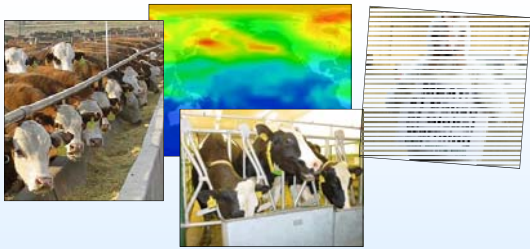


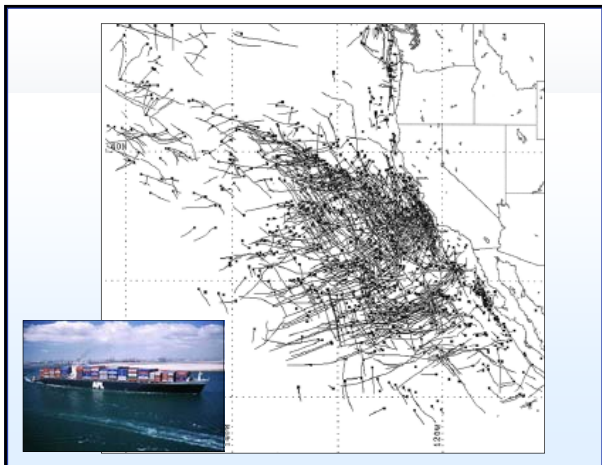


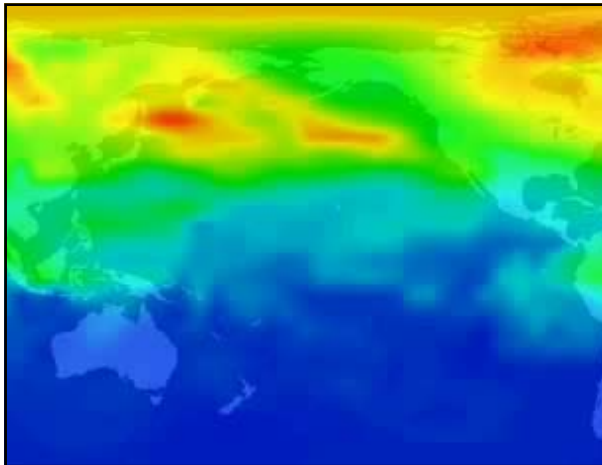
Facts and fiction about livestock and climate change



Frank Mitloehner, Professor & Air Quality Specialist
Department of Animal Science, University of California, Davis







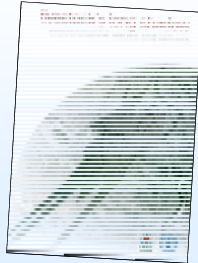


Facts or Fiction on Livestock and Climate Change?

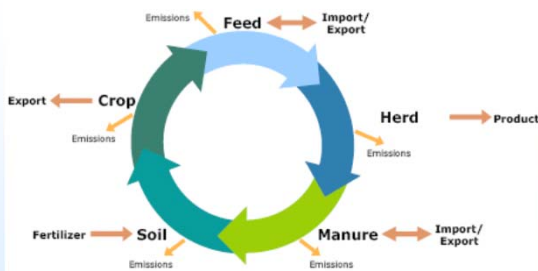
- Livestock produces 18% of all anthropogenic GHG globally
- Livestock produces more GHG than transportation
- Livestock produces even more than 18%, namely 51% of all GHG globally (Worldwatch Institute)
- Grazing systems produce less GHG than conventional animal production in confinement systems

"Livestock's Long Shadow" (FAO, 2006)

- "The Livestock sector is a major player, responsible for 18% of GHG emissions measured in CO₂e. This is a higher share than transport"



Life Cycle Assessment



(NRC, 2003)



UN body to look at meat and climate link

By Richard Black
Environment correspondent, BBC News



Livestock's Long Shadow calculated meat-related emissions from sheep to abattoir.
UN specialists are to look again at the contribution of meat production to climate change, after claims that an earlier report exaggerated the link.

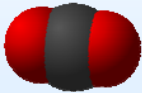
"I must say honestly that he has a point - we factored in everything for meat emissions, and we didn't do the same thing with transport, we just used the figure from the IPCC."

BBC
Dr. Pierre Gerber,
LLS contributing author

GHG & GWP

Global Warming Potential (GWP) of Main GHG

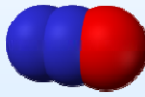
- Carbon Dioxide, CO₂ 1
- Methane, CH₄ 25
- Nitrous Oxide, N₂O 298



CO₂ – Carbon Dioxide

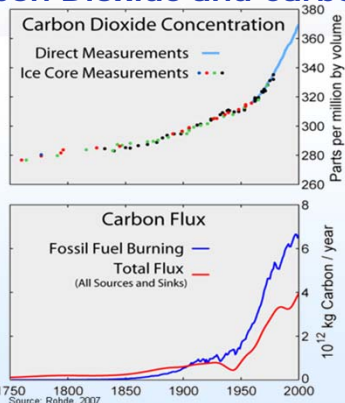


CH₄ – Methane

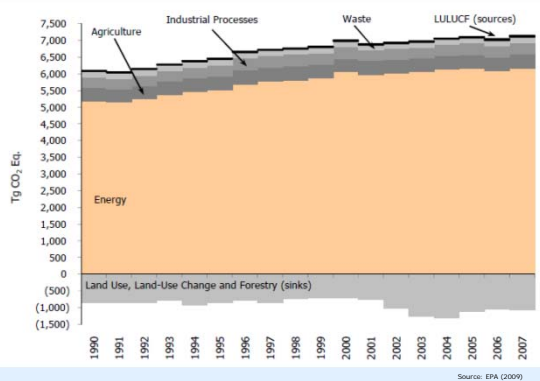


N₂O – Nitrous Oxide

Carbon Dioxide and Carbon Flux



U.S. – the big GHG picture



Asian Urbanization is key driver for industrial feed and food demand

Urban population:
2010 – 50%
2050 – 75%

8 out of 10 emerging market
megacities are in Asia.

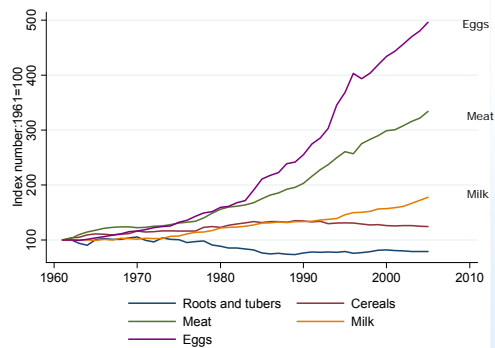


Source: UN Population Division

Asian Hourly Wage Rates in US Dollars

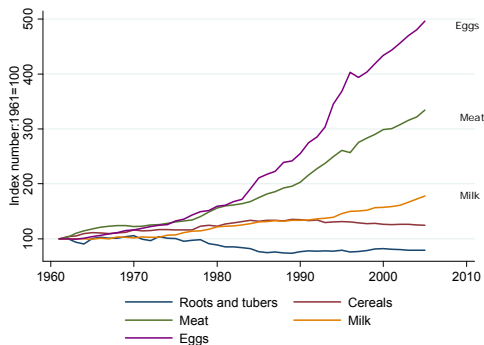
	2008	2009	2010*	2011*	2012*	2013*	2014*	2015*
CHINA	1.56	1.63	1.83	2.16	2.51	2.90	3.29	3.66
HONG KONG	7.24	7.27	7.42	7.64	7.95	8.27	8.68	9.11
INDIA	0.50	0.49	0.53	0.57	0.61	0.66	0.72	0.78
INDONESIA	0.51	0.51	0.59	0.67	0.77	0.88	0.98	1.08
JAPAN	24.30	26.23	22.59	21.70	20.41	19.81	19.51	18.73
SOUTH KOREA	13.21	11.27	13.31	14.54	16.49	18.70	20.91	23.38
MALAYSIA	2.99	2.80	2.97	3.18	3.38	3.58	3.80	4.03
PHILIPPINES	1.65	1.59	1.67	1.77	1.87	1.99	2.11	2.24
SINGAPORE	13.18	12.86	13.18	13.85	14.69	15.59	16.53	17.54
TAIWAN	7.24	6.56	6.95	7.19	7.50	7.85	8.19	8.52
THAILAND	1.08	1.06	1.04	1.08	1.19	1.27	1.35	1.42
VIETNAM	0.81	0.86	0.87	0.89	0.97	1.03	1.07	1.10

Consumption is growing rapidly in developing countries



21

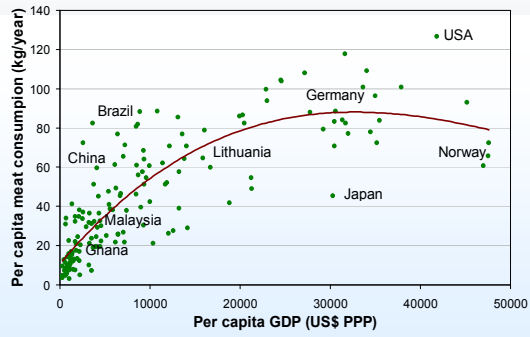
Consumption is growing rapidly in developing countries ...



Per capita consumption of major food items in developing countries - kg per caput per year (index numbers 1961-100)

22

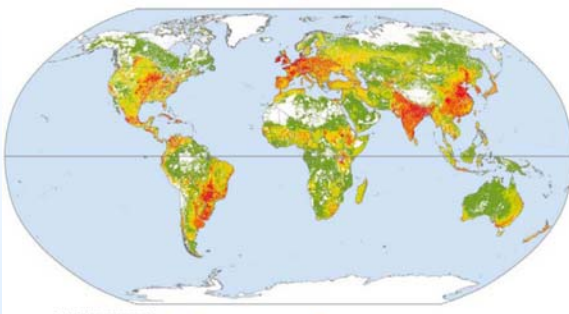
... driven by incomes ...



Per capita GDP and meat consumption by country, 2005.

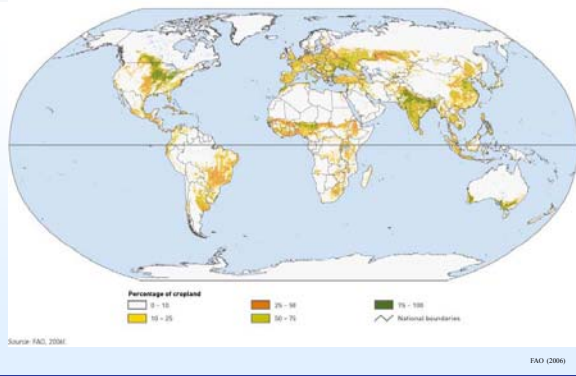
23

Global livestock distribution

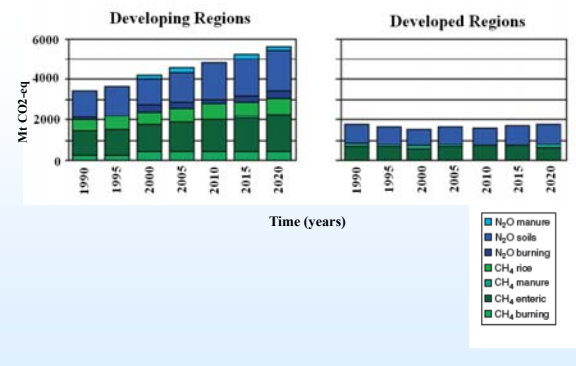


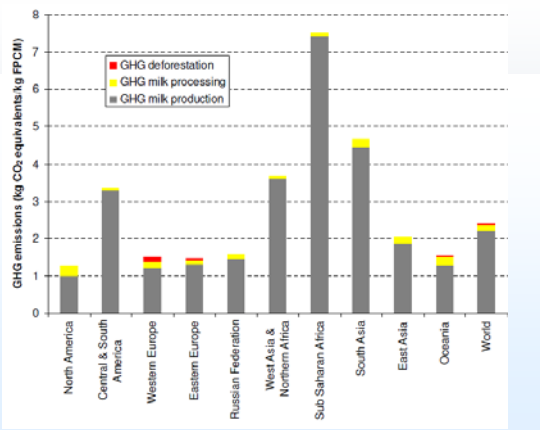
Livestock units per square km
 0 0.1-0.5 0.5-1 1-2.5 >2.5 National boundaries
 FAO (2006)

Distribution of cropland

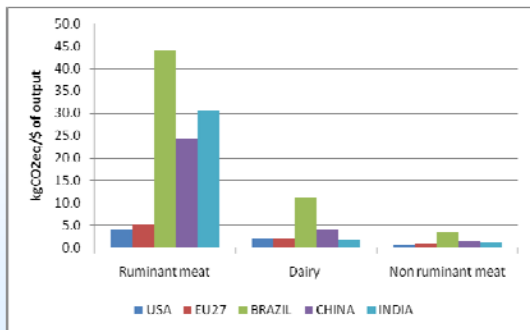


GHG by Regions



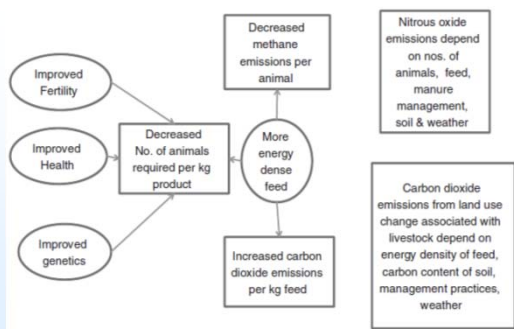


Emission Intensities (direct emissions from livestock)



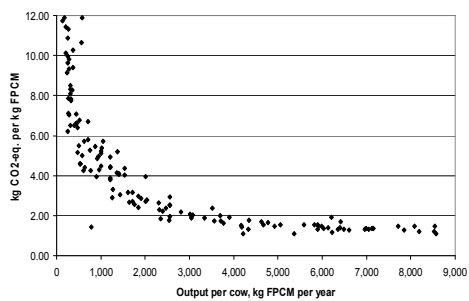
GTAP 2001 data base

Mitigation: interventions to improve productivity



Gill et al. (2010)

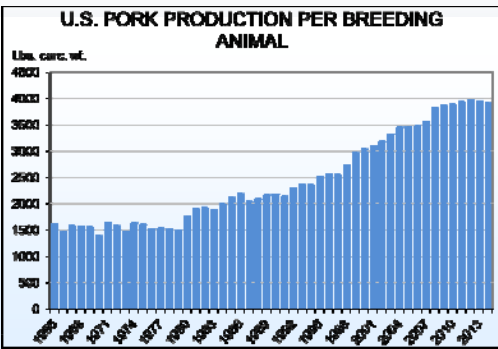
Relationship between total greenhouse gas emissions and milk output per cow



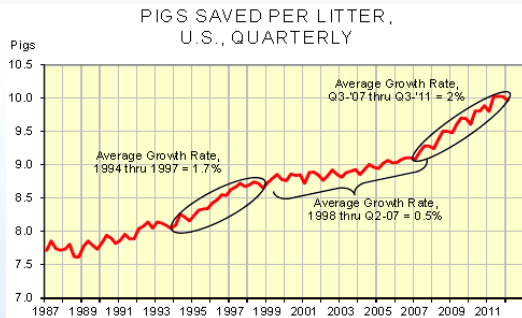
US Dairy trends

- Today, there are 9 million dairy cows in the US, 16 million fewer than existed in 1950.
- Even though cow number have decreased dramatically (1950 versus 2013), milk production nationally has increased 60 percent.
- The carbon footprint of a glass of milk is 2/3 smaller today than it was 70 years ago.

US Pork Trends



US Pork Trends



US Beef trends

- In 1970, the US had 140 Million head of beef
- By comparison, today there are 90 Million head
- In both 1970 and 2010, 24 Million tons of beef were produced

China Swine Example

- China's five year plan focuses on making farms larger and more efficient
- Half of the world's pigs live in China
- 50 million sows w/ 20 piglets born alive
- Equals annual production of 1 Billion pigs
- Pre-weaning mortality causes 400 Million pigs to never make it to the market
- One more pig per sow would mean 1 Million tons of feed saved

Sustainable Intensification is key

- **Production intensity and emission intensity are inversely related**

Livestock Environmental Assessment and Performance Partnership



- LEAP brings together governments, the livestock industry, non-governmental and civil society organizations, leading researchers and inter-governmental organizations
- The FAO, as secretariat and host, will ensure that the project follows science-based and internationally recognized approaches

