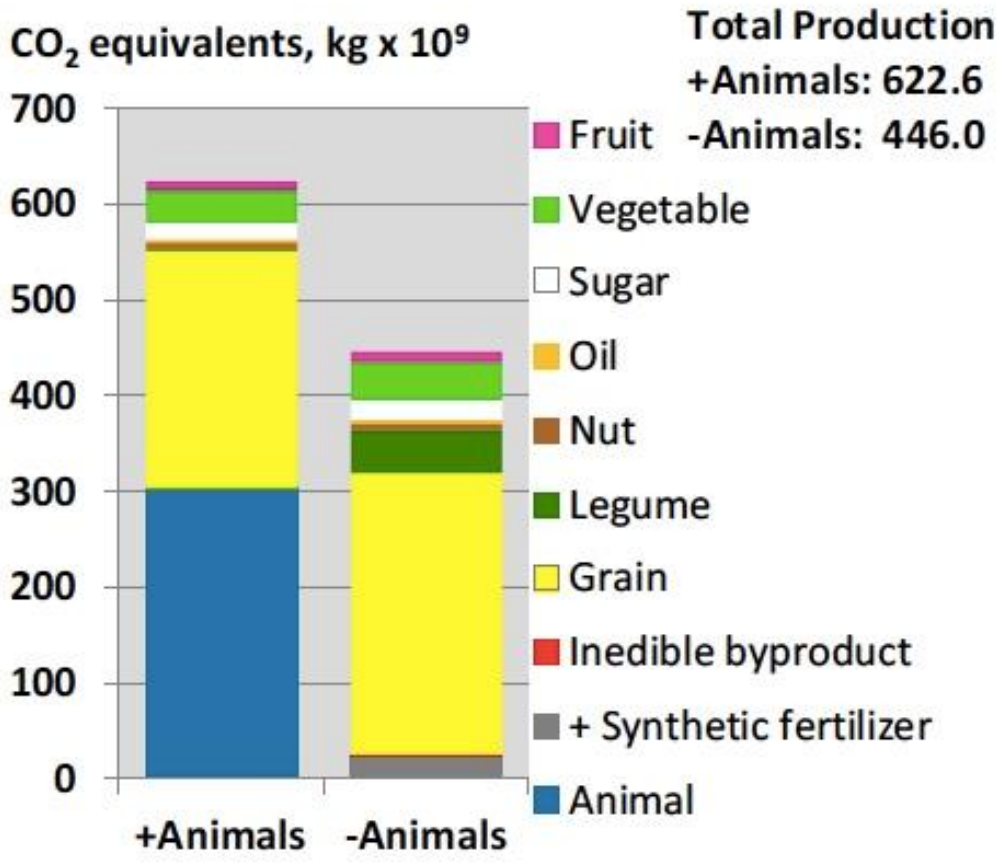


(EPA, 2015) (Mitloehner, 2016)

http://www3.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2015-Main-Text.pdf

WITH AND WITHOUT LIVESTOCK?

- Modeled current US diet vs. complete elimination of animal source foods
- GHG emissions lower when livestock are eliminated, but only 2.6 percentage units
- But dietary challenges occur rapidly with elimination of ASF, esp. Vit A, B_{12}, Ca, DHA, EPA and arachidonic acid



White and Hall, 2017
www.pnas.org/cgi/doi/10.1073/pnas.1707322114

MEETING DUAL PRESSING GLOBAL OBLIGATIONS

1. Feeding the growing population of the world

2. Environmental stewardship

We must use indices of sustainability that reflect both goals

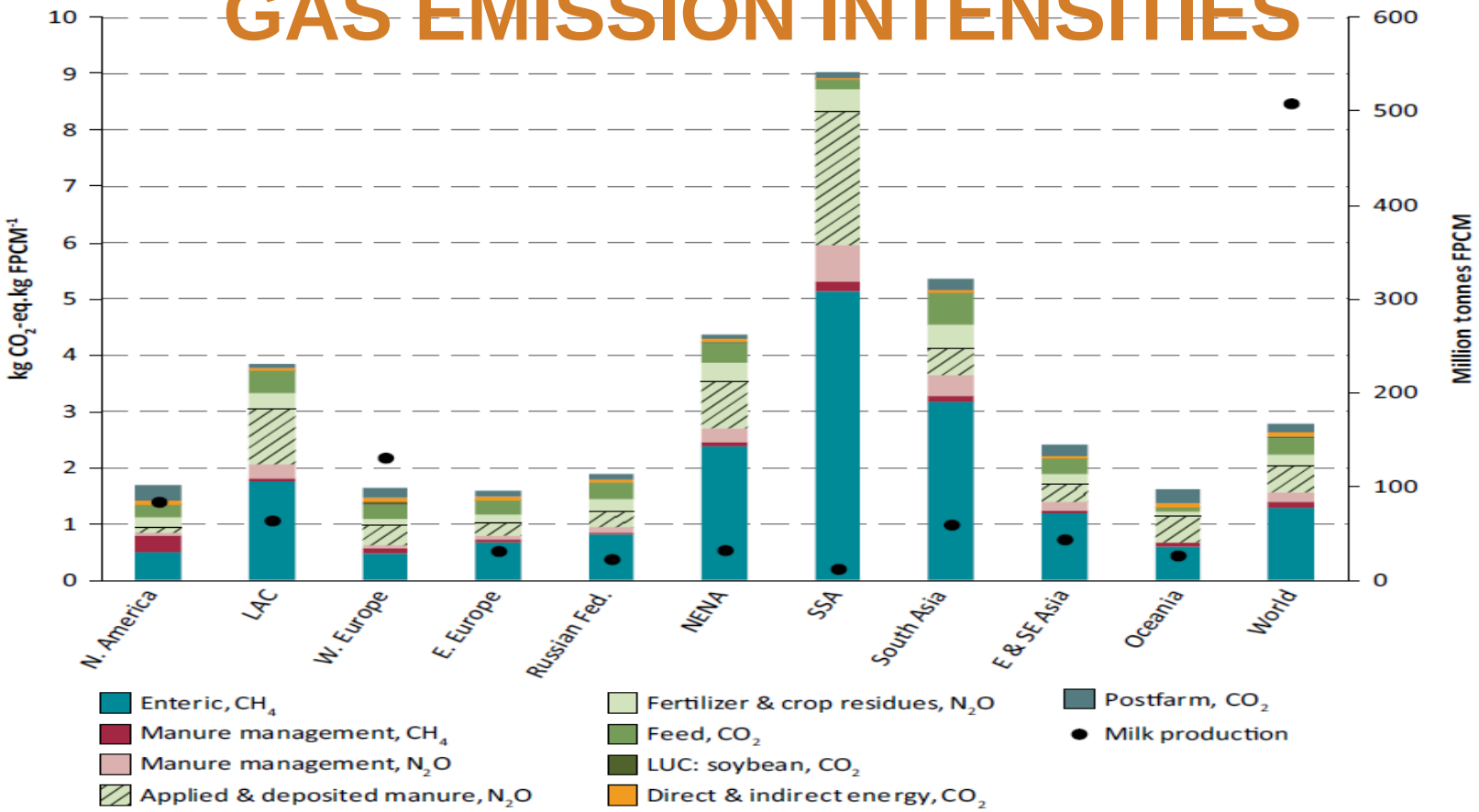
Hence we should measure greenhouse gas emissions/unit of food produced i.e. emissions intensity

GREENHOUSE GAS EMISSION INTENSITIES

- Amount of greenhouse gas produced per unit of livestock product (human consumable) produced

- Vital measurement for meeting the nutritional needs of the poor with livestock and increasing the global demand for animal-source food while decreasing environmental impact of livestock

REGIONAL VARIATION IN GREENHOUSE GAS EMISSION INTENSITIES



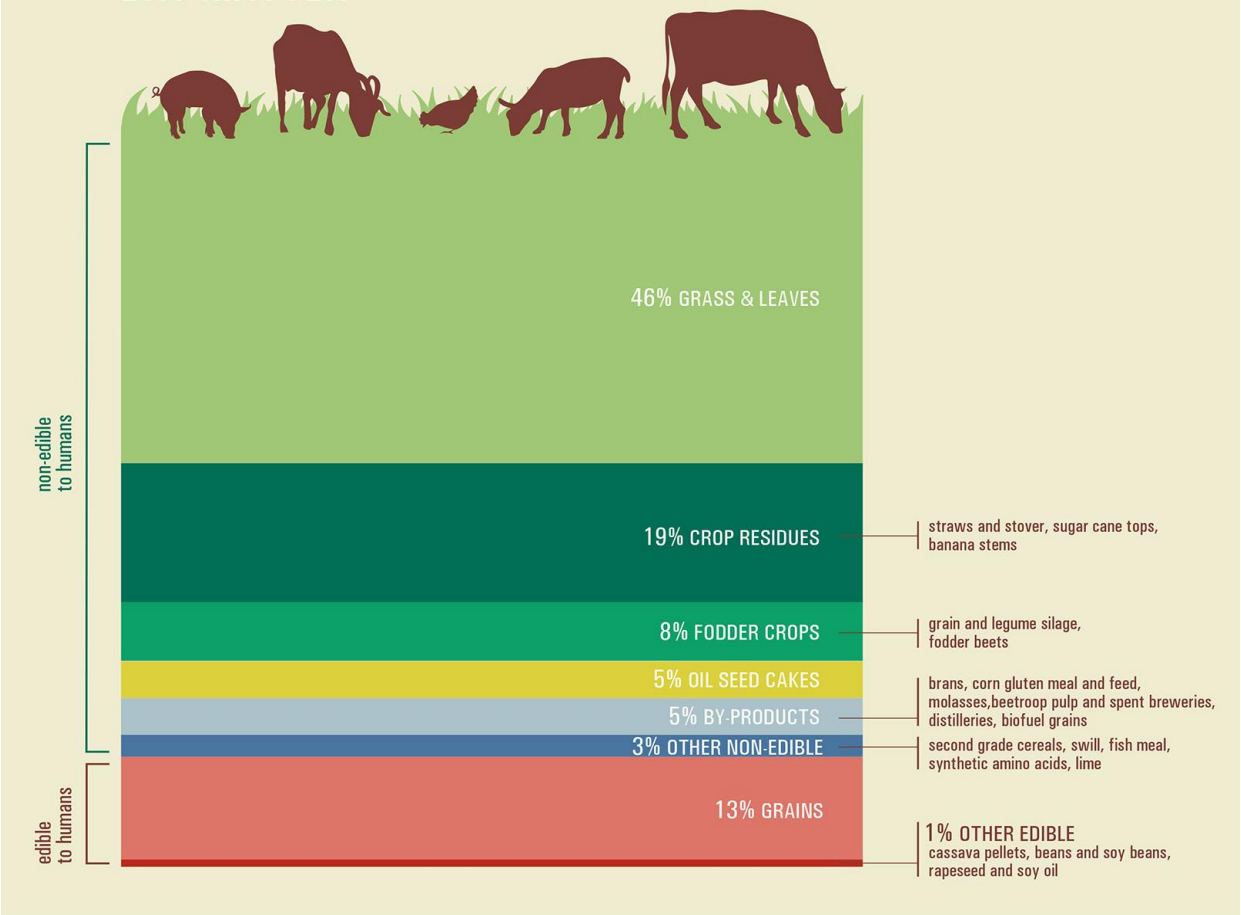
(GLEAM, FAO, 2013)

ASF AND LAND USE

- Allows productive use of 30-40% of the earth's surface which is unsuitable for crop production (Sayre et al., 2013)
- ASF consumption prevents dumping of over 1 billion metric tons/year of agroindustrial co and by-products that we can't eat (Smith, 2017)
- Grazing and range lands provide for water recharge, wildlife habitat and carbon sequestration

http://www.pellet-making-machine.com

FEED VS. FOOD



Adapted from FAO, 2017

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GLOBAL LIVESTOCK CONTRIBUTIONS

- Wealth
- Status
- Insurance
- Resilience
- Manure
- Building materials
- Traction
- Cooking/ heating fuel

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GLOBAL LIVESTOCK CONTRIBUTIONS

- Employs over 1.5 billion, with over ¾ billion dependent livelihoods
- Contributes 40% (mean) to the ag. GDP of developing countries
- **Supplied 25% of protein and 18% of calories consumed globally in 2016**
- Provided traction for about 50% of the world's farmers in 2009 (World Bank)

(Smith, 2017)

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GLOBAL LIVESTOCK CONTRIBUTIONS

Supports and empowers many of the world's smallholder women farmers who own no other assets.

Livestock manure supports more than half of the worlds crops (World Bank)

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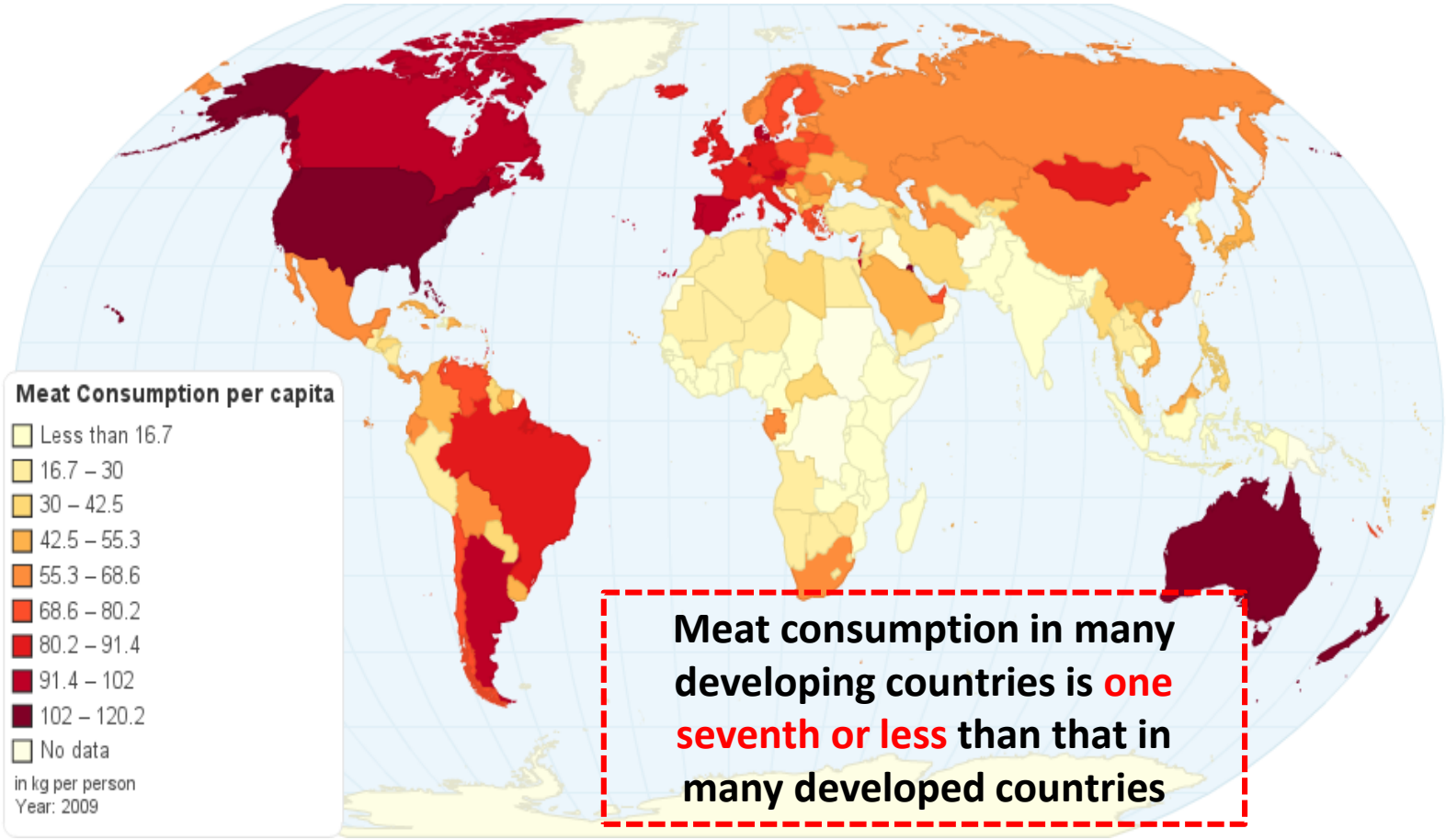
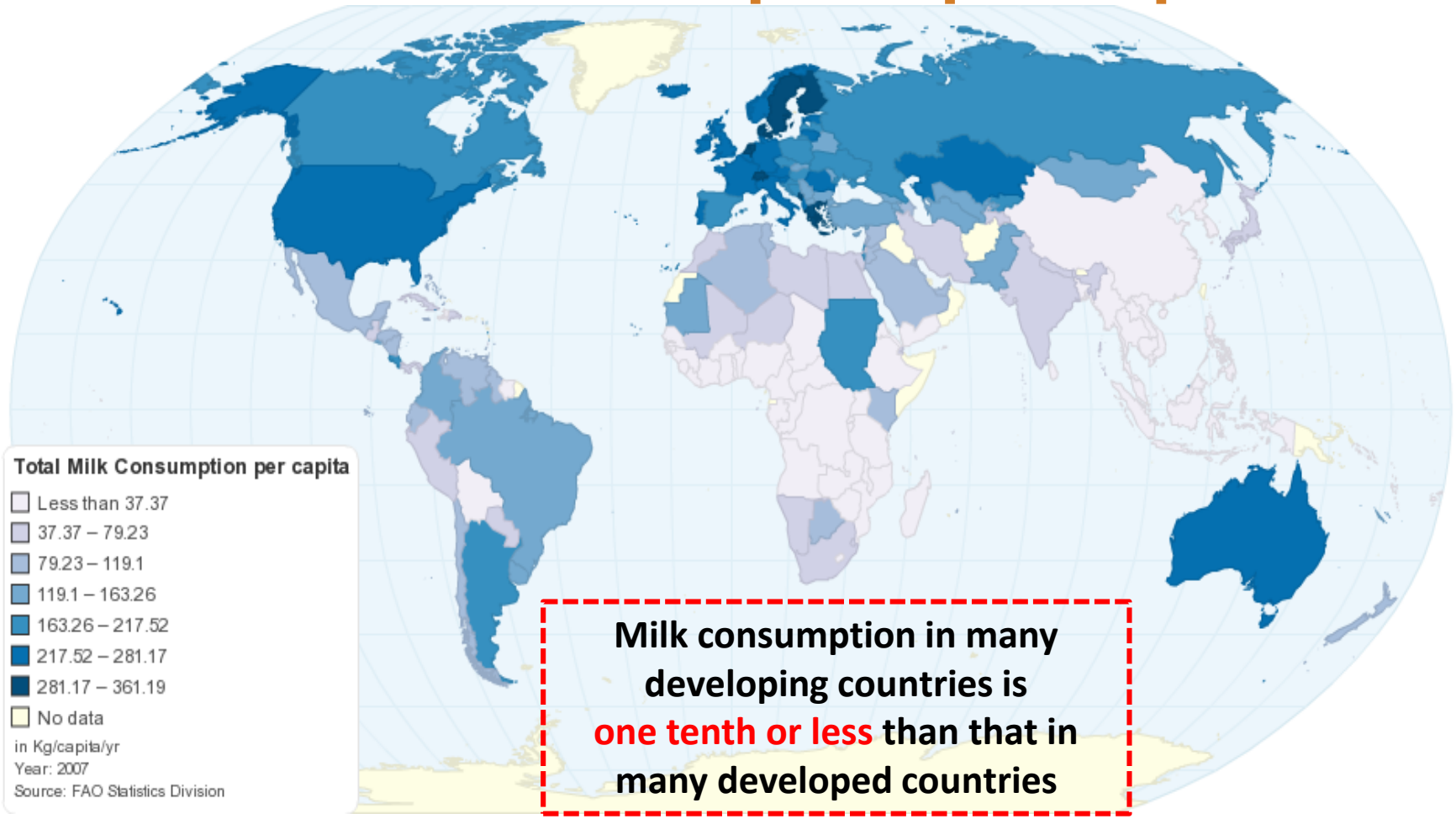
Global meat consumption per capita



Meat consumption in many developing countries is one seventh or less than that in many developed countries

FAO (2013)

Global milk consumption per capita



Milk consumption in many developing countries is one tenth or less than that in many developed countries

FAO (2011)

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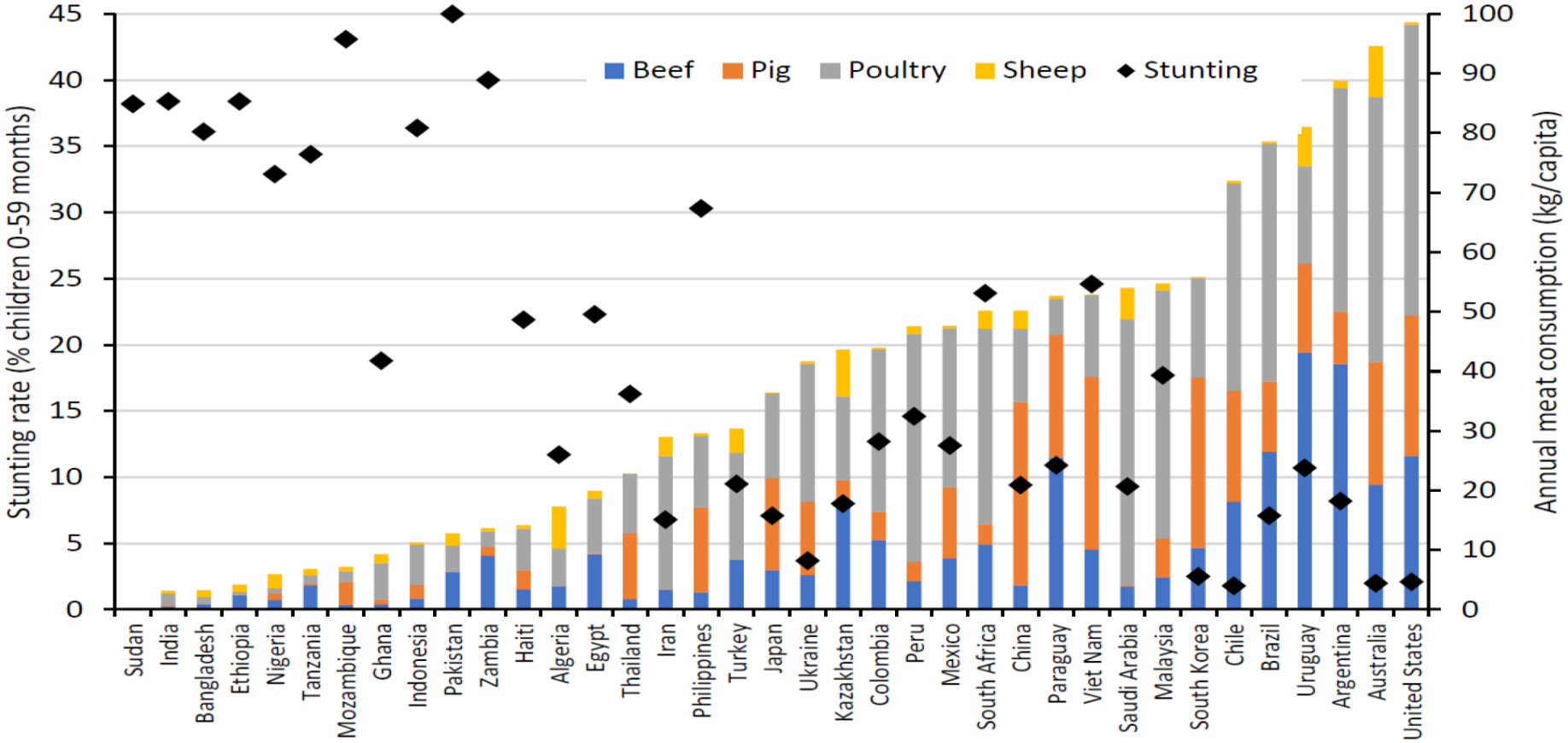
Stunting is inversely related to meat consumption



Adapted from OECD 2018 and UNICEF-WHO, 2017

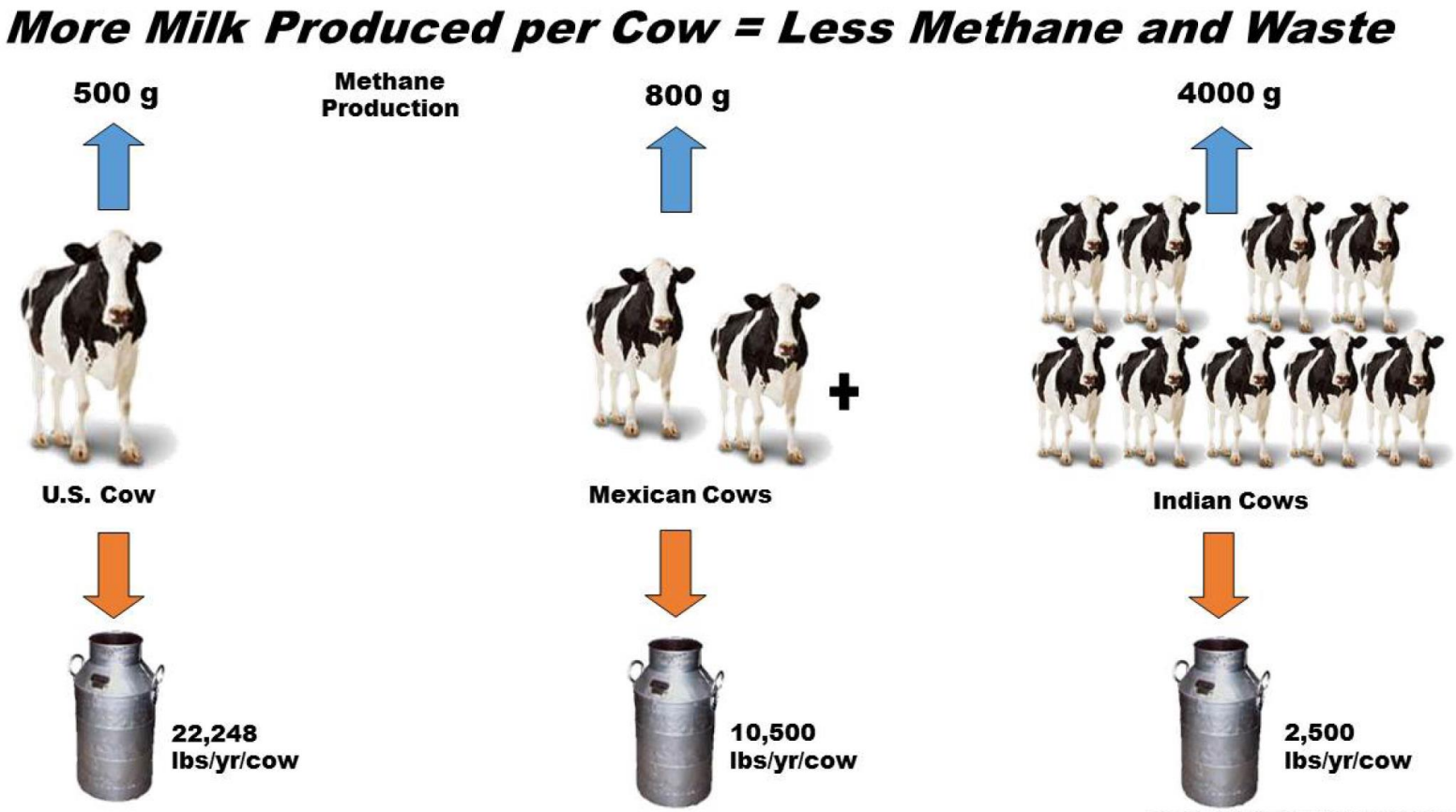
GREENHOUSE GAS EMISSIONS FROM LIVESTOCK CAN BE CUT BY 30% BY

- Improving animal and herd efficiency
- Improved breeding and animal health interventions to shrink herd sizes (meaning fewer, more productive animals)
- Precision feeding, breeding, and better animal health care
- Manure management to recover and recycle nutrients and energy
- Grazing land management to improve productivity and create carbon sinks.

(FAO, 2013)

www.fao.org/news/story/en/item/197623/icode/

PRODUCTION EFFICIENCY



USDA and Compassion in World Farming

(Mitloehner, 2016)

DRIVERS OF INCREASED DEMAND FOR ASF

- Urbanization, Income growth and Population growth
- 70% more food needed for approx. 10 billion people in 2050

(Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat)

Drivers of increased demand for ASF

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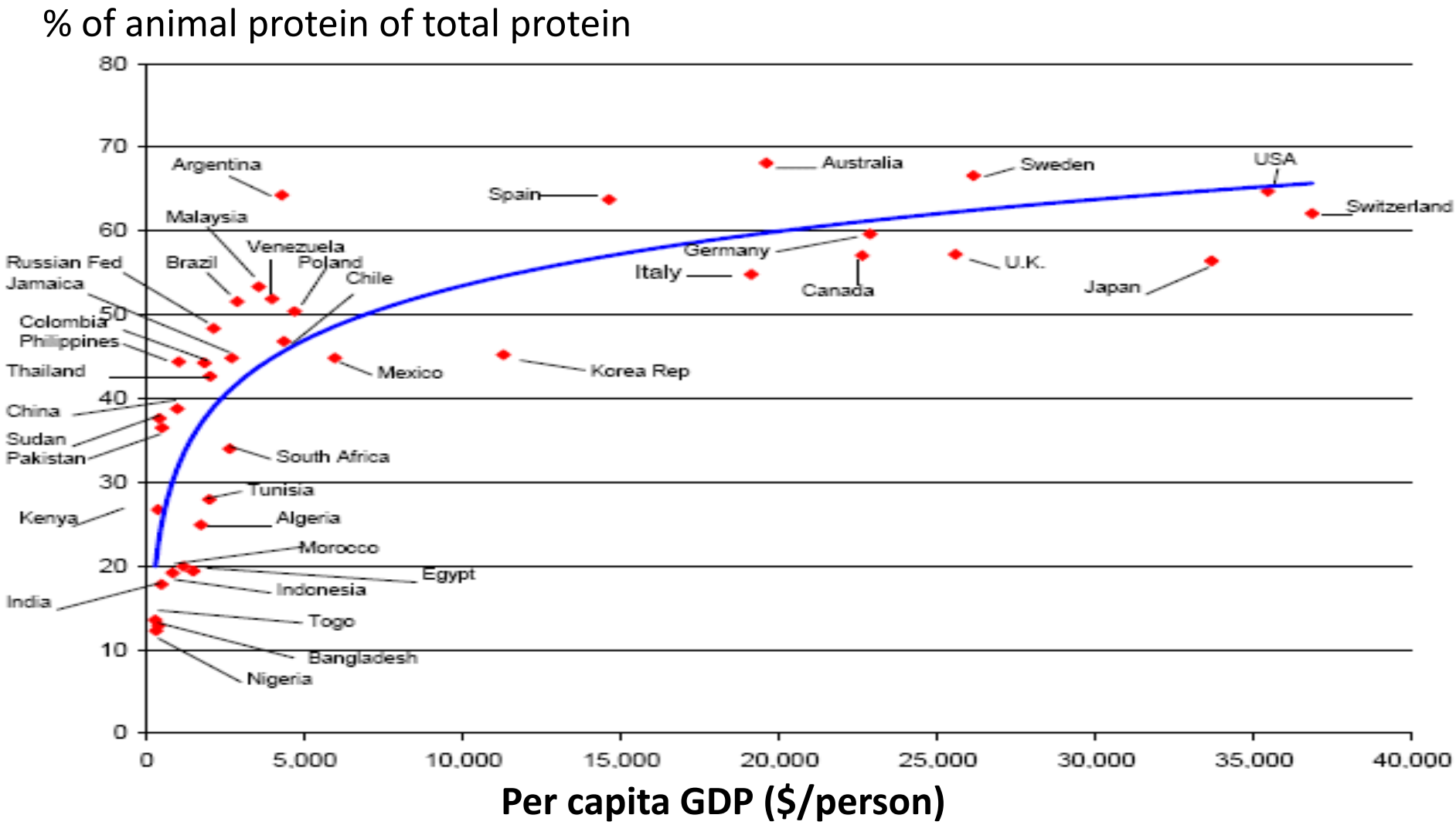
Animal protein consumption increases with income



CONCLUSIONS

- Livestock contribute to global GHG production, but significant improvements are achievable
- Emissions intensity is the endpoint of interest to benchmark as a means of improving ASF yield while reducing emissions
- Livestock production is vital for the educational, nutritional, economic and sustainability needs of the world
- Sustainably increasing livestock production, esp. in developing and emerging economies, is crucial to ensuring food and nutritional security of future populations

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Thank you!

Contact: gdahl@ufl.edu

For more information about the Livestock System Innovation Lab at UF:

http://livestocklab.ifas.ufl.edu/

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www.facebook.com/LivestockLab

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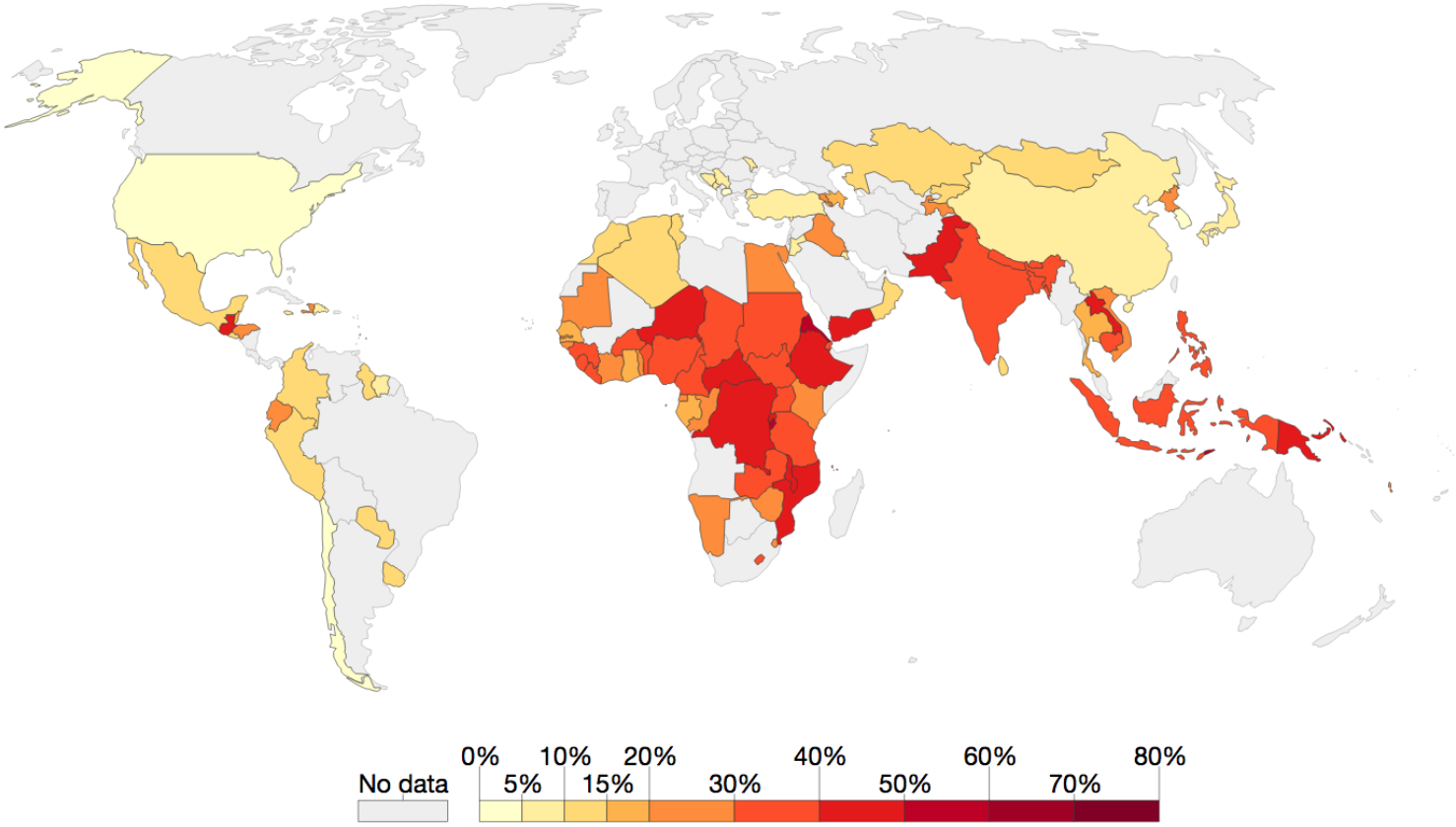
GLOBAL PREVALENCE OF STUNTING (CU5)



Source: World Bank – WDI

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www.concernusa.org

- Reduces the GDP of African / Asian countries by 10% on average (World Bank, 2017)
- Must be reduced by 40% by 2030 (World Health Assembly)

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GLOBAL LIVESTOCK CONTRIBUTIONS

- Offers greatest opportunity to reduce greenhouse gas emissions from agriculture
- Allows food production on 57% of earth's land *that cannot be used for crop production*
- Converts millions of tons of agroindustrial by-products that cannot be consumed by humans into livestock feeds, turning waste into food and reducing pollution
- Only about 14% of the feed dry matter ingested by livestock is edible to humans based on recent FAO data

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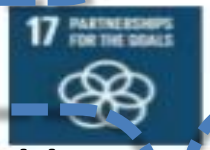
Livestock contribute to inclusive sustainable economic growth

Livestock contribute to equitable livelihoods



ASF improve nutrition and health

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Livestock and sustainable ecosystems

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Tarawali, 2015

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Brain Food: Clever Eating

(Gupta, 2016; Nature)

- Early human meat eaters developed bigger brains than plant eaters.
- Iron is crucial for the growth and branching of neurons in the womb;
- Zinc is found in high concentrations in brain regions for learning and memory;
- Vitamin B12 maintains the sheaths that protect nerves;
- **Deficiencies in micronutrients in meat linked with disorders like - low IQ, autism, depression and dementia**.