

Gains from Trade and the Environment

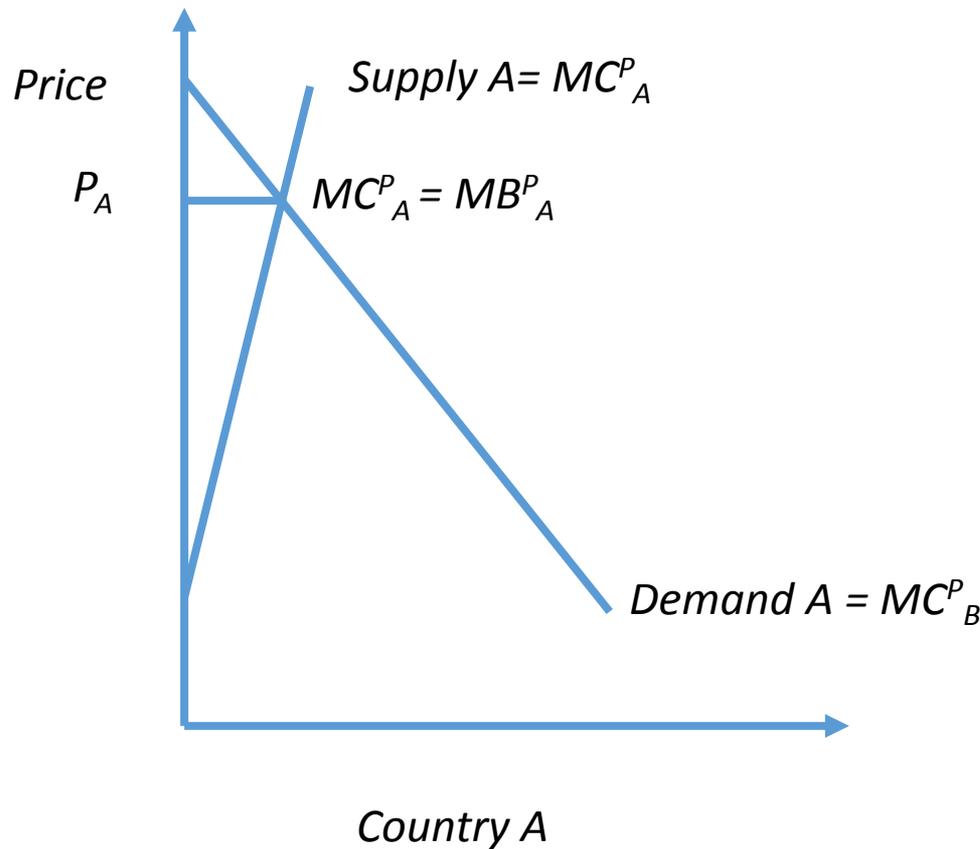
Ted Bilyea and Richard Gray

**Presented at Farm Foundation & CAPI Expert Group Meeting
Chicago, IL
July 31, 2019**

What does economic theory tell us about the gains from trade?

- In the absence of distortions trade improves countries' ability to deal with domestic and international shocks to supply and demand
 - Where differences in competitive market prices are greater than transportation costs arbitrage occurs and trade results in increased total economic surplus
- In the absence of environmental externalities trade optimizes global resource allocation

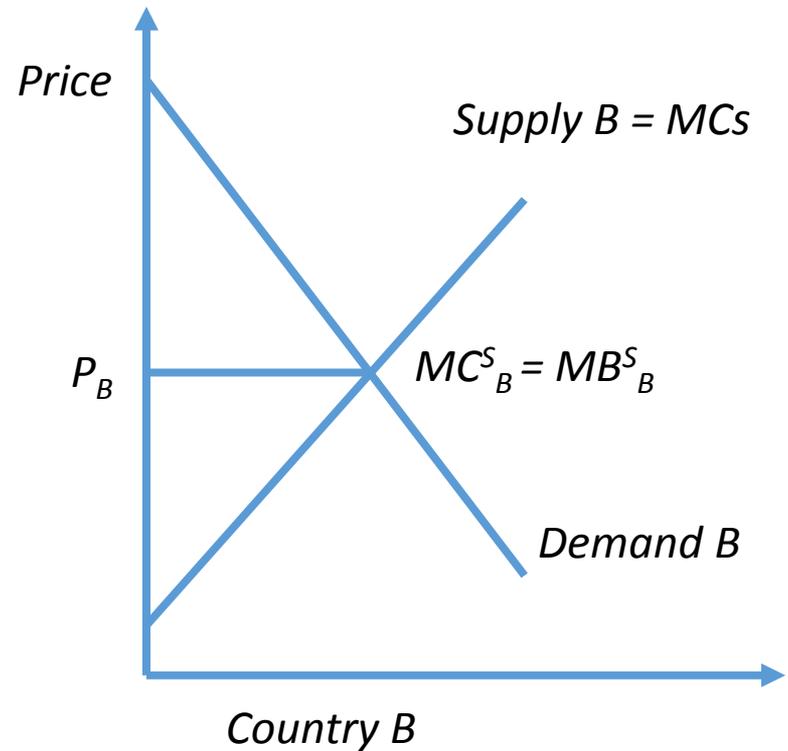
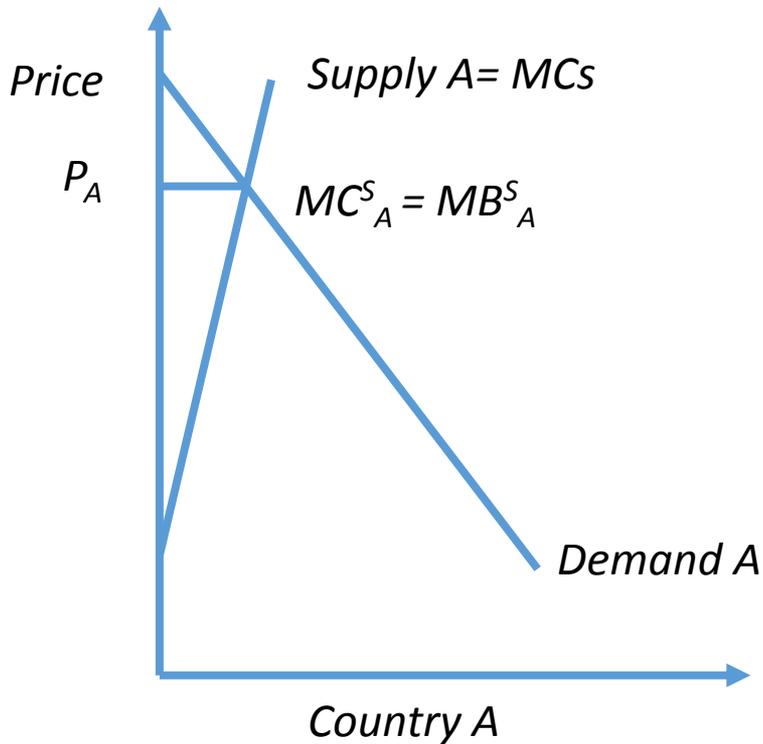
The Gains from Trade



Competitive markets equate the marginal cost of production (supply price) to the marginal willingness to pay (demand price)

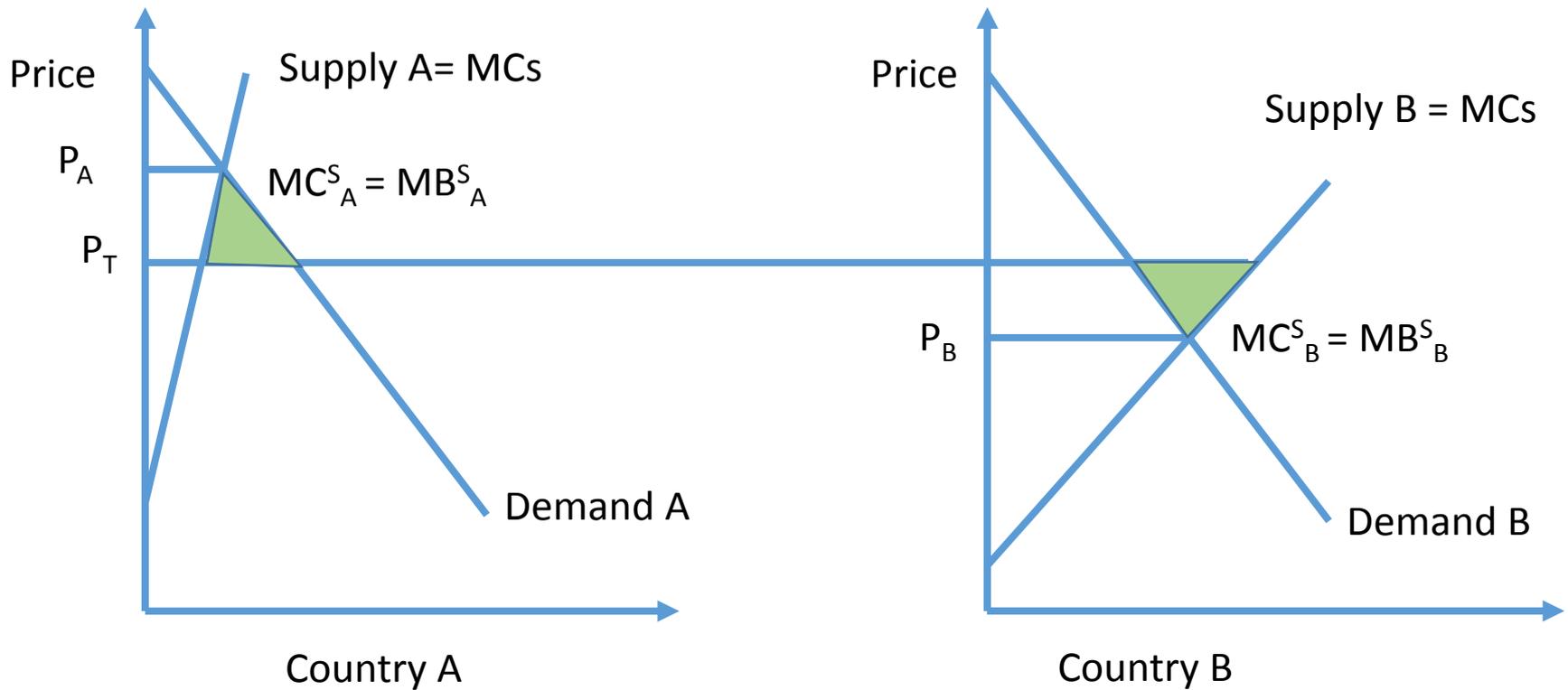
When private marginal cost is equal to social marginal cost and market demand represents the consumers willingness to pay competitive markets work well to maximize total economic surplus

The Gains from Trade



In the absence of trade, prices can differ a lot across countries

The Gains from Trade



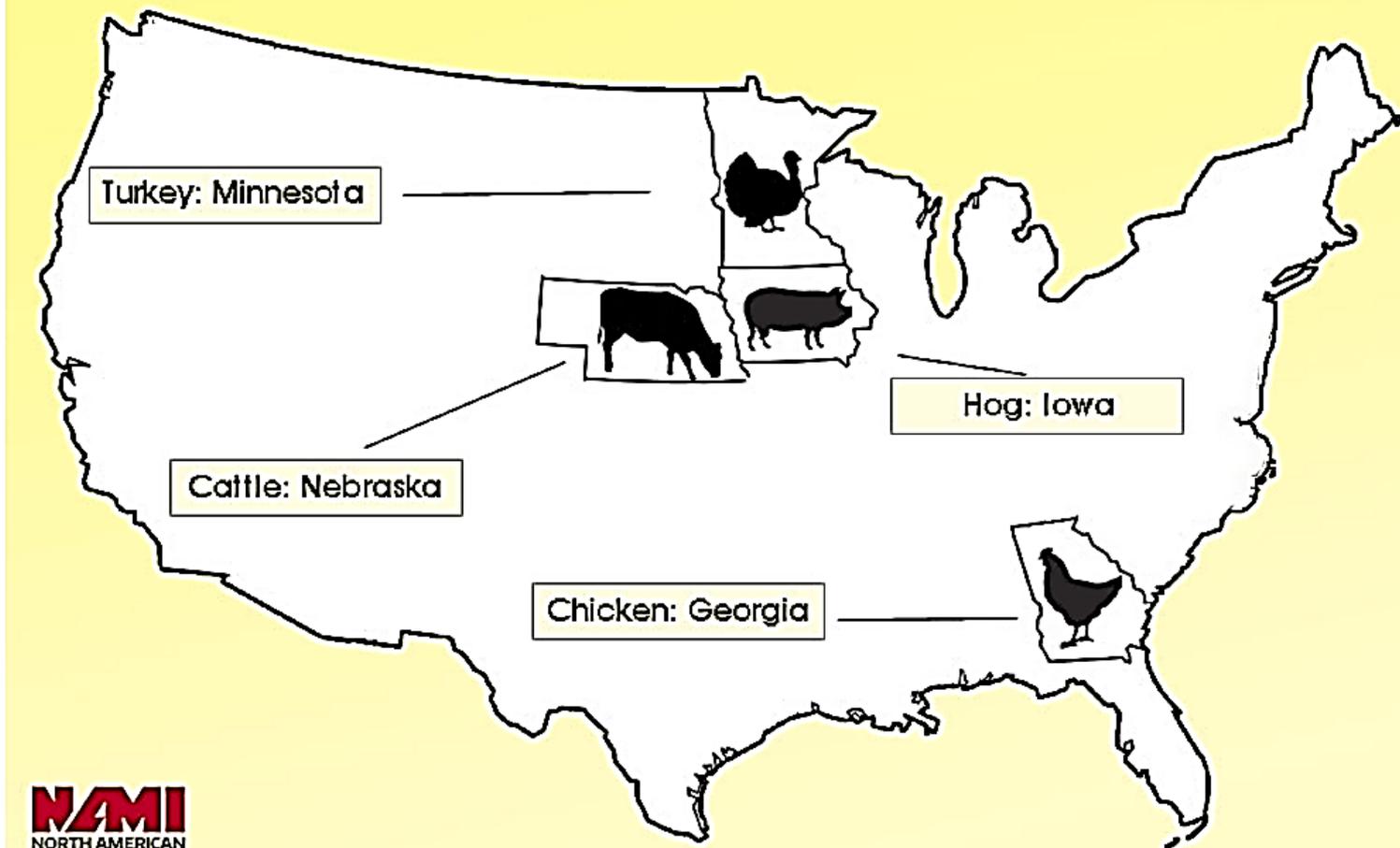
Trade increases economic surplus in both countries

Disruptions in trade have huge economic and potential environmental costs

- Disruptions could be caused by
 - Domestic or regional agricultural policies with objectives such as self-sufficiency in food
 - *Ad hoc* and retaliatory trade actions
 - animal or plant disease quarantines

Optimizing the allocation of resources is critical for the global commons

Top Livestock and Poultry Slaughtering States



When do markets not work?

- When Government subsidies and/or unpriced environmental costs artificially lower the private marginal cost below social marginal cost
- When there is a social or public benefit to a good which is not reflected in its demand

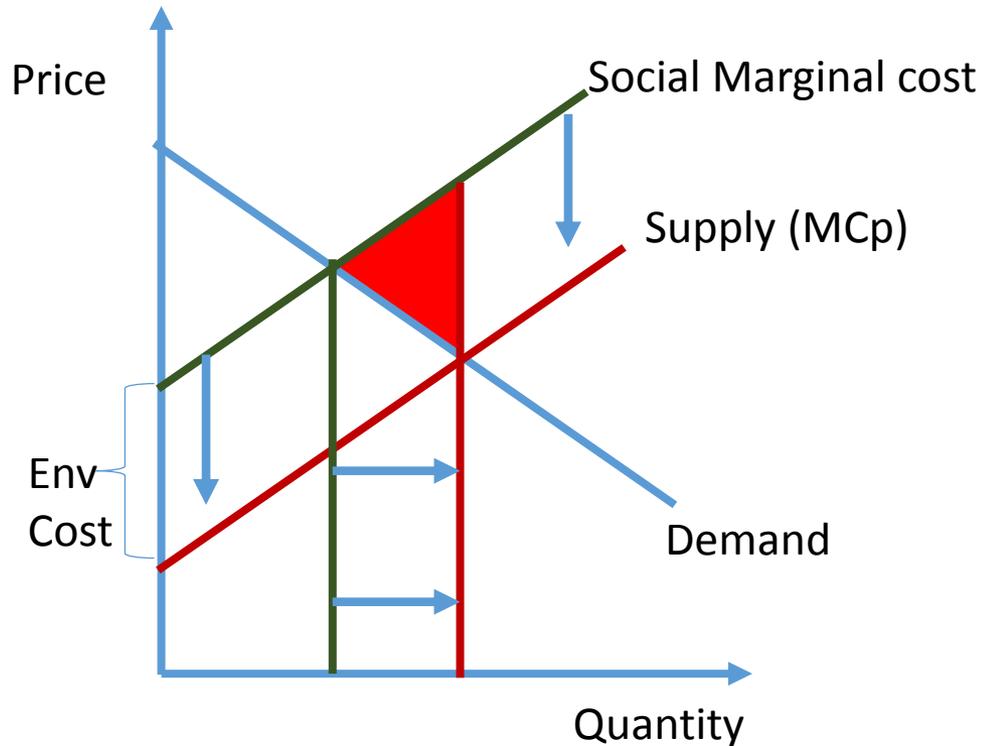
$$MCs = MCp = P = MBp = MBs$$

$$MCs = MBs$$

$$MCs \neq MCp = P = MBp \neq MBs$$

$$MCs \neq MBs$$

Unpriced (External) Environmental Costs Cause Excessive Production

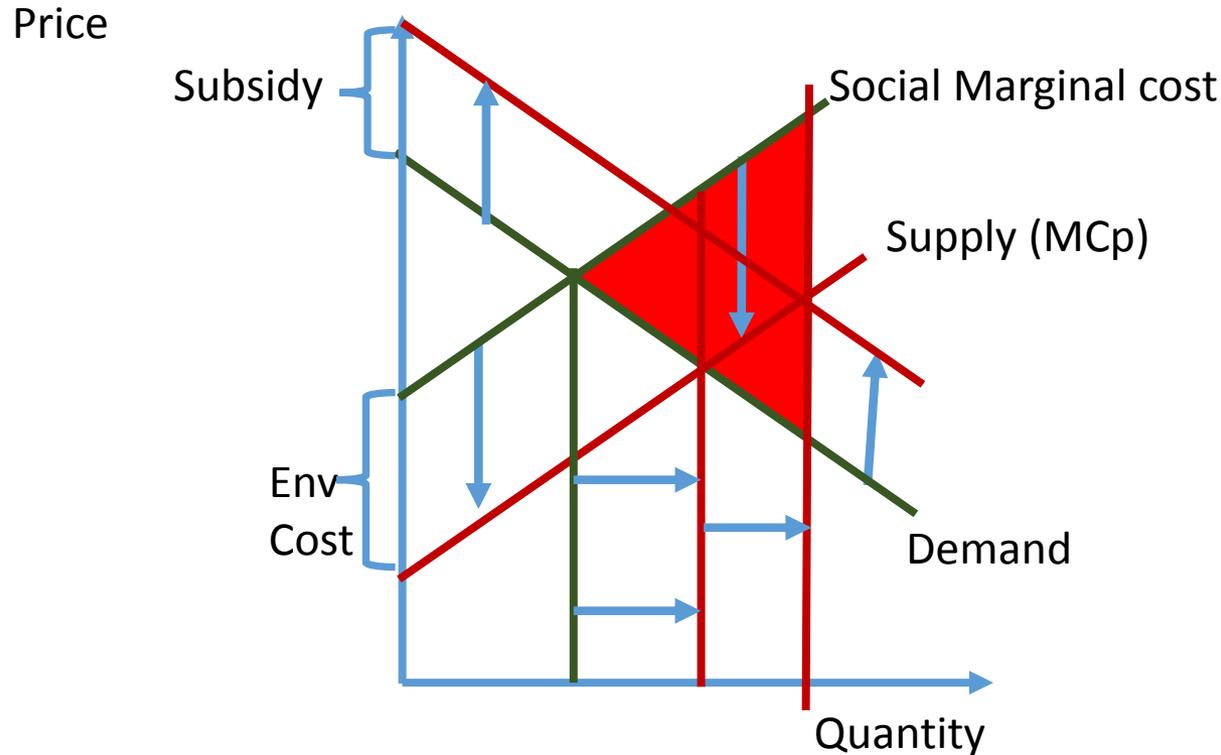


The industry does not face the true cost of production

Subsidies, taxes, and unpriced externalities reduce the gains from trade

- Import tariffs or other measures to subsidize domestic producers will reduce total economic surplus and impede growth
- Environmental subsidies reduce total economic surplus and erode natural capital
- Domestic subsidies further magnify the impact of externalities
- Gains are maximized when external costs and benefits are reflected in the market

Unpriced (External) Environmental Costs Cause Excessive Production



- Output subsidies increase overproduction and result in economic losses
- Trade can make this effect worse because it flattens the demand curve

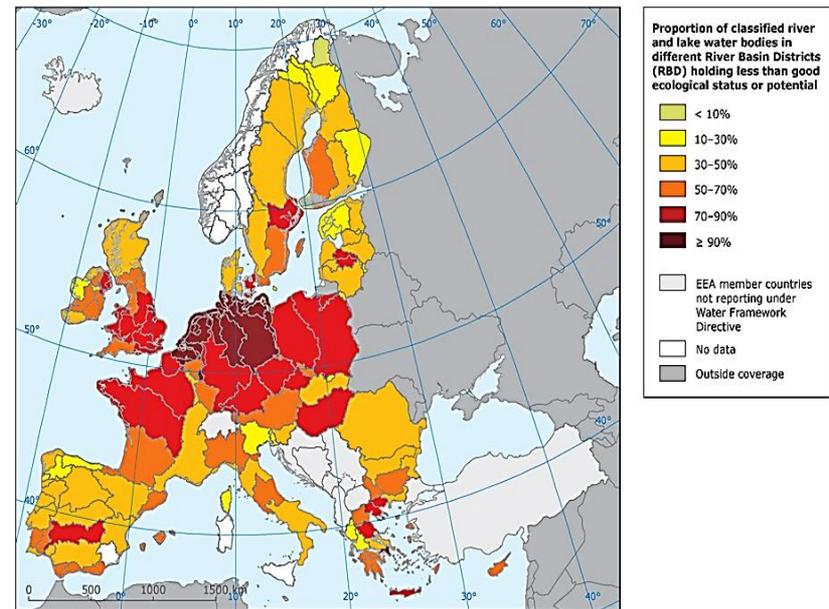
Domestic policies reduce the gains from trade and increase threats to the environment

Key findings of the EU Agri Committee of the European Parliament:

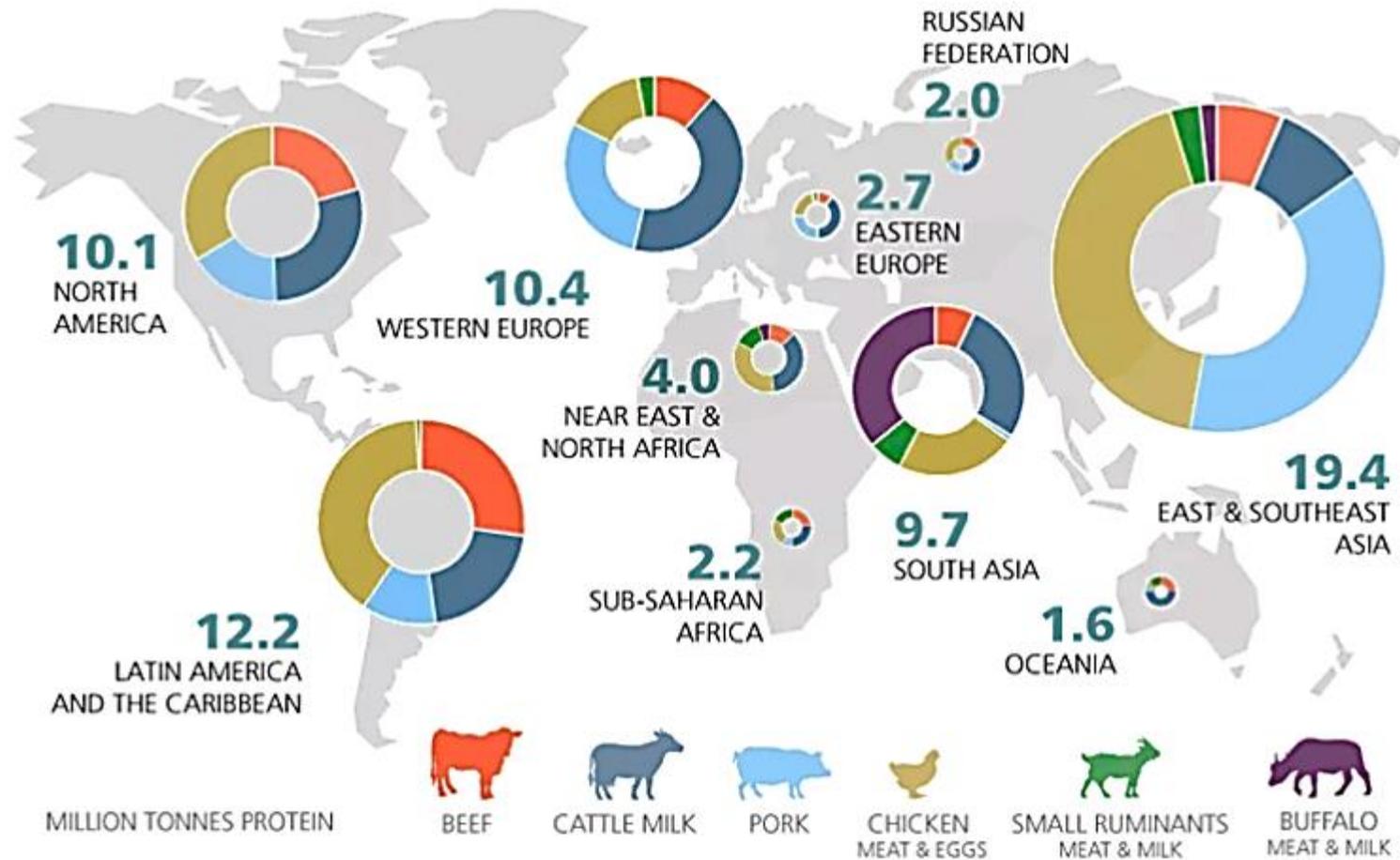
- For the bovine meat sector the level of support was 100% of total net farm income
- For the dairy sector the level of support was 49% of total net farm income
- For the cattle sector the level of support was 57% of total net farm income

Source: EU-DG for Internal Policies Research for Agri Committee- The EU Cattle Sector: Challenges and Opportunities-Milk and Meat, 2017

Proportion of river and lakes with less than good ecological status



Current trade flows do not optimize resource allocation



Global livestock production by region (milk and eggs expressed in protein terms). FAO, CC BY-ND

Live hog pricing closely relates to tariffs, non tariff barriers and subsidies

GENESUS

Global Market Report

Price as of July 17th , 2019

Domestic price (own currency)

US dollars
(Liveweight/lb.)

	Domestic price (own currency)		US dollars (Liveweight/lb.)
USA (Iowa-Minnesota) [Weighted Avg.]	70.72	USD/100 lb. carcass	52.33 ¢
Canada (Ontario) [Base Price]	167.60	CAD/100 kg carcass	46.62 ¢
Mexico City	33.25	MXN/kg liveweight	79.27 ¢
Brazil (South Region)	4.88	BRL/kg liveweight	58.87 ¢
Russia	113.50	RUB/kg liveweight	81.94 ¢
China	16.77	CNY/kg liveweight	\$ 1.11
Spain	1.456	EUR/kg liveweight	74.16 ¢
France	1.536	EUR/kg carcass	66.12 ¢
United Kingdom	151.63	GBP/100 kg carcass	68.41 ¢
Vietnam (national average)	36,800	VND/kg liveweight	71.83 ¢
South Korea (national average)	4,481	KRW/kg carcass	\$ 1.33
Japan * (my estimate)			1.45

Production response to policy distortions can create excessive livestock intensity



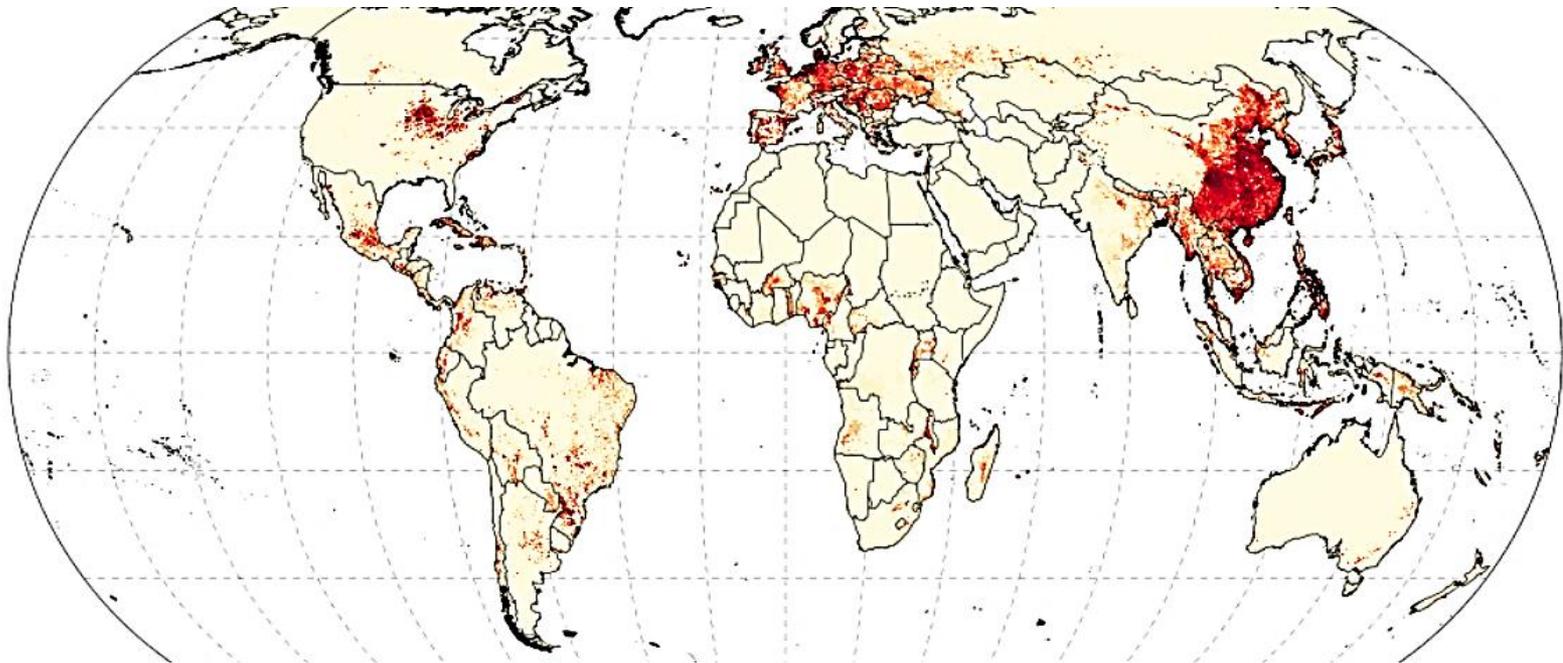
Food and Agriculture Organization
of the United Nations

Google Custom Search



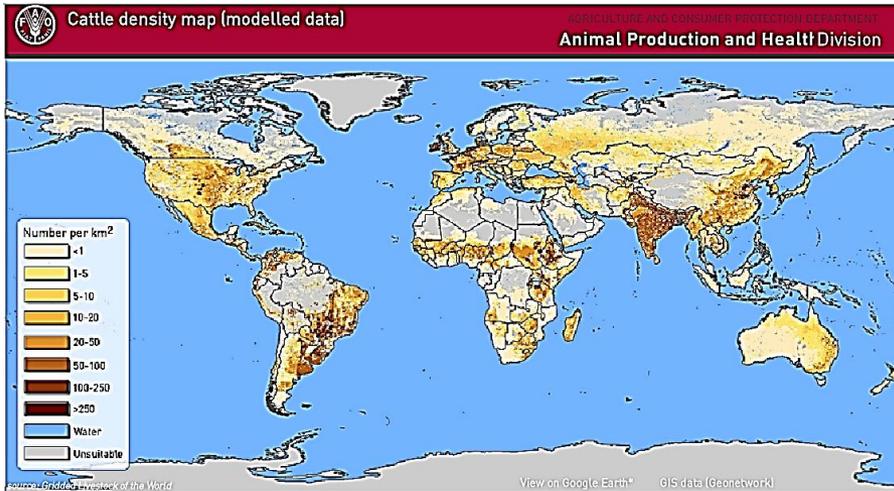
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Swine Density



And increases the risk of epidemics

One Health: People, Pathogens and Our Planet[©]

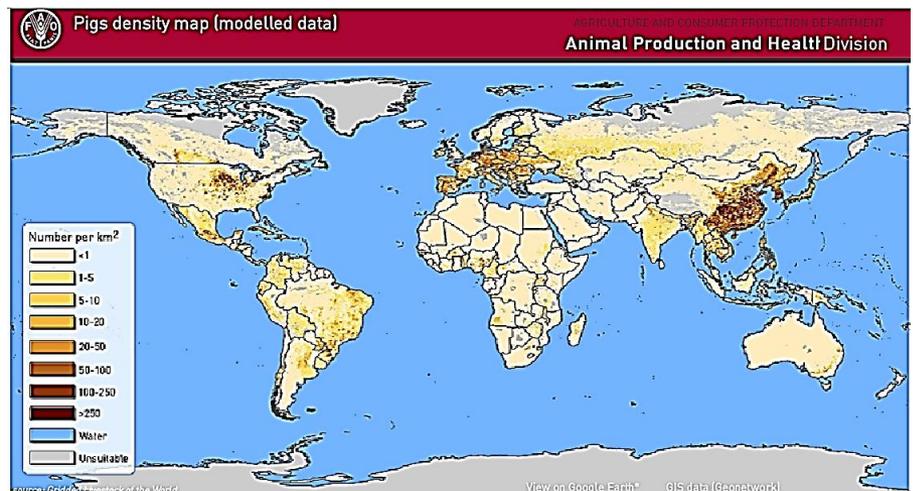


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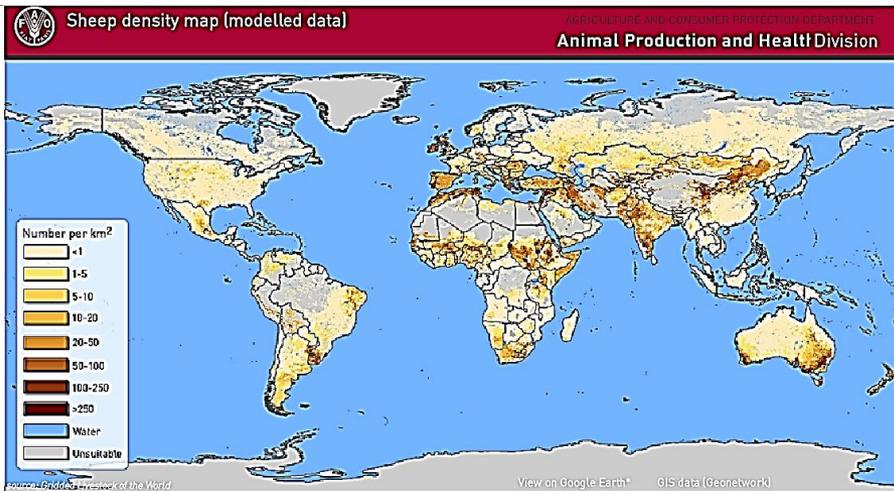


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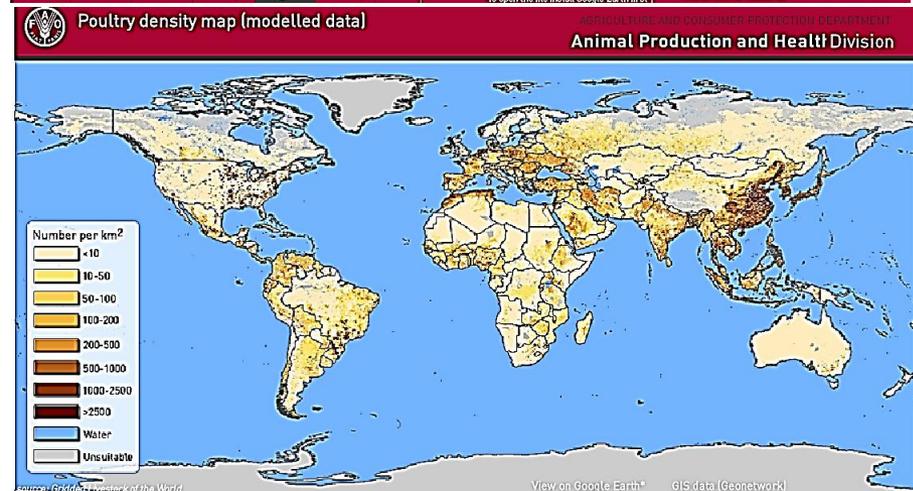


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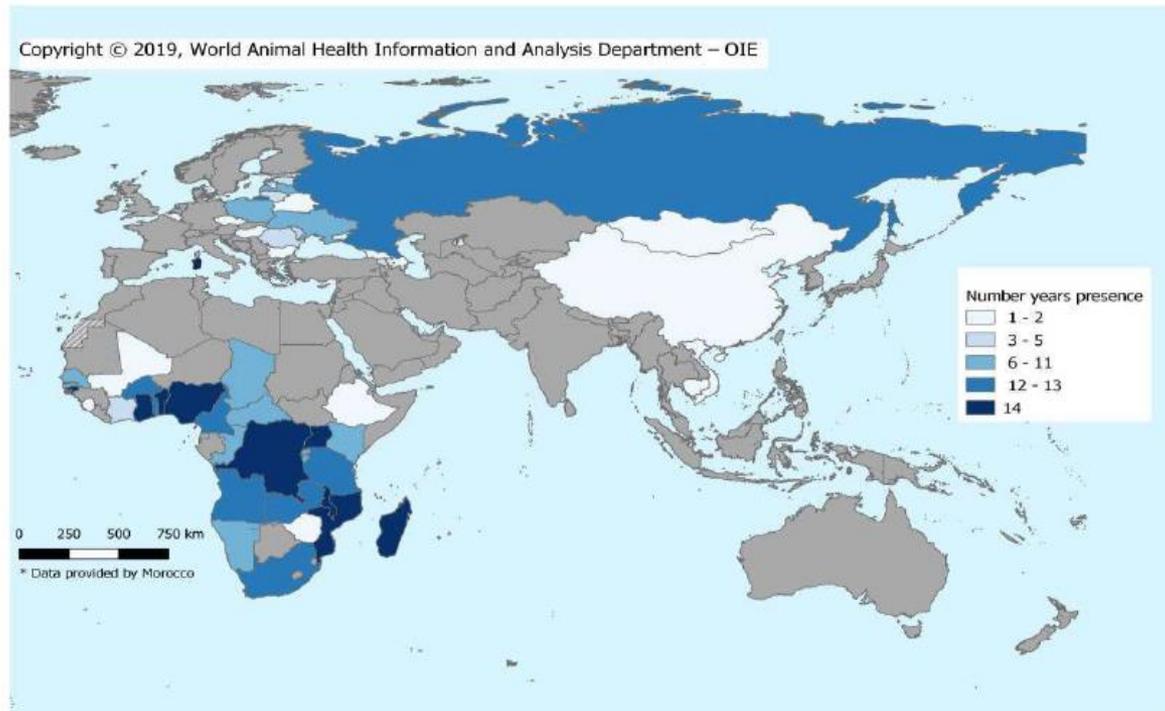
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Excessive intensity magnifies the scale and speed of damage from animal diseases

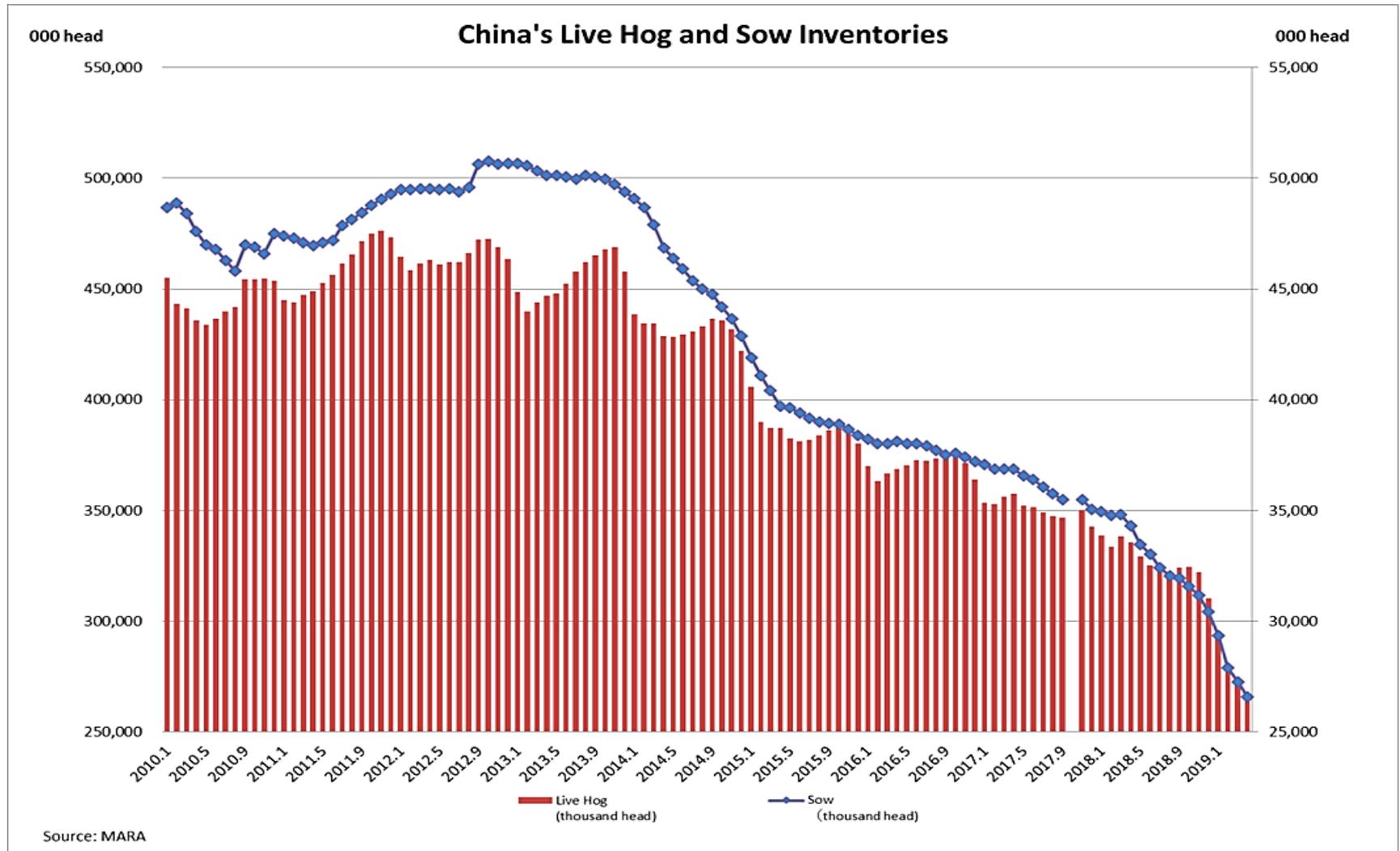
OIE
SG87

Global African swine fever situation

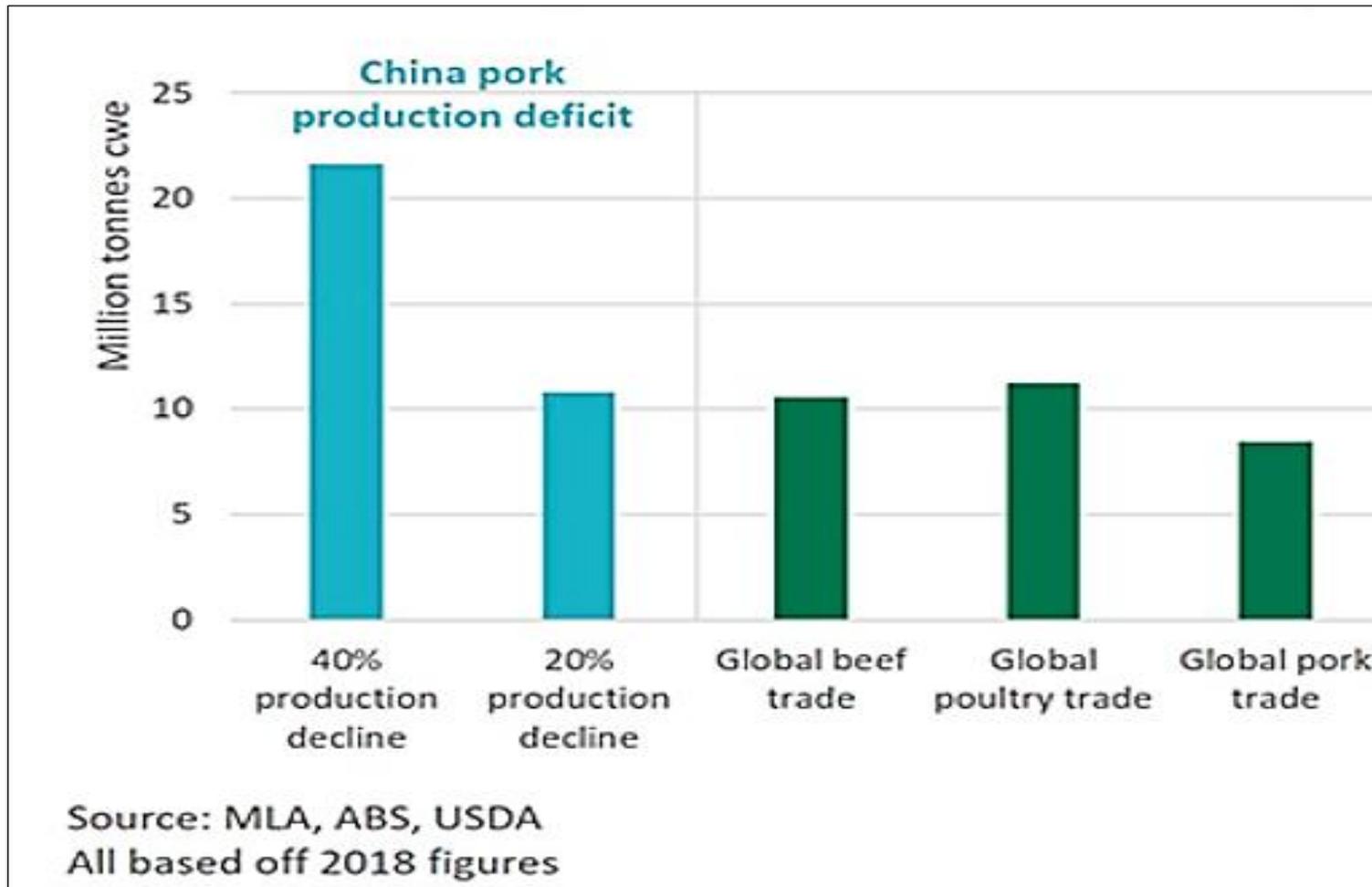


Cumulative Year of Presence of ASF as notified by OIE Member Countries from 2005 to 2018 (WAHIS)

The decline in China's hog inventories accelerated



Putting the ASF pork shortage into perspective

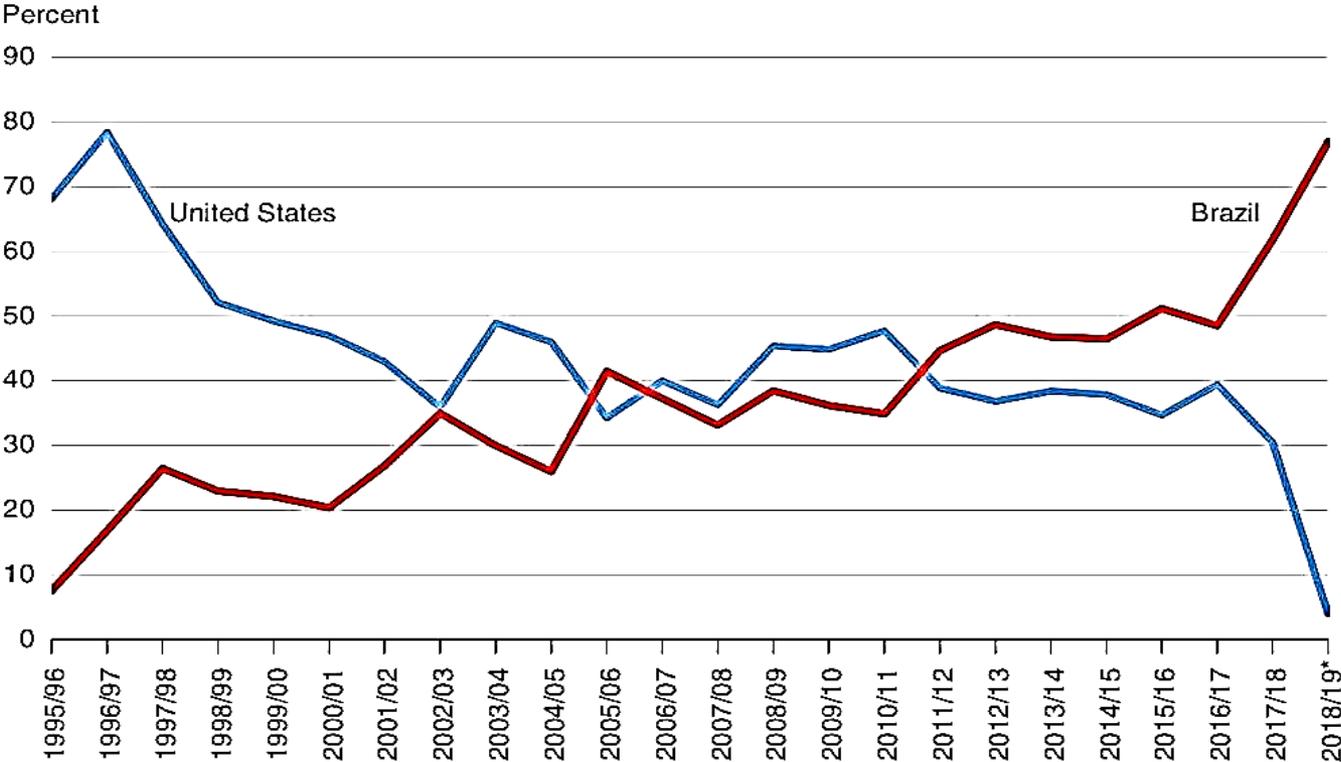


Normally trade would fill the growing protein deficit in Asia from ASF

- In this case, global meat protein production is so skewed to China that the gap cannot be easily filled by trade.
- Moreover, trade in soybeans and canola meal along with other hog inputs are massively disrupted with the decline in Chinese hog production by 40%.
- Add to that a tariff war between the U.S. and China and the result is trade disruption with long term economic and environmental consequences

Trade diversion could result in the further deforestation of the Amazon

China soybean imports: Shares supplied by United States and Brazil, 1995–2019



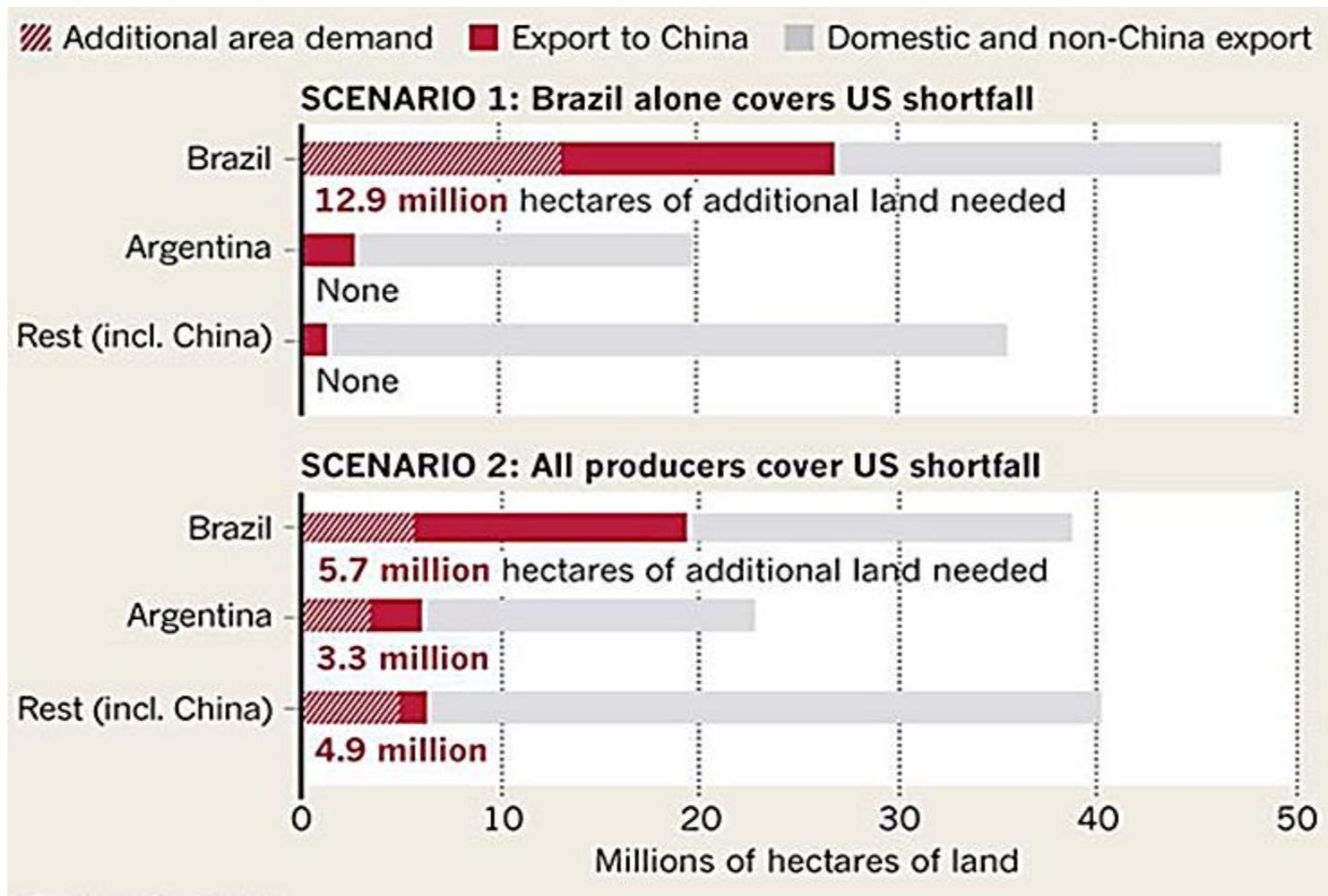
Note: Chart shows share of soybean imports arriving in China during China’s October–September market year.

*2018/19 data for October 2018–February 2019.

Source: ERS analysis of China Customs data accessed from IHS-Global Insight, Global Trade Atlas.



The U.S. China trade war is changing global production and shifting global land use

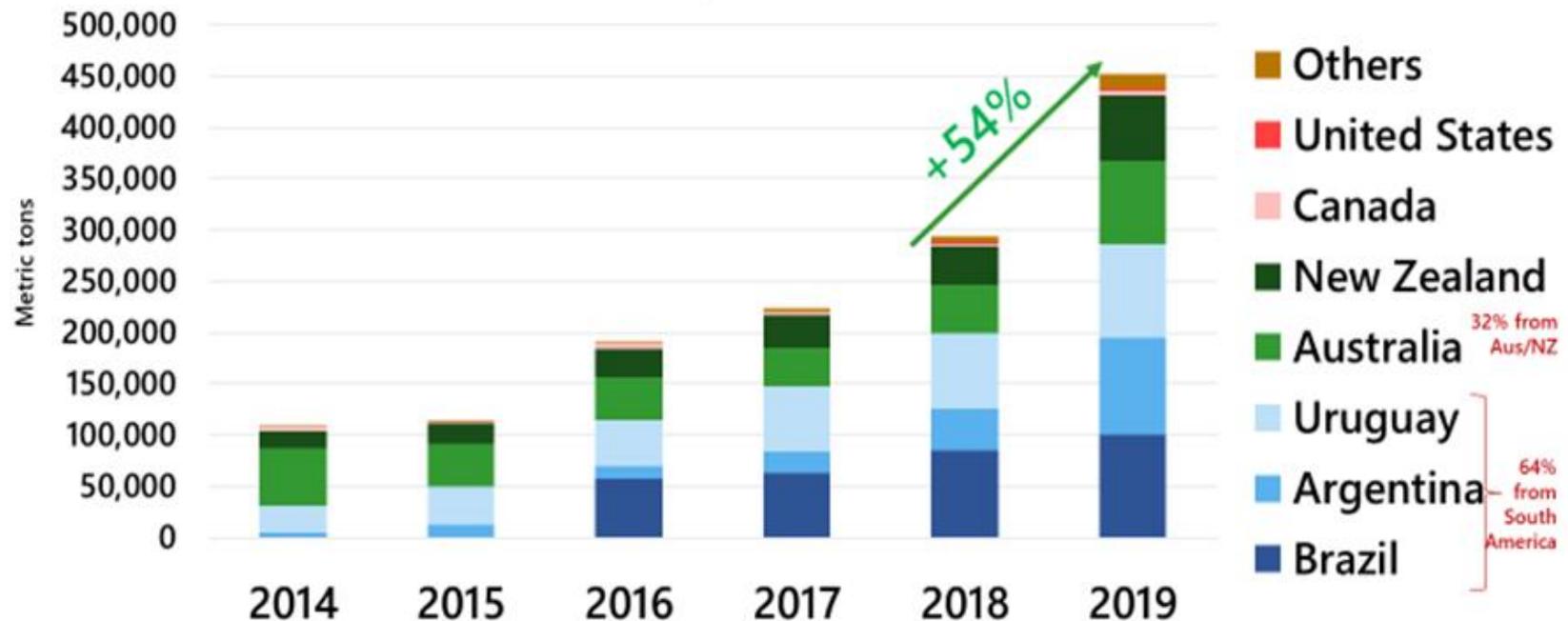


Also resulting in a massive change in global beef trade

China's beef imports are red-hot



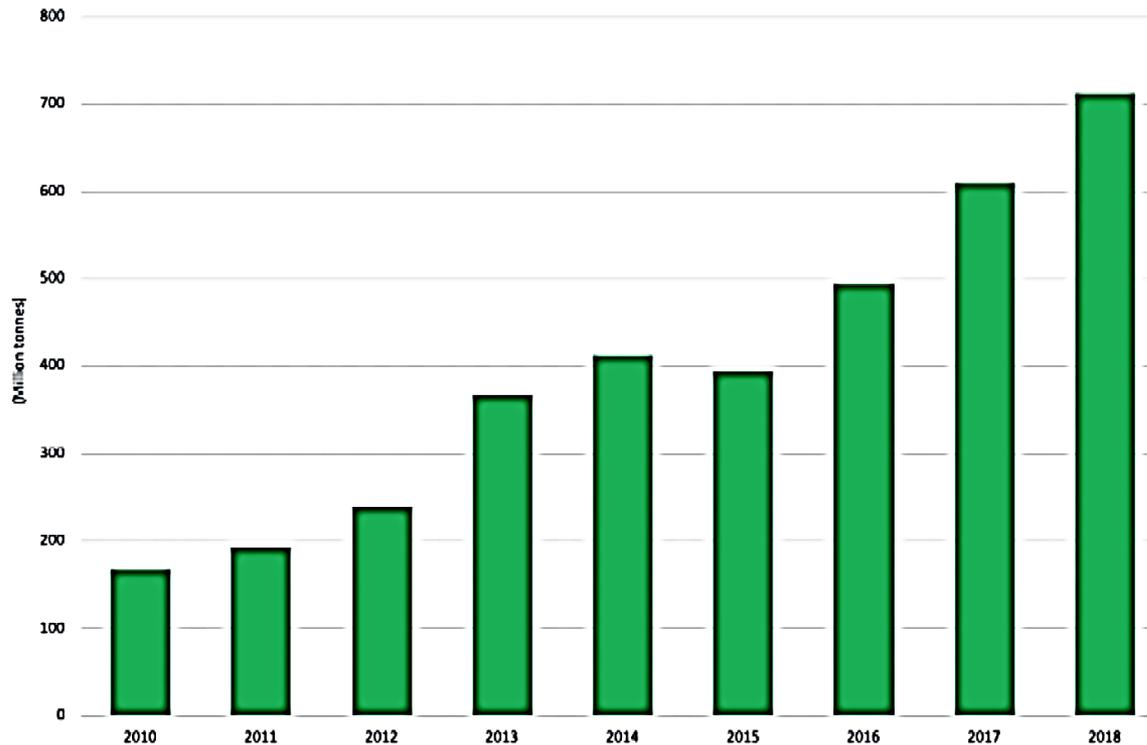
China's Beef & Variety Meat Imports: Jan-April series



Grain-fed accounts for about 6% of China's import volume and is mostly from: Australia (20,000 mt, +66%), Canada (5,000 mt, +237%) and the U.S. (2,300 mt, steady)

Source: GTA & USMEF; tariff on U.S. beef = 37% while Australia pays 6%

Brazil's Beef Exports to Chinese Mainland and Hong Kong Soar

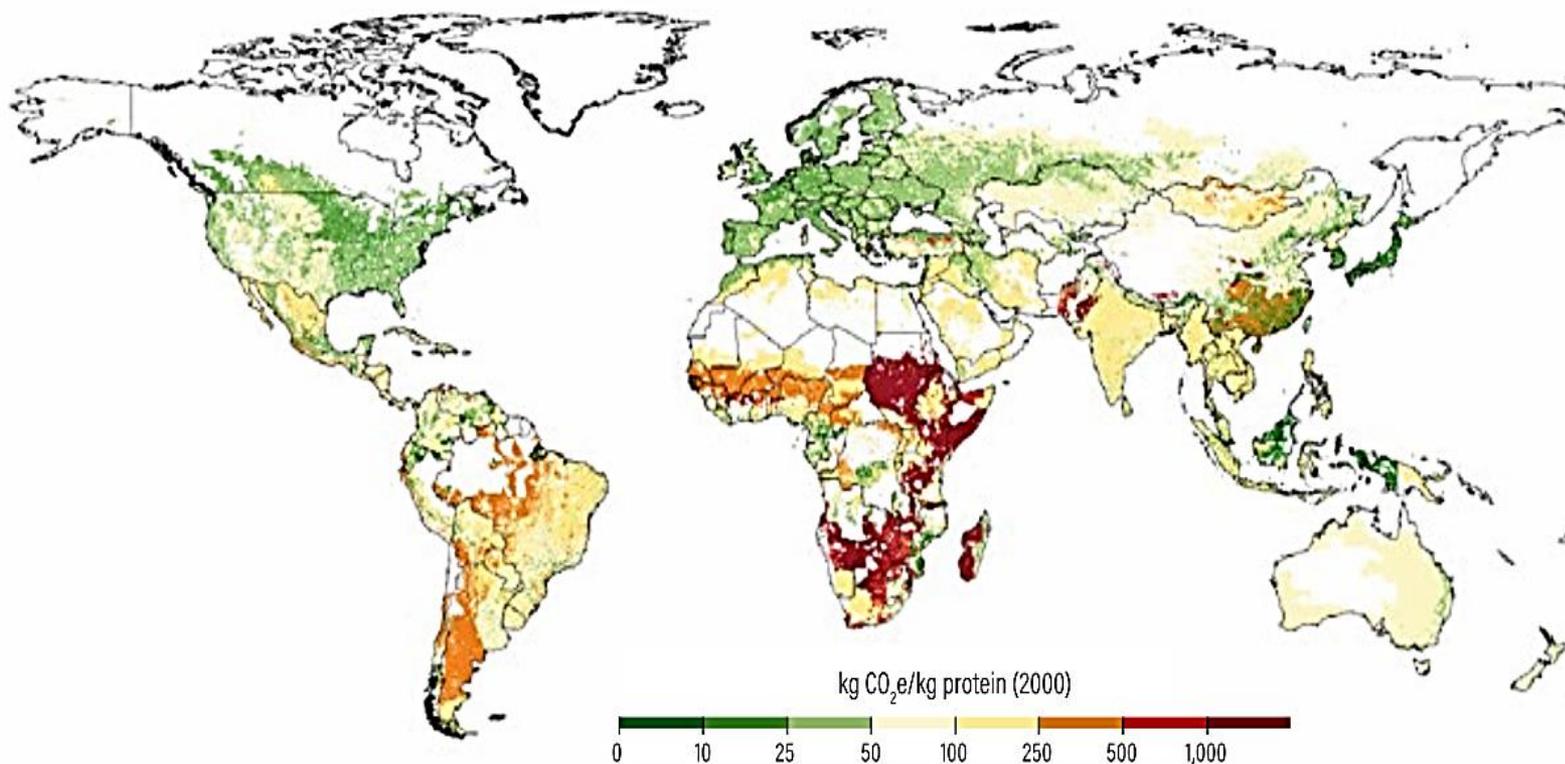


Source: ABIEC

The Chinese mainland and Hong Kong account for 44 percent of Brazil's 1.8 million tonnes of beef exports in 2018.

Source: ABIEC

Inefficient beef production systems resulting in higher greenhouse gas emission intensities

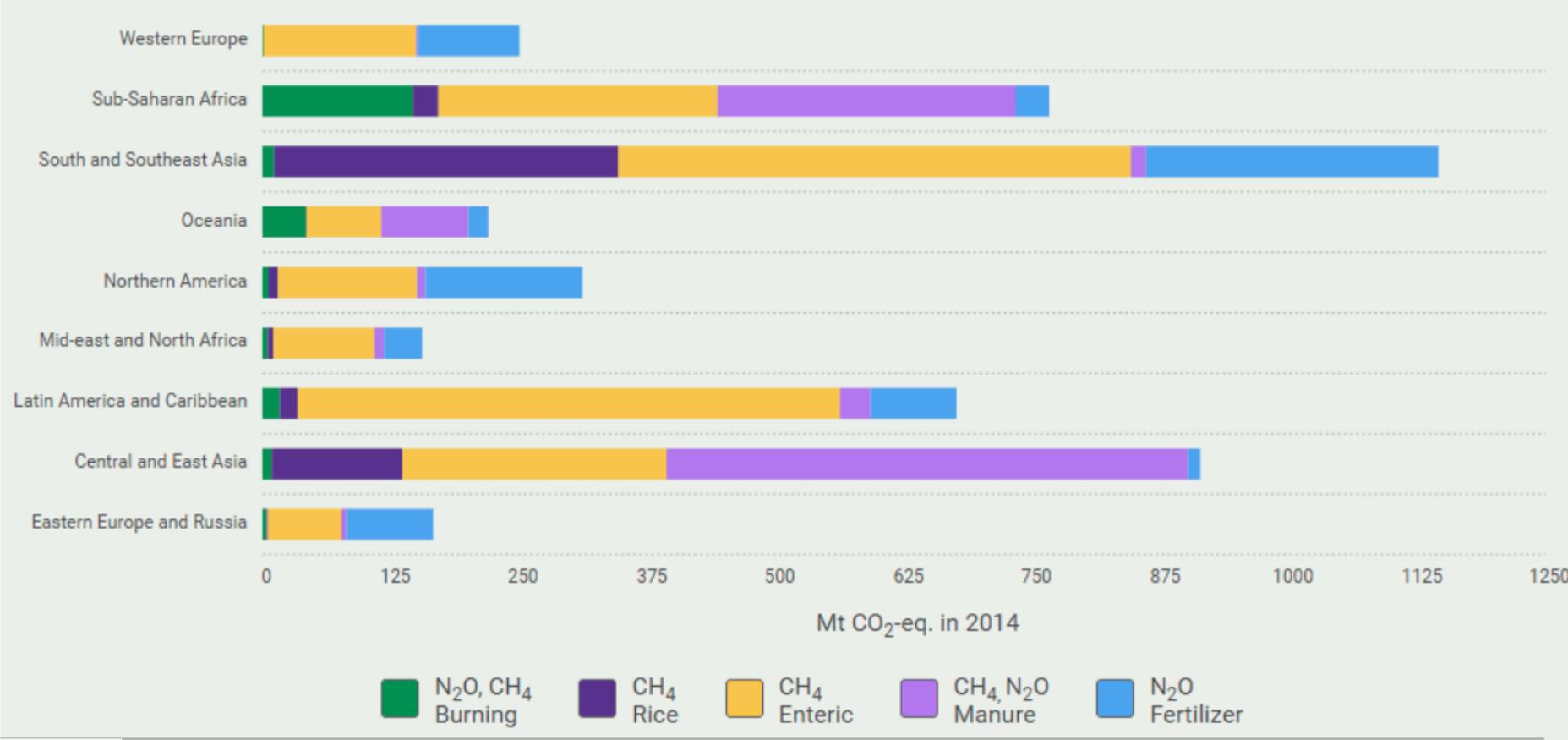


Source: Herrero et al. (2013).

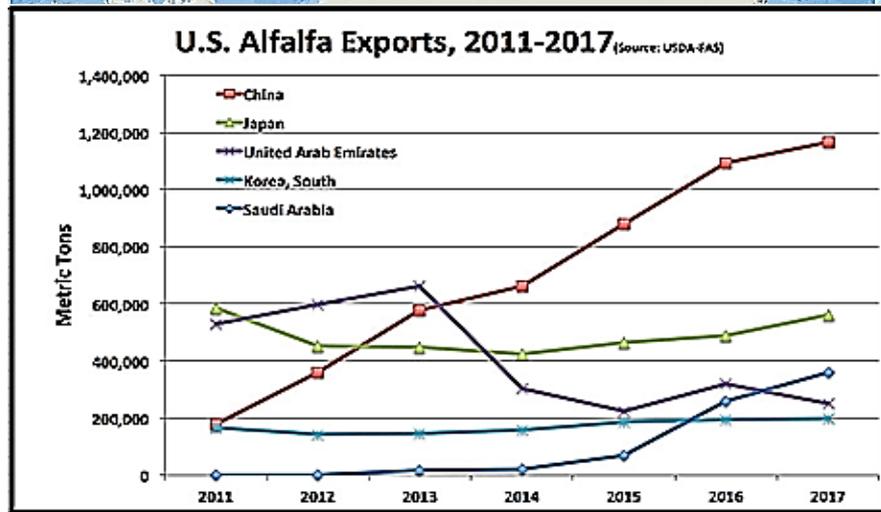
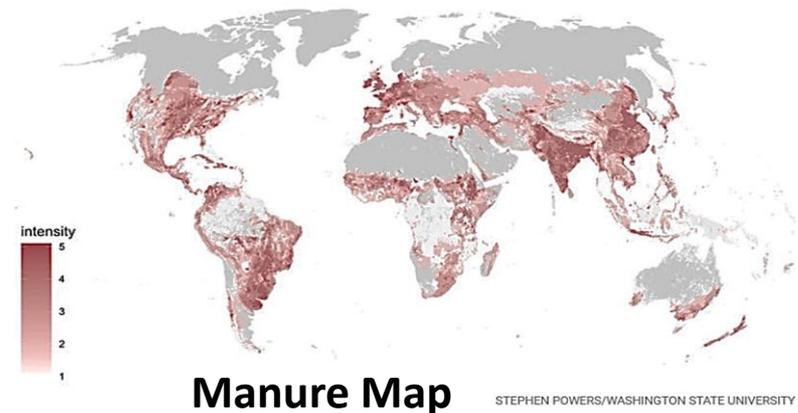
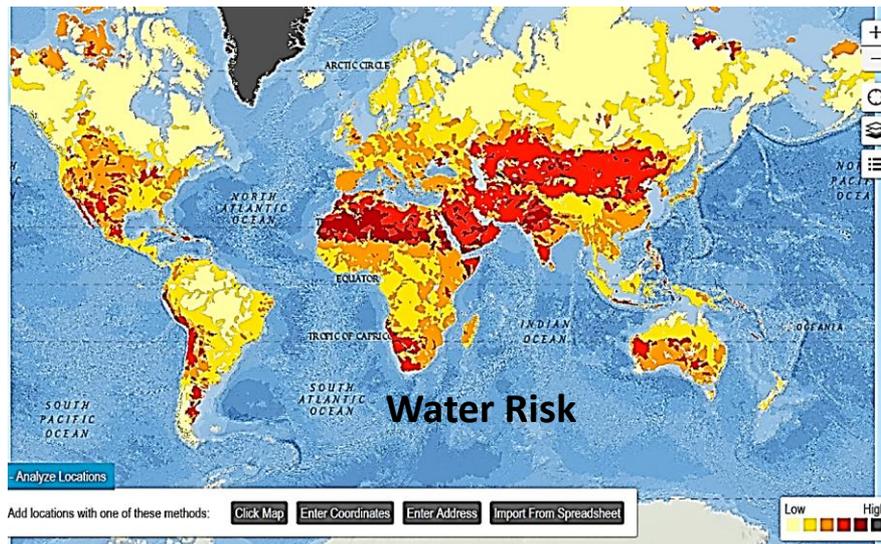
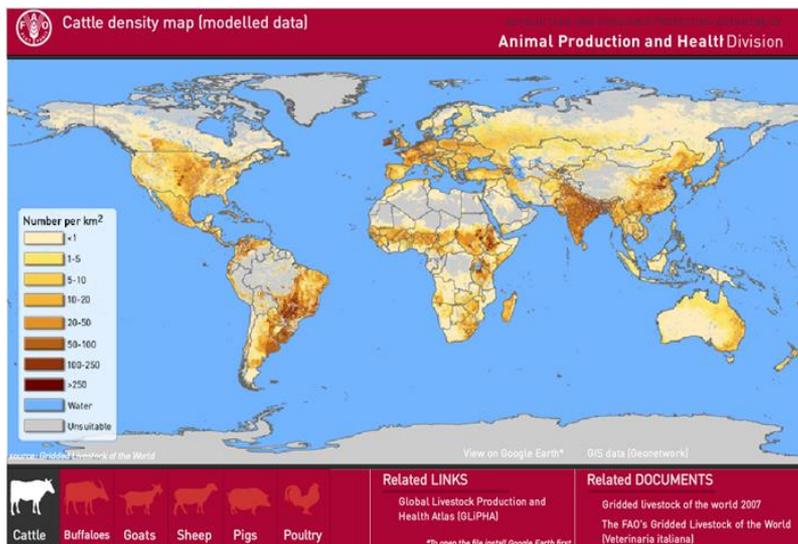
As printed on WRI, 2018

Huge environmental costs of suboptimal trade flows

Regions are not equal in GHG efficiency



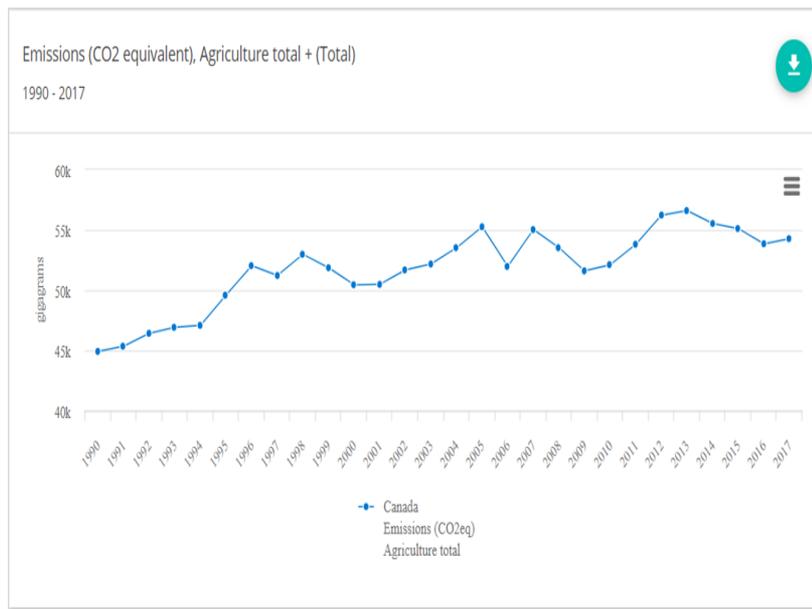
China's plan for greater self sufficiency in dairy & beef to cause further economic and environmental costs



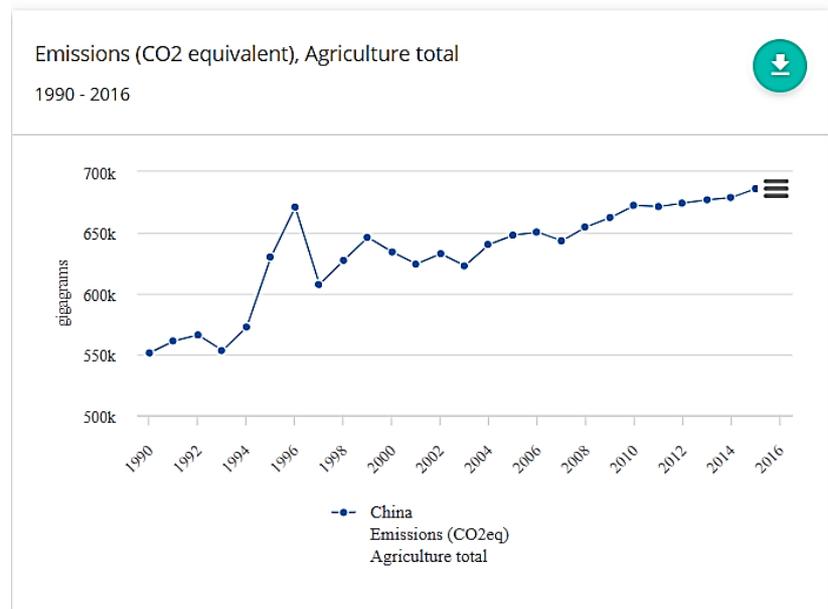
Trade could be essential in reducing the GHG emissions globally

Canada

China

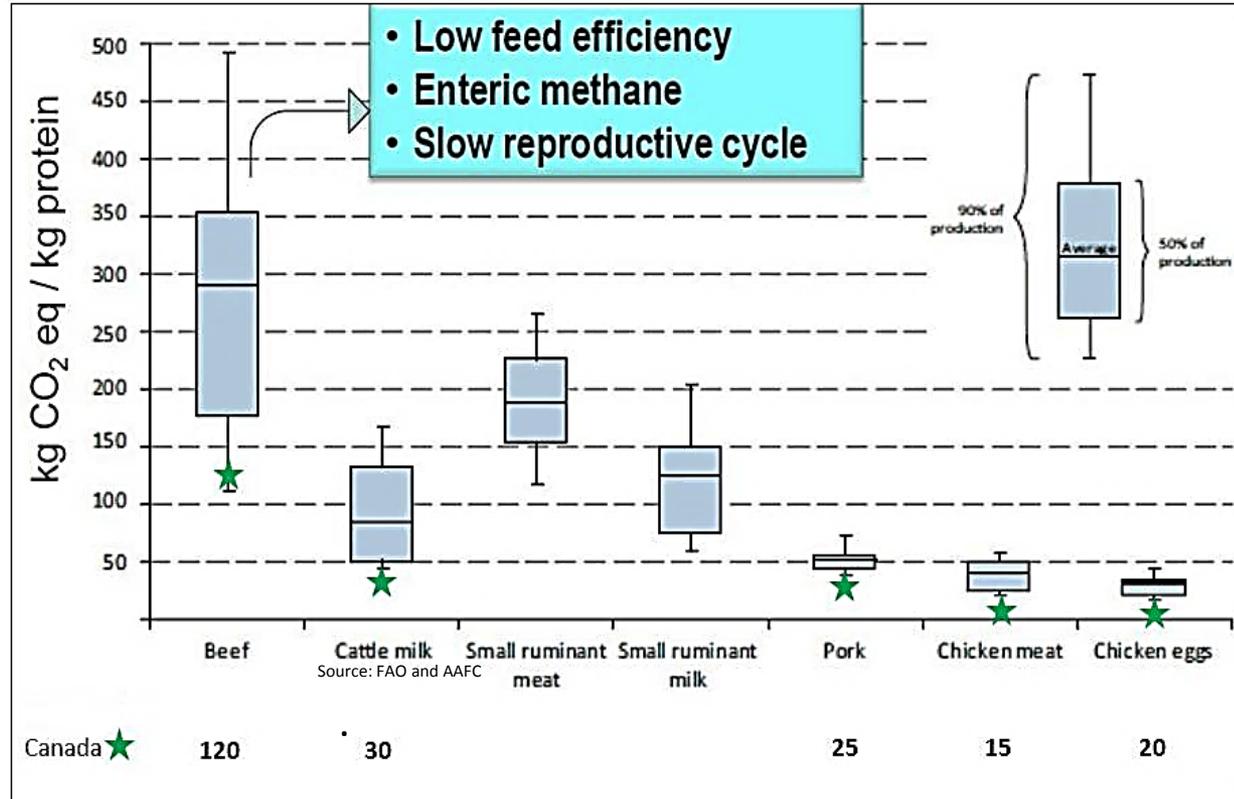


Emissions



Source: FAO, Agricultural Emissions

There is a huge variation in global GHG efficiency in animal protein – North America is among the most efficient



“Just discouraging a farmer from efficiently producing beef would hurt the climate because some less efficient farmer would likely produce the beef anyway.”

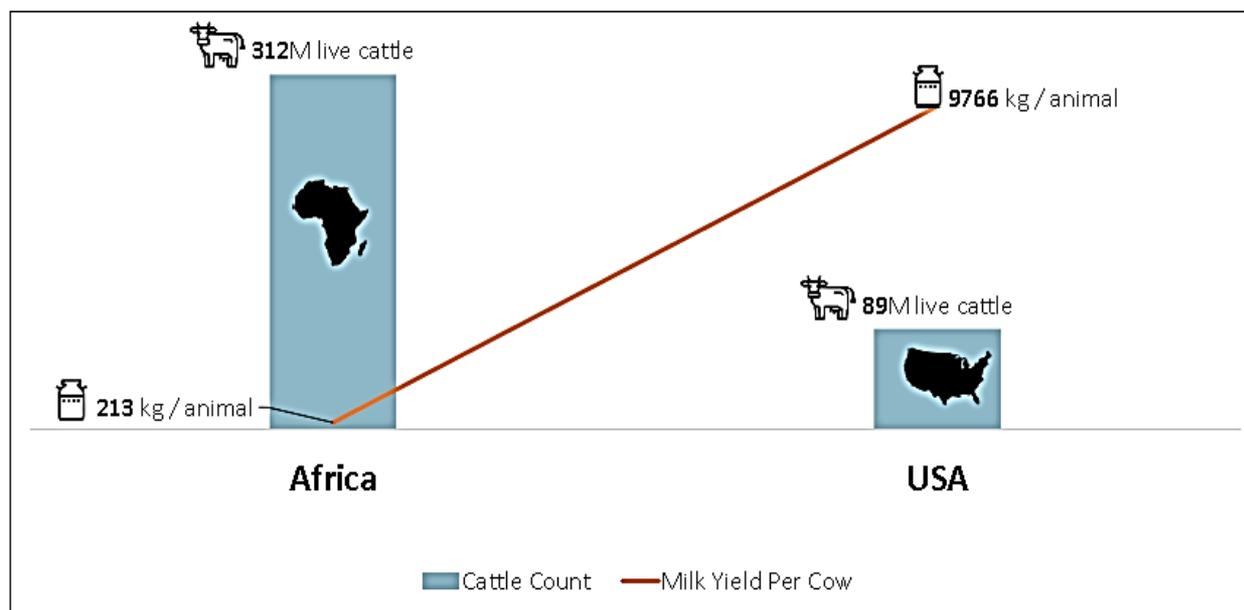
T. Searchinger, Forbes, December 13, 2018

Source: AAFC and FAO

Technology transfer could reduce GHG emissions globally...

LIVESTOCK: GLOBAL TRENDS & CHALLENGES

Africa - USA: Cattle Count & Milk Yield per Cow (2014)

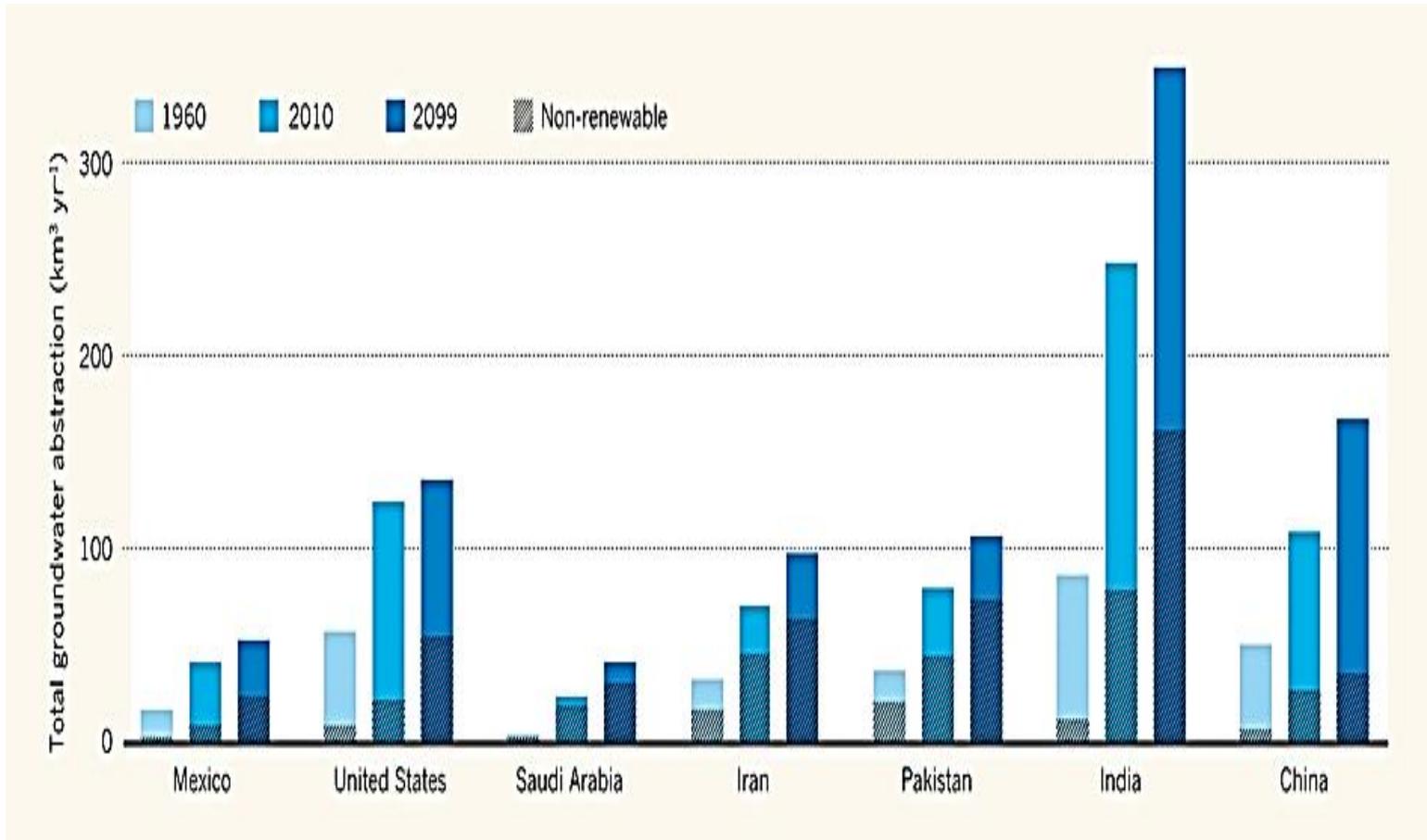


- *Total livestock count of live cattle, measured as the total number of live animals at any single time*
- *Milk yields measured as the quantity of milk produced per animal in kilograms. This is measured as the weighted-average of production across all milk-bearing livestock.*
- *Source FAO – OurWorldInData.org*

Last updated: June 21, 2019

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...and rationalize the use of natural resources



Hydrology: When wells run dry [Richard Taylor](#) *Nature* 516, 179–180 (11 December 2014)

...and the trade in virtual water

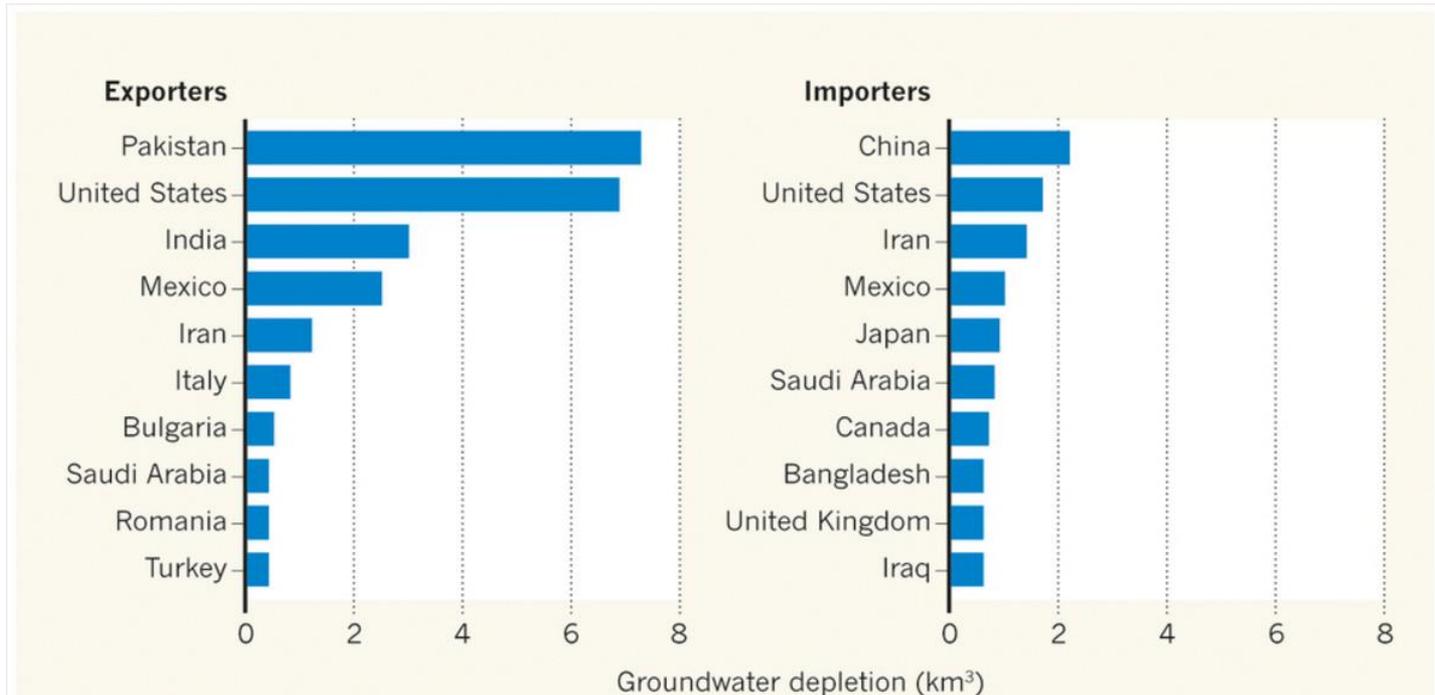
Figure 1: Top ten exporters and importers of groundwater depletion embedded in the food trade.

From

Environmental science: Eating ourselves dry

Maite M. Aldaya

Nature 543, 633–634 (30 March 2017) | doi:10.1038/543633a

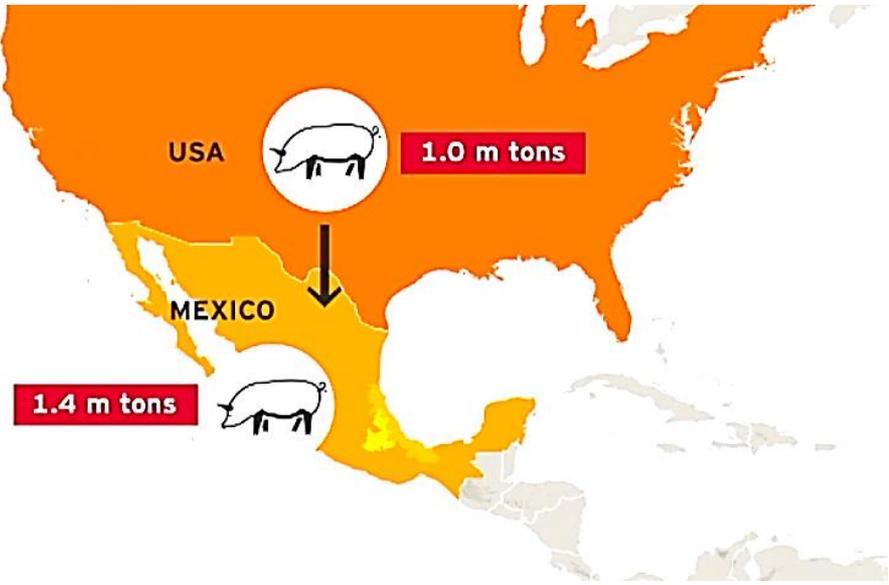


Notwithstanding environmental issues, the approaching China meat shortage begins to draw in meat from Africa



June 25 2019 First shipment of Namibian beef arrives in China

Trade disruption such as tariff wars have long lasting consequences once investments are made



Granjas Carroll de México to double pork production

BUSINESS

Mexico to raise pork output amid Trump threats

Mexico imports tons of US pork. But with President Trump questioning free trade, the country expands its own capacities. Mexico's largest pork producer is doubling its sow count and has a lofty goal: to turn the import nation into a pork exporter in the long run.

Undistorted Trade is essential to a sustainable food future

- Reduces the impacts of local supply and demand shocks on prices
- Rationalizes the location of production
- Reduces the impacts of production activities on the environment and climate change
- Improves food security

How do we move toward undistorted trade?

- Reduce production distorting subsidies
- Have policies to price important environmental costs including
 - GHG emissions
 - soil and biodiversity loss
 - non-renewable water use
 - health impacts
- Educate the public, industry and policy makers about the benefits of free trade
- Encourage technology development and transfer to developing countries

The End
Thank you