Animal Feedlot Greenhouse Gas (GHG) Calculator User's Manual

The Animal Feedlot GHG Calculator (Feedlot tool) is an excel-based calculator that estimates the GHG emissions from housing and manure management from dairy cows, poultry, and swine barns located in Minnesota based on equations and factors from EPA's Inventory of U.S. Greenhouse Gas Emissions and Sinks (1990-2022) and user inputs. This information can be used in the preparation of Item 18 GHG Emissions/Carbon Footprint in the Environmental Assessment Worksheet (EAW) form. For additional guidance, refer to the Minnesota Environmental Quality Board (EQB) EAW guidance for climate and adaptation and resilience.

Who should use this tool

The Feedlot tool is for proposers to report greenhouse gas emissions in an Environmental Worksheet (EAW) or Environmental Impact Statement (EIS) for feedlot projects under Minnesota Admin. Rule 4410.4400 subp.29. The tool allows feedlot owners and their consultants to evaluate the change in increasing animal count or a change in manure management.

Workbook organization

The workbook contains the following sheets. Only edit the light-green input cells; dark-green cells display computed results.

Sheet	Purpose
Introduction	Quick introduction of color-coded cells and source of background data.
Dairy/Poultry/Swine	Enter animal counts and site-specific factors. Results are summarized at the top.
Alfalfa acres	Optional: Enter acreage of alfalfa crops used to reduce CO2 emissions.
GWP conversion	Reference global warming potentials (GWPs).
Notes	History of updates.

Steps

1. Save a working copy of the file so originals are preserved.
2. On each relevant species tab (Dairy, Poultry, Swine) enter the animal counts in the light-green cells for the existing facility and for the project (proposed changes). If the facility is new, enter 0 for the existing column. Enter animal counts on each relevant species tab.
3. Review the default emission factors and other parameters shown to the right of the inputs. These are from EPA tables and are pre-filled. Only replace them if you have documented, site-specific values. The emission factors based on the information on the right as color coded per section:
    - methane barn manure storage;
    - nitrous oxide barn and manure storage; and
    - nitrous oxide manure land application.

4. The Global Warming Potential (GWPs) are based on the Intergovernmental Panel on Climate Change's (IPCCs) 4th Assessment Report. IPCC has since released a 5th and 6th Assessment Report with updated GWP values. The GWP's are:

Emission	AR 4	AR 5	AR 6
CH_4	25	28	27
N_2O	298	265	273

5. (Optional) Account for alfalfa acres on the Alfalfa acres sheet. Alfalfa is the most widely grown forage crop worldwide and is thought to be a significant carbon sink due to high productivity, extensive root systems, and nitrogen fixation. Including alfalfa in the crop rotation significantly reduces the need for nitrogen application in the following crops. This results in less fertilizer, either manure or commercial fertilizer and thus less trips around the field.
6. Read the results at the top of each species tab. The results can be transferred to the Alternate EAW under operations as a non-combustible emission.

Animal definitions

The Feedlot tool has a separate tab for Dairy cows, poultry, and swine. Within each tab, there are multiple categories for each animal type.

- Dairy
  - Calves- one to six months in age.
  - Heifers- defined by the start of the age of 6 months to when the animal gives birth to her first calf.
  - Cows- animal that has birthed a calf. There is an additional field users must address for cows and that is the animal unit per head. Animal units are calculated using a factor which converts animals of different species into equivalent units. The user must enter in cells F12 and K12, either a "1.0" for Jersey Bred or "1.4" for Holstein Bred.
- Poultry
  - Pullets- young female chicken that has not reached maturity.
  - Layers-chicken bred for egg production.
- Swine- the weight classes are based on Minnesota Administrative Rule 7020.03000 subpart 5c.
  - Less than 55 lbs.
  - 55-330 lbs.
  - Greater than 330 lbs.

Tips

Several cells have additional information to assist in providing additional guidance.

- If a red triangle is in the upper right corner of a cell, users can hover over the red triangle see a greater explanation on the information required.
- Certain fields include a link to the EPA's Inventory of U.S. Greenhouse Gas Emissions and Sinks directing users to the tables where the data was pulled and are cited to the right.