Upcoming Models & Tools to Improve Manure Management: ManureDB

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Overview

- Livestock manure provides nutrients for cropping systems
- Published U.S. manure "book values" are several decades old
- The University of Minnesota has grant funding to create a manure nutrient database called ManureDB.
- We are partnering with laboratories that analyze manure.
- Partnering with laboratories and universities that analyze manure
- Public website and data download now available

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What are manure book values used for?

- Developing manure management plans
- Establishing best nutrient management practices for manure land application
- Using as a baseline for nutrient management education
- Modeling nutrient cycling and gas emissions

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ManureDB: Nationwide Manure Test Database

- Minnesota Supercomputing Institute
- Stakeholder group

- Schema
- Database
- Website

- Laboratory cooperation
- Currently cleaning and uploading data
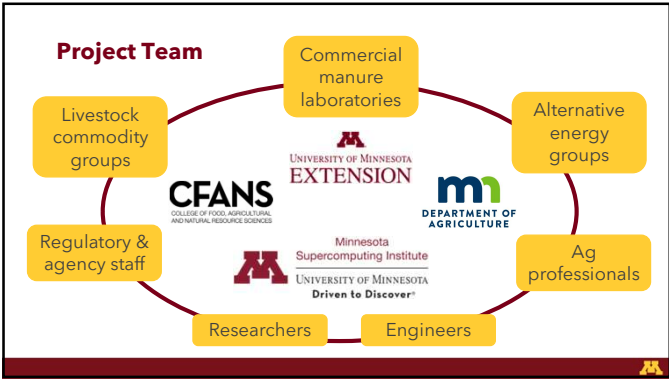- Over 489,000 samples in the database with more getting processed for entry

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Project Team

Commercial manure laboratories

Livestock commodity groups

Alternative energy groups

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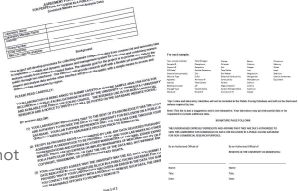
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Data Use Agreement & Privacy Concerns

- Two-page agreement between the University of Minnesota and the participating laboratory

- No customer names or addresses

- Only first 3 digits of the ZIP code will be imported into the database

- ZIP codes and laboratory identities are not included in the public-facing database

- To help maintain privacy, at least five samples/year/geography will be needed to publicly show up in summaries

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Survey Data Template

- Lab Name
- Year Analyzed (required)
- Date Sampled, Date Received, Date Analyzed, Date Reported
- Sample ID
- ZIP Code, State
- Sample Notes
- Manure Type
- Animal or Other Amendment Type (required)

- Manure Treatment
- Agitated
- Bedding Type
- Storage Type
- Length of Storage
- Application Method
- Targeted Analytes

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Targeted Analytes

- Moisture
- Total Nitrogen
- Phosphorus
- Water Extractable Phosphorus
- Potassium
- Soluble Potassium
- Zinc
- Sulfur
- Total Carbon
- Total Organic Carbon
- pH
- Volatile Solids

- Total Suspended Solids
- Nitrate-N
- Chloride
- Ash
- Total Solids
- Electrical Conductivity
- Organic Matter
- Carbon:Nitrogen Ratio
- Ammonium-N
- Boron
- Calcium
- Copper
- Iron

- Magnesium
- Manganese
- Molybdenum
- Sodium
- Arsenic
- Cadmium
- Cobalt
- Chromium
- Mercury
- Nickel
- Lead
- Selenium
- Aluminum

- Barium
- Silicon
- Strontium
- Calcium Carbonate Equivalent (CCE)
- Sodium Absorption Ratio (SAR)
- Cation Ratio of Soil Structural Stability (CROSS)
- Fecal Starch
- Sulfate-S

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Choose Method, Basis, Units

- Methods options based on:
  - Recommended Methods of Manure Analysis
    (z.umn.edu/Manure-analysis-methods)
  - AgGateway Modus Agronomic Testing Lab Standard (currently updating!)
  - Interviews with labs
- Basis
  - As received (wet)
  - Dry

- Units
  - %
  - ppm
  - lbs/1000 gal
  - lbs/ton

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ManureDB is live!

http://manuredb.umn.edu/

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ManureDB Current Stats

- **21** signed data use agreements
- **9** more verbal agreements, pending signatures
- Number of all samples in database: **489,034**
- Number of all samples with known location: **382,935**
- Number of all lab results in database: **5,223,334**
- Number of states with at least one sample: **49 plus DC and PR**

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ManureDB Screenshots
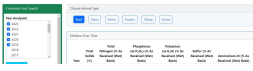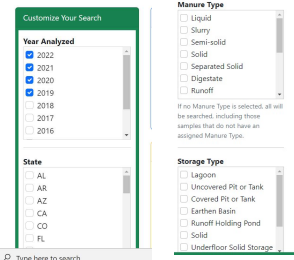
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Data Download Feature (new!)

Data Explorer

Welcome to the ManureDB Data Explorer, a tool to access U.S. manure test data curated by the University of Minnesota. Customize your search by Animal Combined Category, Animal Type, Moisture Designation, Region, State, and/or Year categories.

You can view the number of sample results for a particular search combination and view those individual samples in the lower pane. You can also export those results as a .csv file for further analysis. Refer to the License page for details on data reuse and requested citation of the ManureDB data.

ManureDB allows query selections in any order of the categories. Click on an item from any of the categories to start. You can select single, multiple, or no items from each category. To easily select multiple items in a category, hold down the Cmd key (macOS) or the Ctrl key (Windows) and click the desired categories. To select a range of items in the same category, hold down the Shift key and click the top and bottom items to select the range. Click "Clear Selection" to remove all previous selections and start over.

A reference guide explaining column fields can be found here.

Animal Combined Category	Animal Type	Moisture	Region	State	Year

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Why care? How could this be useful?

- Of course, your own samples are always best!
- Offers comparison scenarios and benchmarking
- Research

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Dairy Manure Types (1998-2022)

Key
- Total N
- Total P as P_2O_5
- Total K as K_2O

# of samples:	210	6163	179	373	5083	421
	Digestate (liquid)	Liquid	Separated Liquid	Separated Solid	Solid	Compost

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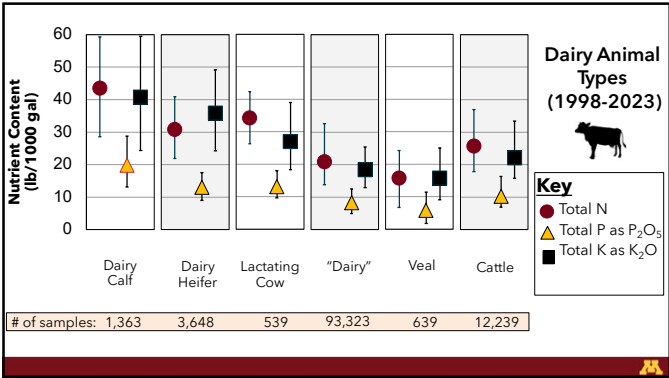
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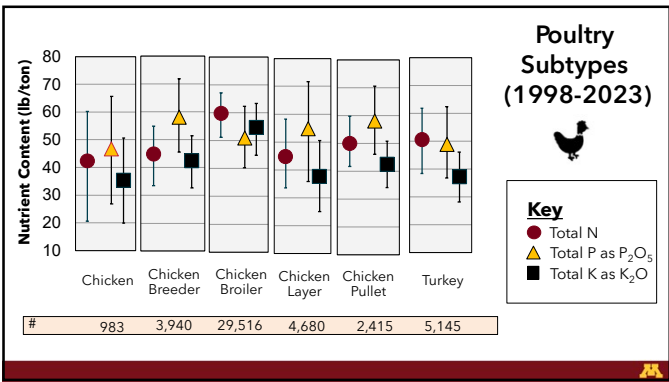
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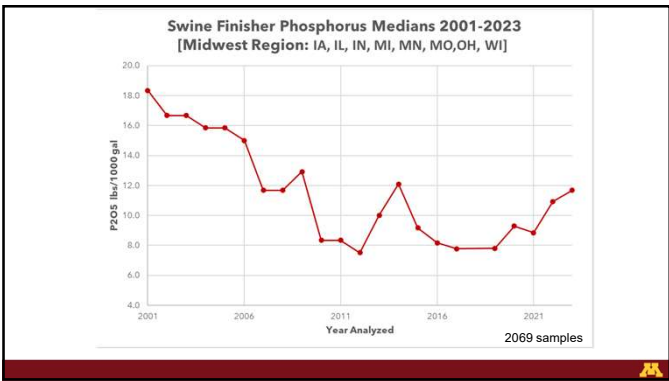
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Future Plans

- Mobile-friendly website with design updates
- Add data visualization displays
- Archive data on annual basis in Ag Data Commons with assigned DOI
- Test ability to connect with API
- Recruit more laboratories, universities, consultants, etc. to participate in the database
- Streamline annual data update process

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Stay in the loop!

Interested in learning more?

✉ manure@umn.edu

🌐 z.umn.edu/ManureDB-signup

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