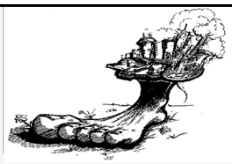

Green House Gas Emissions form Poultry Houses

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Mandatory Reporting of Annual Emissions

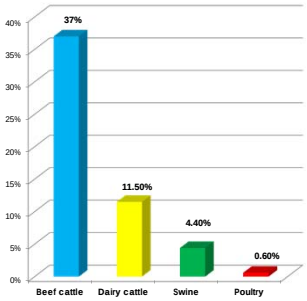
- Currently applies only to;
  - Direct GHG emitters
  - Fossil fuel suppliers
  - Industrial gas suppliers
- Threshold is 25,000 tonne CO_2e or more per year
- More the 10,000 facilities in the US is covered by this rule
- These facilities account for 85-90% of the US GHG emissions

Global Warming: should we be worried?

- Real or imagined?
  - There has been an increase in the levels of certain gasses
  - Impacts of these gases on the climate?
  - Knowing your carbon footprint and energy use can help you to reduce your energy bill and improve your bottom line!

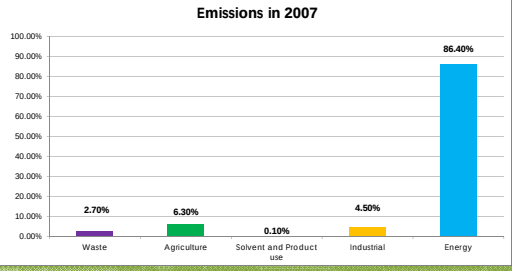
GHG Emissions from Animal Agriculture

- Agriculture is responsible for 6.3% of the GHG emissions in the US
- Of this 6.3%, 53.5% comes from animal agriculture



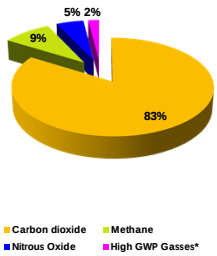
Why be concerned

- US EPA has been directed to require mandatory reporting of GHG emissions form all sources in all sectors in the US economy



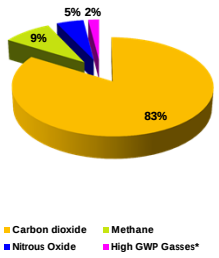
GHSs of Concern

- Carbon dioxide (CO_2)
- Methane (CH_4)
- Nitrous Oxide (N_2O)
- *Hydroflorocarbons
- *Sulfur Hexafluoride



GHSs of Concern

- CO_2- largest source of GHG emissions in the US
- CO_2 from fossil fuel use is largest source of CO_2 emissions



Where is the CH_4 emitted on the farm coming from?

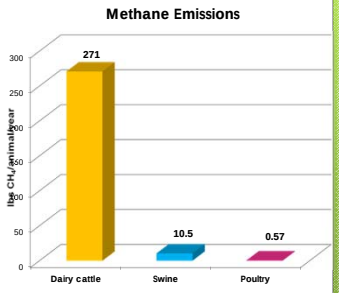
- Utilization of fossil fuels:
  1. Purchased electricity- indirect emissions
  2. Propane use in furnaces, incinerators,
  3. Diesel use for generators, trucks, tractors etc.
- Enteric fermentation:
  - CH_4 is a part of the normal digestive processes in animals
  - Significantly less in birds and other non-ruminants than ruminants
  - Feed quality and feed intake affects emissions (lower quality/higher feed intake results in higher CH_4 emissions)
- Manure management:
  - Anaerobic decomposition of manure produces CH_4
  - Liquid vs solid manure storage

Carbon Footprint?

- Your carbon footprint is a measure of the amount of GHGs that are being emitted into the atmosphere because of your activity or product.
- The gasses of particular concern for us are;
  - CO_2
  - *CH_4
  - *N_2O
- *They are expressed in carbon equivalents (CO_2e)
  - CH_4:CO_2= 25:1
  - N_2O:CO_2= 298:1

CH_4 emissions

- Small amount of CH_4 emitted from poultry from enteric fermentation compared to dairy/beef cattle and swine



Where is the CO_2 emitted on the farm coming from?

- Utilization of fossil fuels:
  1. Purchased electricity- indirect emissions
  2. Propane use in furnaces, incinerators,
  3. Diesel use for generators, trucks, tractors etc.
- Consumption of plant material (feed) by animals results in;
  - Breakdown of C into animal biomass (meat and eggs)
  - CO_2 respired by the animals
  - Fecal deposition of C in unutilized co-products (manure)

CH_4 emissions

- Most of the poultry manure is stored in dry storage under aerobic conditions
- CH_4 production from animal manure increases with temperature

Where is the N_2O emitted on the farm coming from?

- Utilization of fossil fuels:
  1. Purchased electricity- indirect emissions
  2. Propane use in furnaces, incinerators,
  3. Diesel use for generators, trucks, tractors etc.
- Manure Management:
  - Direct emissions from nitrification and denitrification of the organic nitrogen in the manure and urine
  - Indirect emissions from volatization, run-off and leaching of nitrogen during treatment storage and transportation
  - N_2O emission will occur in manure that is stored aerobically

Recent findings

- To produce 1lb of chicken 7.05lbs of GHGs was emitted (Germany)

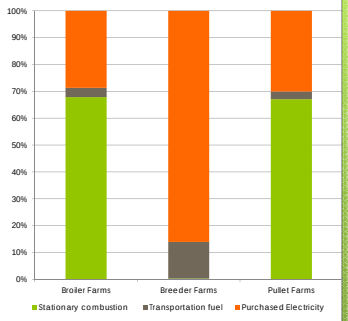
- To produce 1lb pork 8.8lbs of GHGs were emitted (US)

Where is the N_2O emitted on the farm coming from?

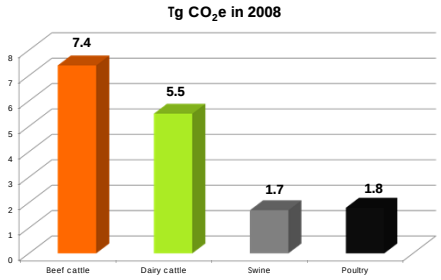
- N_2O emissions are influenced by environmental factors;
  - Oxygen status
  - Temperature
  - Moisture content
- Mixture of manure and bedding combined with the partial compaction of the bedding creates a condition that favors passive aeration- results in uncontrolled nitrification and denitrification

GHGs on poultry production farms

- 68% of GHG emitted on broiler and pullet farms is from propane use
- 85% of GHG emitted on breeder farms is from electricity use

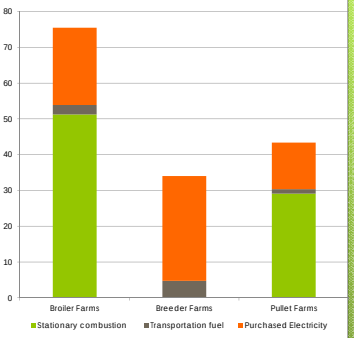


N_2O emissions from manure management

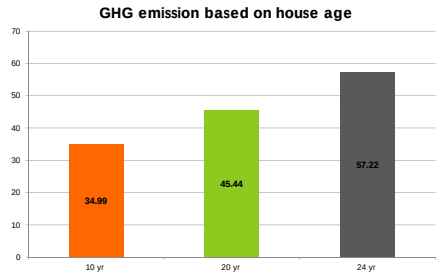


GHGs on poultry production farms

- Avg. broiler farm emits ~75 tonne CO_2e
- Avg. breeder farm emits ~34 tonne CO_2e
- Avg. pullet farm emits ~ 43 tonne CO_2e



- Emissions increase with the age of the house



Reducing GHG emissions- Manure Management

- CH_4
  - Manure handled as a solid or spread on land, decompose aerobically and produce little or no CH_4
  - Proper management of bedding (indoor) and manure heaps (in storage sheds) will reduce GHG emissions
    - Avoid prolonged litter storage to reduce CH_4 emissions
    - Minimize compaction
    - Frequent addition of litter
    - Keep litter dry and covered from the elements

Reducing GHG emissions

- Reducing energy use will also reduce the amount of GHGs that is emitted
- Reduction has to be done on a farm by farm basis
- Reduce propane use by preventing heat loss;
  - Enclose houses that are not solid walls
  - Insulate curtain openings, walls and ceiling

Reducing GHG emissions- Manure Management

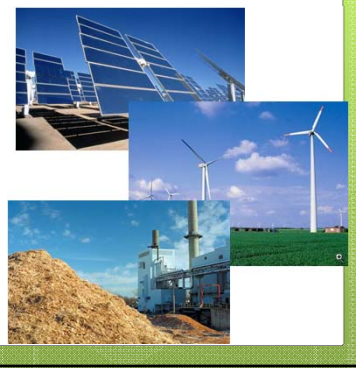
- CH_{4-}
  - Changes in diet to reduce CH_4 emissions
- N_2O
  - Add nitrification inhibitors to reduce N_2O emissions
  - Addition of high carbon substrate to manure heaps
  - Compaction of manure heap to reduce aeration

Reducing GHG emissions

- Use the attic area as a solar energy collector;
  - Install attic outlets
- Use more efficient equipment such as;
  - Fans, generators, lighting, heaters
- Maintenance of equipment;
  - Clean fans
  - Clean outlets/inlets
  - Change fan belts as needed

Alternative Energy Sources

- These have been considered;
  - Solar: expensive to implement, high cost of recovery
  - Wind: not accessible to all, not practical in all areas
  - Biomass: has a low power density, could not be used to power farm, could be used to heat houses



Thank You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