

New Detailed GHG Inventory Data for Agriculture and Forestry

Kathryn Bickel
Global Change Program Office

Contributors: FS, ARS,
NRCS, OEPNU, EPA, CSU



www.usda.gov/oce/gcpo/ghginventory.html



Purposes of USDA GHG Inventory for Agriculture and Forestry

- Provide data at multiple scales (by region, state, ownership, livestock, crops, etc.)
- Identify opportunities to reduce emissions and enhance sinks
- Provide specific information for landowners and technical service providers
- Identify key uncertainties and priorities for improving emissions estimates

Organization of USDA GHG Inventory



Chapter 1: Introduction



Chapter 2: Livestock

Enteric fermentation ~ Livestock manure



Chapter 3: Crop Production

Cropland soils ~ Rice cultivation ~ Residue burning



Chapter 4: Forests

Forest biomass ~ Wood products ~ Urban trees



Chapter 5: Agriculture Energy Use



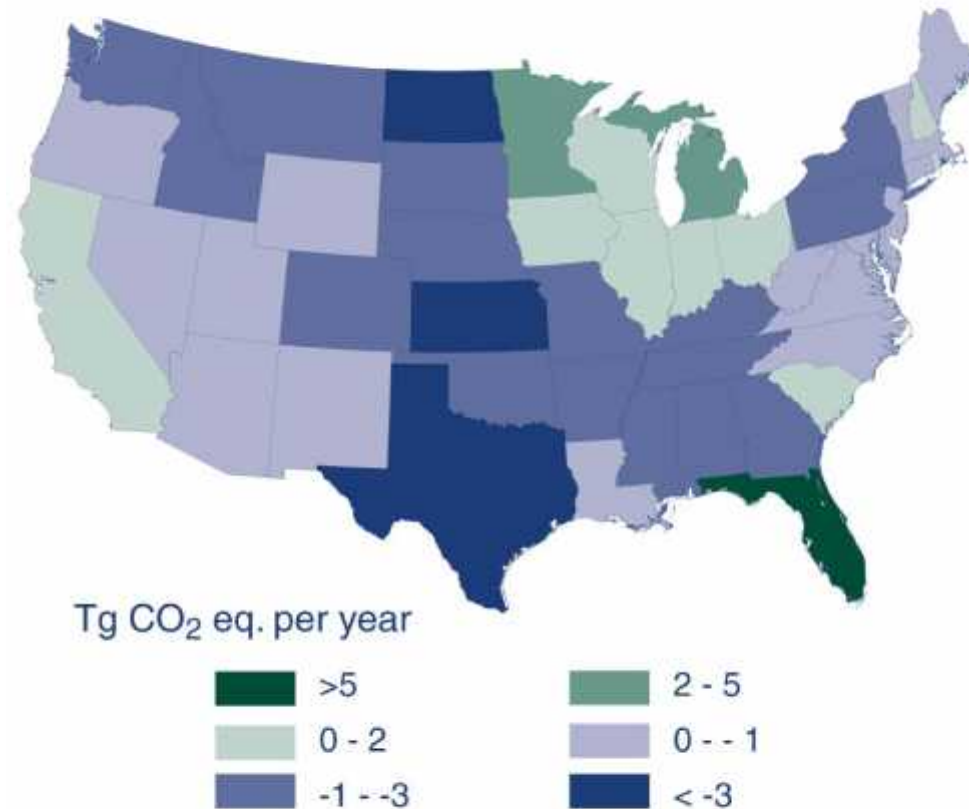
Each Chapter Contains...

- Description of the source/sink and what causes it
- How emissions/sequestration from the source/sink are estimated
- Emissions/sequestration by relevant categories
 - for example: emissions by livestock, state, region, land ownership
- Details for 2001 and time series provided for 1990-2001



Data for most agriculture sources are provided at least at the State-level

Map 3-1
CO₂ emissions and sequestration in agricultural soils, 1997

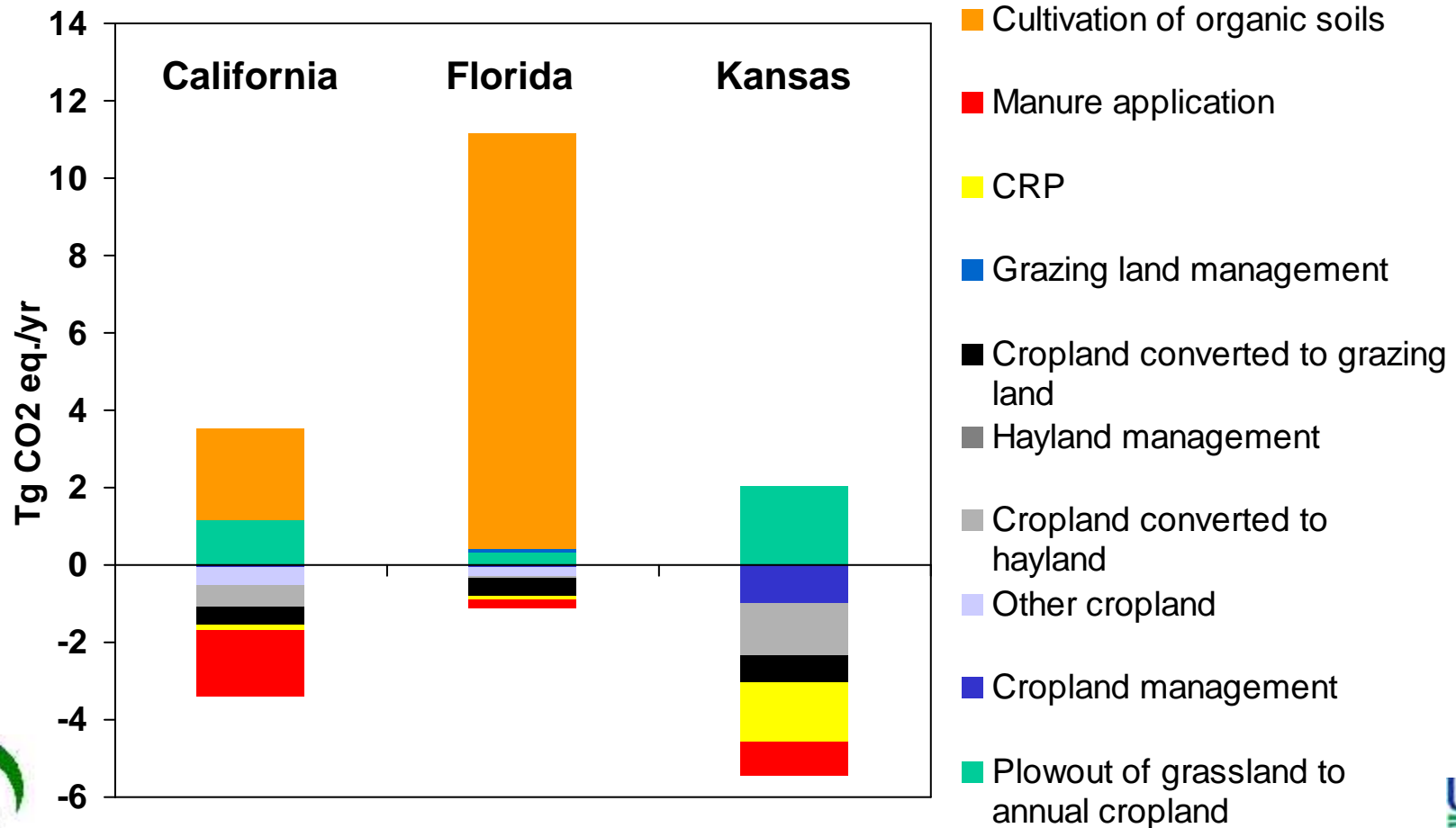


Note: Negative values correspond to sequestration.



For some sources, data disaggregated to evaluate causes and trends

CO2 emissions/sequestration in Agricultural Soils in three States by management action





Forest data reported at the regional level

Figure 4-2
Forest ecosystem carbon stocks and average stock density according to region and carbon pool, 2001

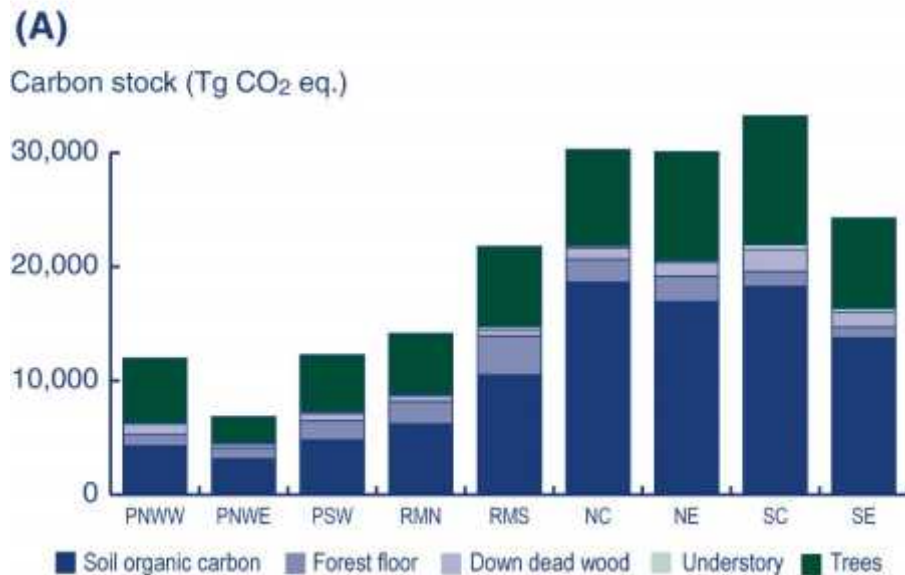
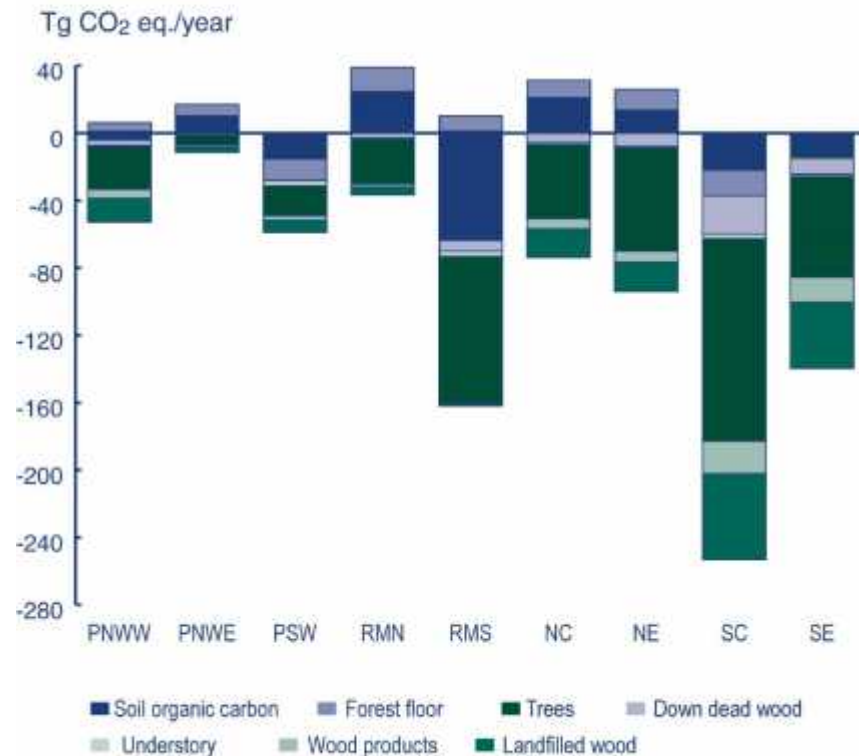


Figure 4-3
Net annual forest carbon stock change, summarized according to region and carbon pool, 1997-2001

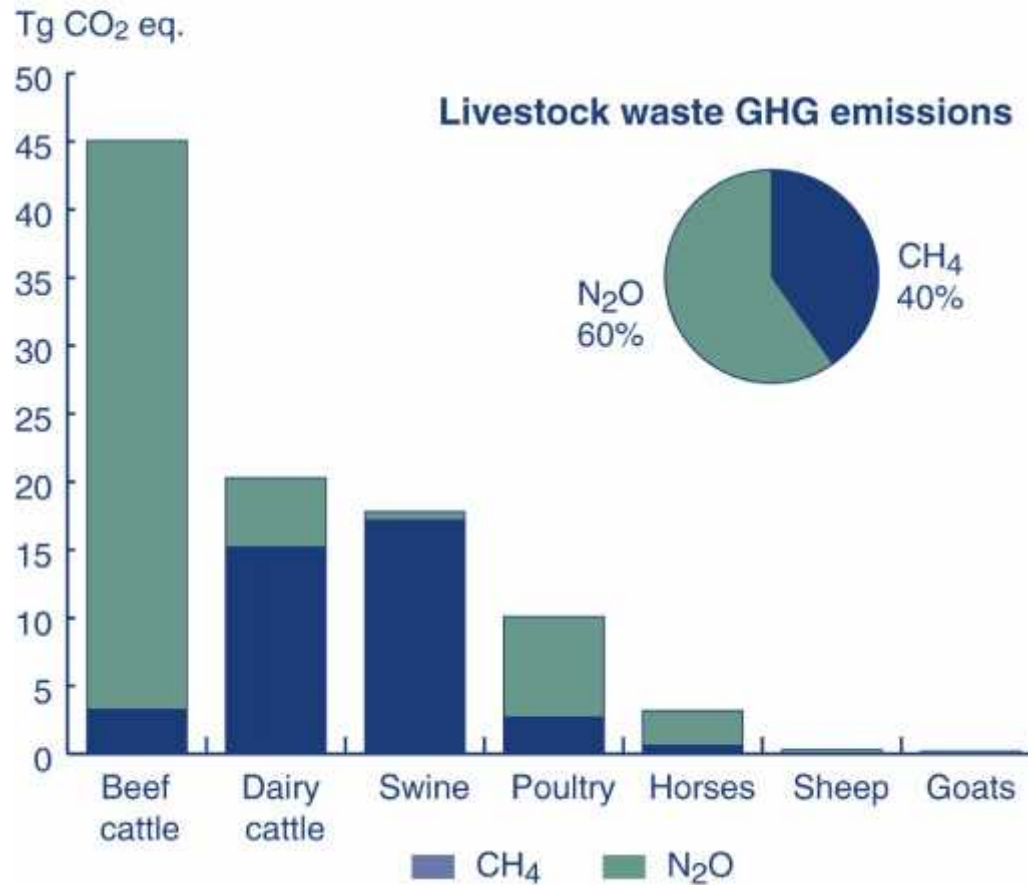


Note: Negative values correspond to sequestration.



Livestock data reported by livestock category

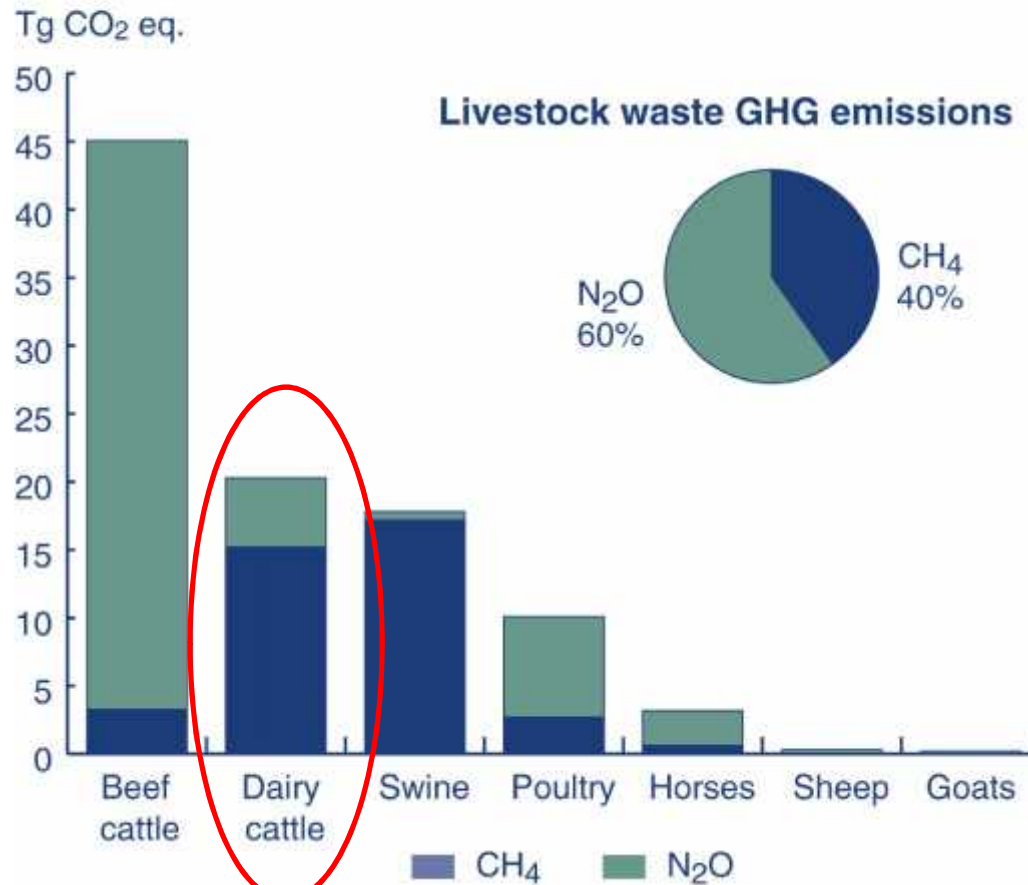
Figure 2-2
U.S. Greenhouse gas emissions from livestock waste by livestock type, 2001





Livestock data reported by livestock category

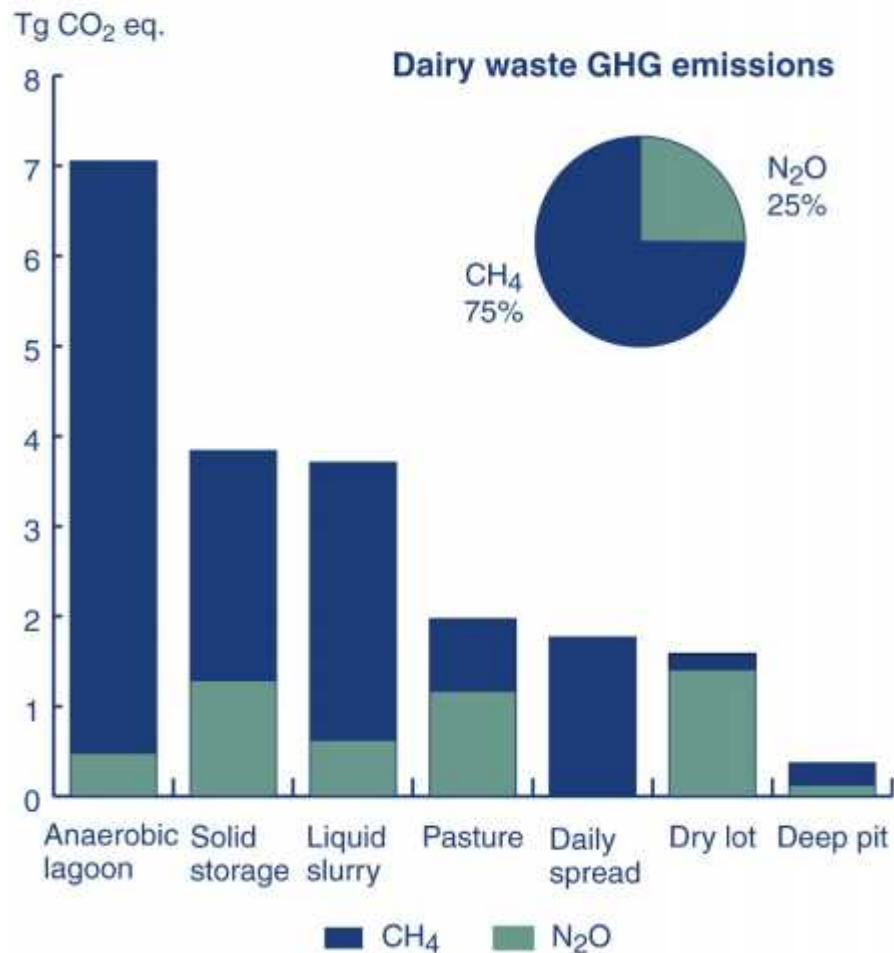
Figure 2-2
U.S. Greenhouse gas emissions from livestock waste by livestock type, 2001





Livestock data reported by waste management system: dairy example

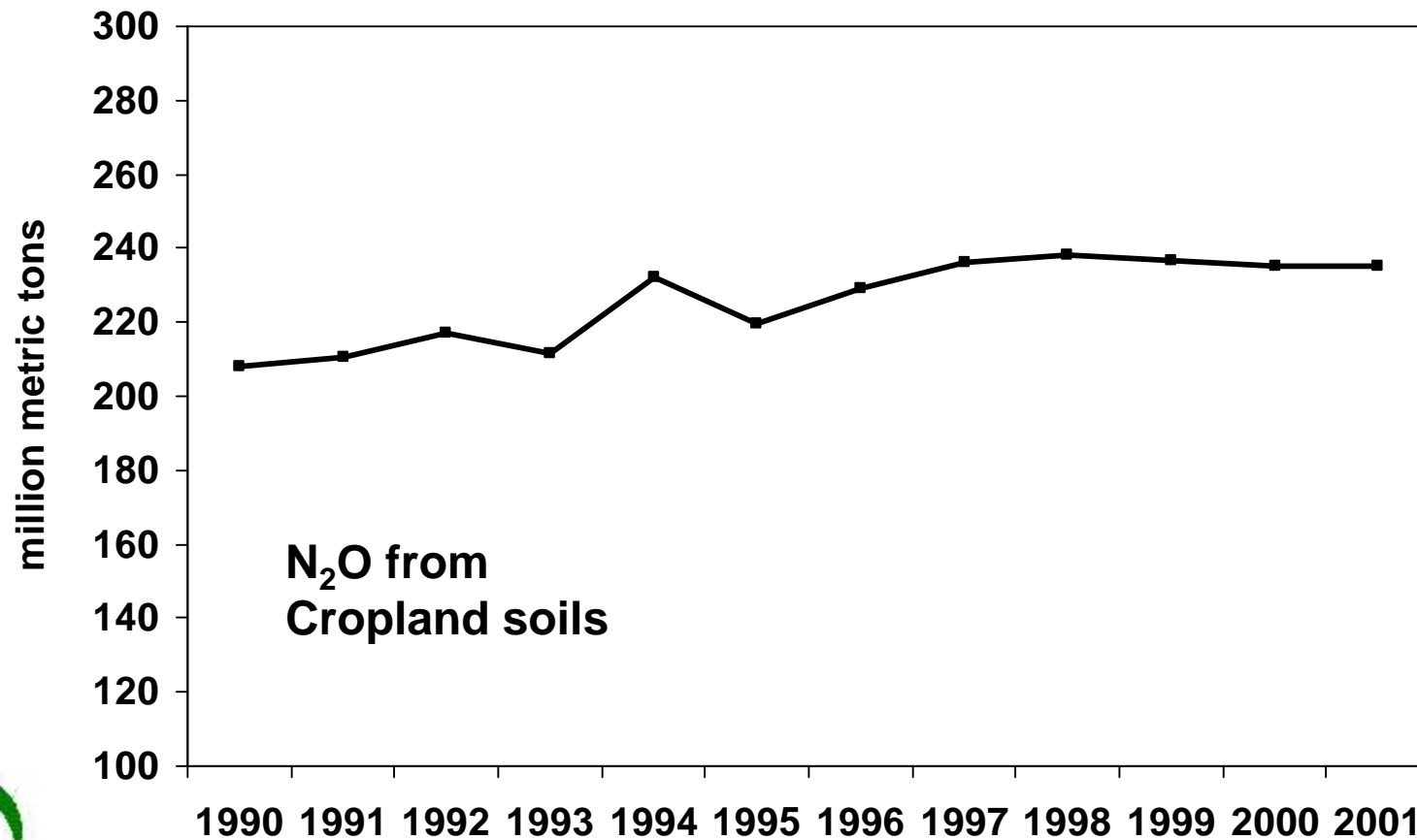
Figure 2-4
U.S. Greenhouse gas emissions from dairy cattle manure, 2001





Data provide basis for further applications:
example with N₂O emissions

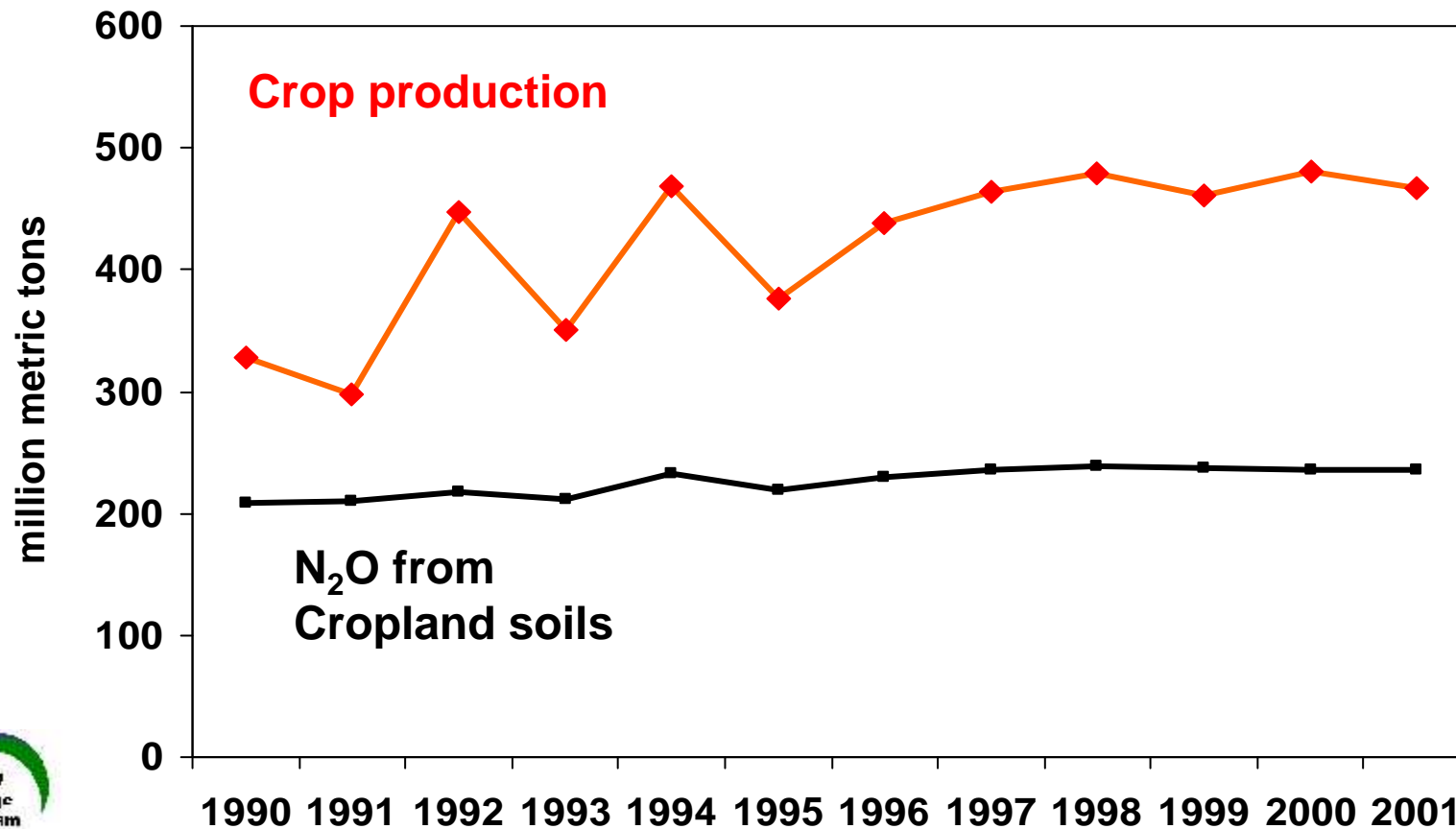
N₂O emissions increased by 13% from 1990 to 2001





Applications of Crop Emissions Data

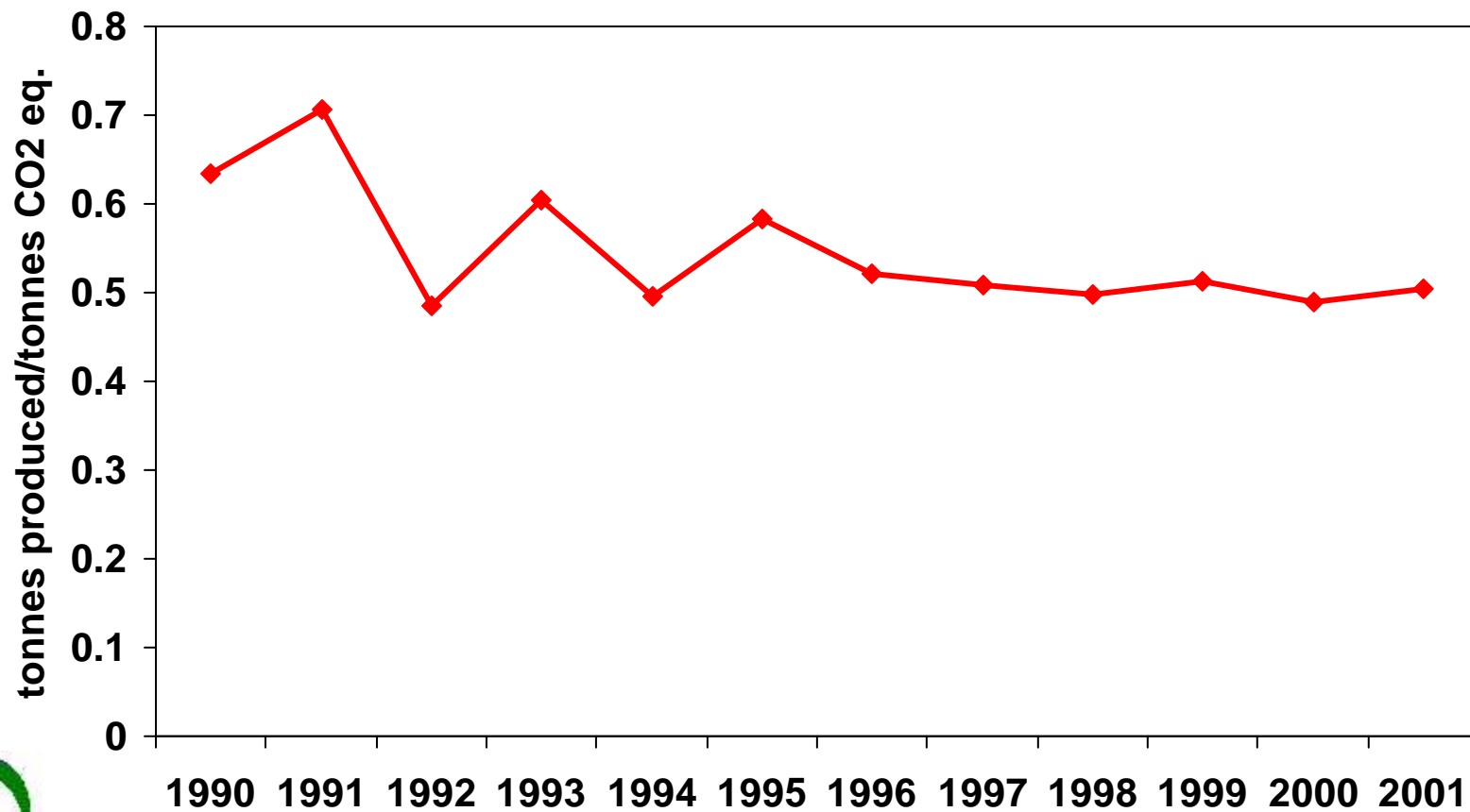
Corn, wheat, and soybean production increased by 42%, 1990-2001





Applications of Crop Emissions Data

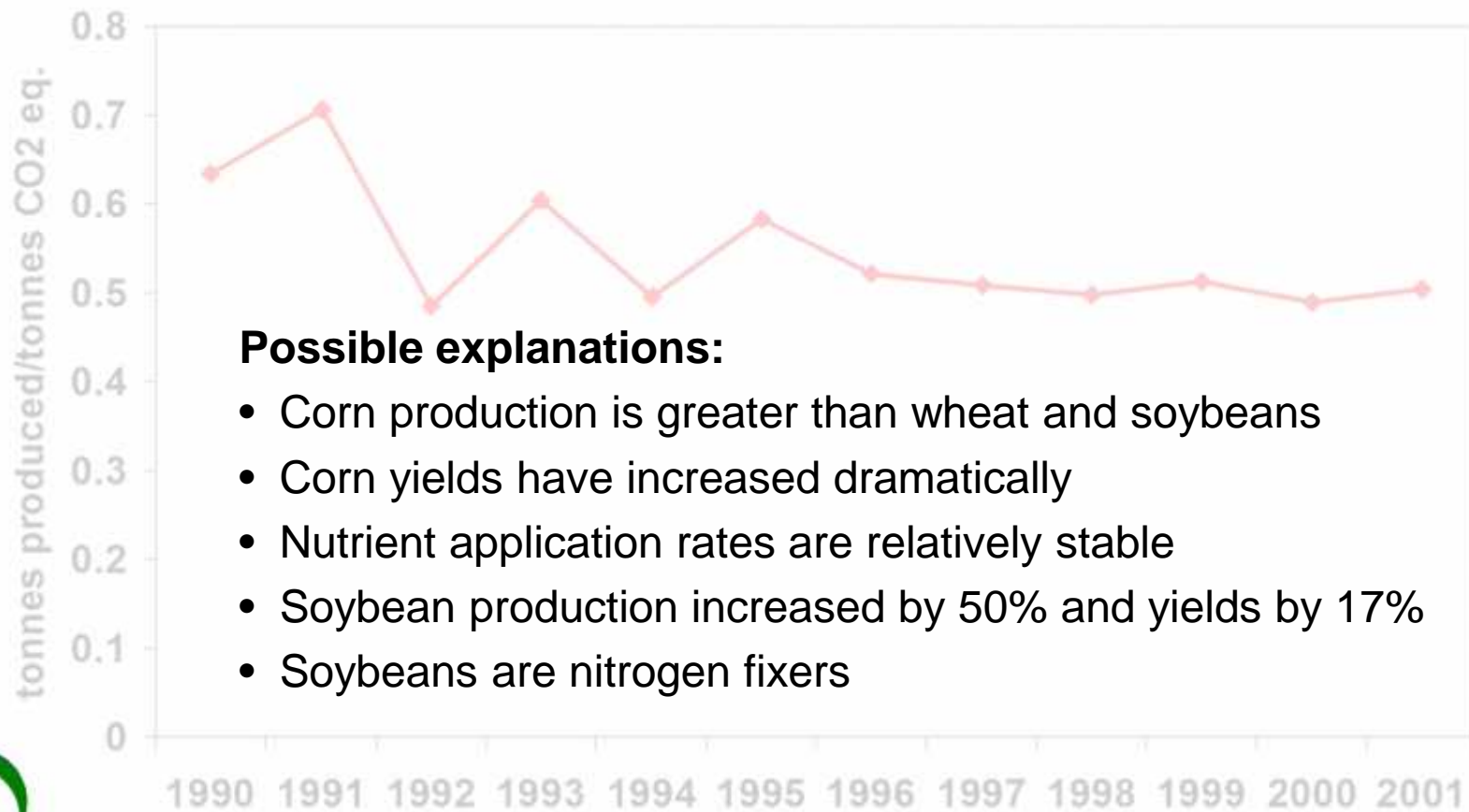
20% decline in emissions per unit of output, 1990-2001





Applications of Crop Emissions Data

20% decline in emissions per unit of output, 1990-2001



Possible explanations:

- Corn production is greater than wheat and soybeans
- Corn yields have increased dramatically
- Nutrient application rates are relatively stable
- Soybean production increased by 50% and yields by 17%
- Soybeans are nitrogen fixers



Next steps:

- We plan to continue publication biennially
- Considering expanding to include:
 - analysis of opportunities for mitigation and
 - tracking of GHG impacts of USDA conservation programs
- Address growing demands for information on GHG's in agriculture and forestry



www.usda.gov/oce/gcpo/ghginventory.html

- Inventory Contributors

- John Brenner, NRCS
- James Duffield, OEPNU
- Ron Follett, ARS
- Linda Heath, FS
- John Kimble, NRCS
- Dina Kruger, EPA
- Joe Mangino, EPA
- Arvin Mosier, ARS
- Stephen Ogle, CSU
- Keith Paustian, CSU
- Hosien Shapouri, OEPNU
- James Smith, FS
- Tom Wirth, EPA
- Peter Woodbury, FS

