Facts and fiction about livestock and climate change

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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
Life Cycle Assessment

(NRC, 2003)
Global Warming Potential (GWP) of Main GHG

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

Carbon Dioxide Concentration
- Direct Measurements
- Ice Core Measurements

Carbon Flux
- Fossil Fuel Burning
- Total Flux (All Sources and Sinks)

Source: Rohde. 2007
U.S. – the big GHG picture

Source: EPA (2009)
4.5 Billion + population of USA in 10 years

There are more people living inside this circle than outside of it.
Today and Tomorrow’s Markets
Consumption is growing rapidly in developing countries ...

Per caput consumption of major food items in developing countries – kg per caput per year (index numbers 1961=100)
... driven by incomes ...

Per capita GDP and meat consumption by country, 2005.
Global livestock distribution

FAO (2006)
Distribution of cropland

Source: FAO, 2006
Mitigation: interventions to improve productivity

- **Improved Fertility**
- **Improved Health**
- **Improved genetics**

Decreased
No. of animals
required per kg product

Decreased methane
emissions per animal

More energy
dense feed

Increased carbon
dioxide emissions
per kg feed

Nitrous oxide
emissions depend on nos. of
animals, feed, manure
management, soil & weather

Carbon dioxide
emissions from land use
change associated with
livestock depend on
energy density of feed,
carbon content of soil,
management practices,
weather

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 $\frac{2}{3}$ smaller today than it was 70 years ago.
US Pork Trends

U.S. PORK PRODUCTION PER BREEDING ANIMAL

Lbs. carc. wt.
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’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