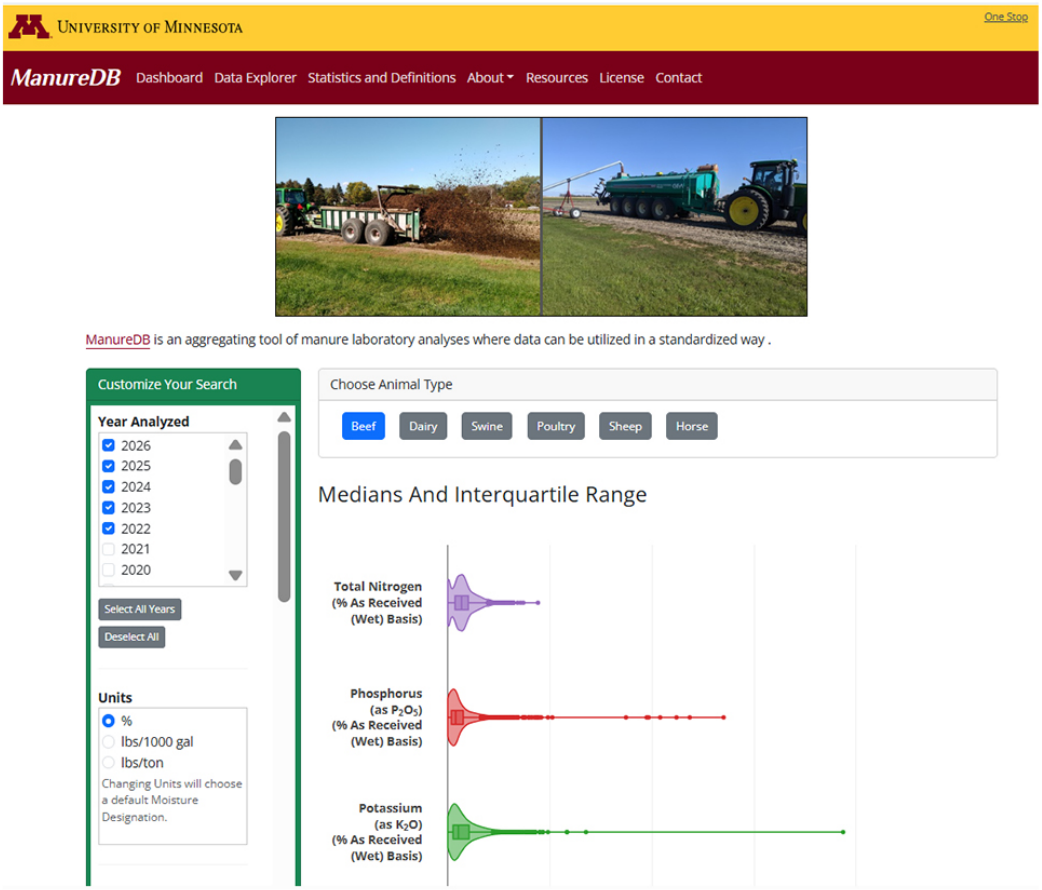
Science Societies

ManureDB: The database for all things manure

By Nancy Bohl Bormann, Melissa Wilson, and Erin Cortus

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Screenshot of the ManureDB website.

Do you use manure data in your work? Fertilizer prices, environmental concerns, and soil health benefits could all be reasons to take a closer look at manure nutrient data. Fortunately, there is a resource called ManureDB that combines manure data from across the U.S. This article will give a brief background of this project, its design and progress, how to use the website, how to participate as a data collaborator, and future plans for the project.

Do you use manure data in your work? Fertilizer prices, environmental concerns, and soil health benefits could all be reasons to take a closer look at manure nutrient data. Fortunately, there is a resource called ManureDB that combines manure data from across the U.S. This article will give a brief background of this project, its design and progress, how to use the website, how to participate as a data collaborator, and future plans for the project.

To assist when actual manure nutrient analyses are not available, book values are the approximate manure nutrient concentrations of a group of manure samples, usually focusing on the major nutrients of nitrogen (N), phosphorus (P), and potassium (K). Several organizations published book values of manure characteristics including MidWest Plan Service (MWPS) in 2004, American Society of Agricultural and Biological Engineers (ASABE) in 2005, and USDA Natural Resources Conservation Service (USDA-NRCS) in 2008.

University of Minnesota (UMN) faculty, Dr. Melissa Wilson and Dr. Erin Cortus, noticed differences between current manure analyses and those published book values in their Extension and research work. Knowing there are thousands of manure samples analyzed across the U.S. annually, it made sense to partner with agricultural labs to pull together more modern manure nutrient data. With initial funding from a USDA National Institute of Food and Agriculture (NIFA) grant and now a USDA-NRCS grant, they made it happen. They partnered with agricultural labs, the Minnesota Supercomputing Institute, UMN College of Food, Agricultural and Natural Resources Sciences, UMN Extension, and the Minnesota Department of Agriculture to launch a dynamic database where data can be viewed multiple ways, including by year, by animal type, moisture content, and by state or region. The database meets FAIR principles (Findable, Accessible, Interoperable, and Reusable).

Data privacy is essential for ManureDB. Data use agreements are required for any data collaborator. No names or addresses are associated with samples—just the state or first three digits of a ZIP code for location. The public-facing website does not show those three digit ZIP codes, which lab analyzed the samples, account information, or sample notes for samples. At least five samples per year for location (state, region, U.S.) are required for samples to show up in public summaries. A data template was created to capture sample metadata and reporting information such as units in a standardized format.

ManureDB milestones

By 2022 the ManureDB team had the template and database framework developed and uploaded the first datasets in November of that year. The public website launched in May 2023, and public data downloads became available in January 2024. Improvements in website functionality continually evolve, improving the data

visualization and summary tools available. The ManureDB team published snapshots of the ManureDB data in USDA's Ag Data Commons in August 2024 and January 2026 and plan to continue to do so annually. For a deeper dive into ManureDB's design, reference "ManureDB: Aggregation of U.S. Manure Data" in the *Journal of the ASABE*. As of January 2026, ManureDB included 550,000 samples from 49 states, 22 data collaborators, 65 animal types, 18 organic amendments, and consisted of more than 5.8 million total data points (Tables 1 and 2).

Table 1. Percent of ManureDB samples that have certain analyte measurements, as of January 2026.

ManureDB analytes	Percent, %
Phosphorus	98
Potassium	98
Total N	97
Sulfur	68
Total solids	59
Calcium	61
Magnesium	58
Sodium	58
Zinc	58
Manganese	58
Copper	58
Moisture	51
Iron	53

ManureDB analytes	Percent, %
Boron	41
pH	36
Ammonium-N	34
Aluminum	30

Table 2. Distribution of all database samples by region.

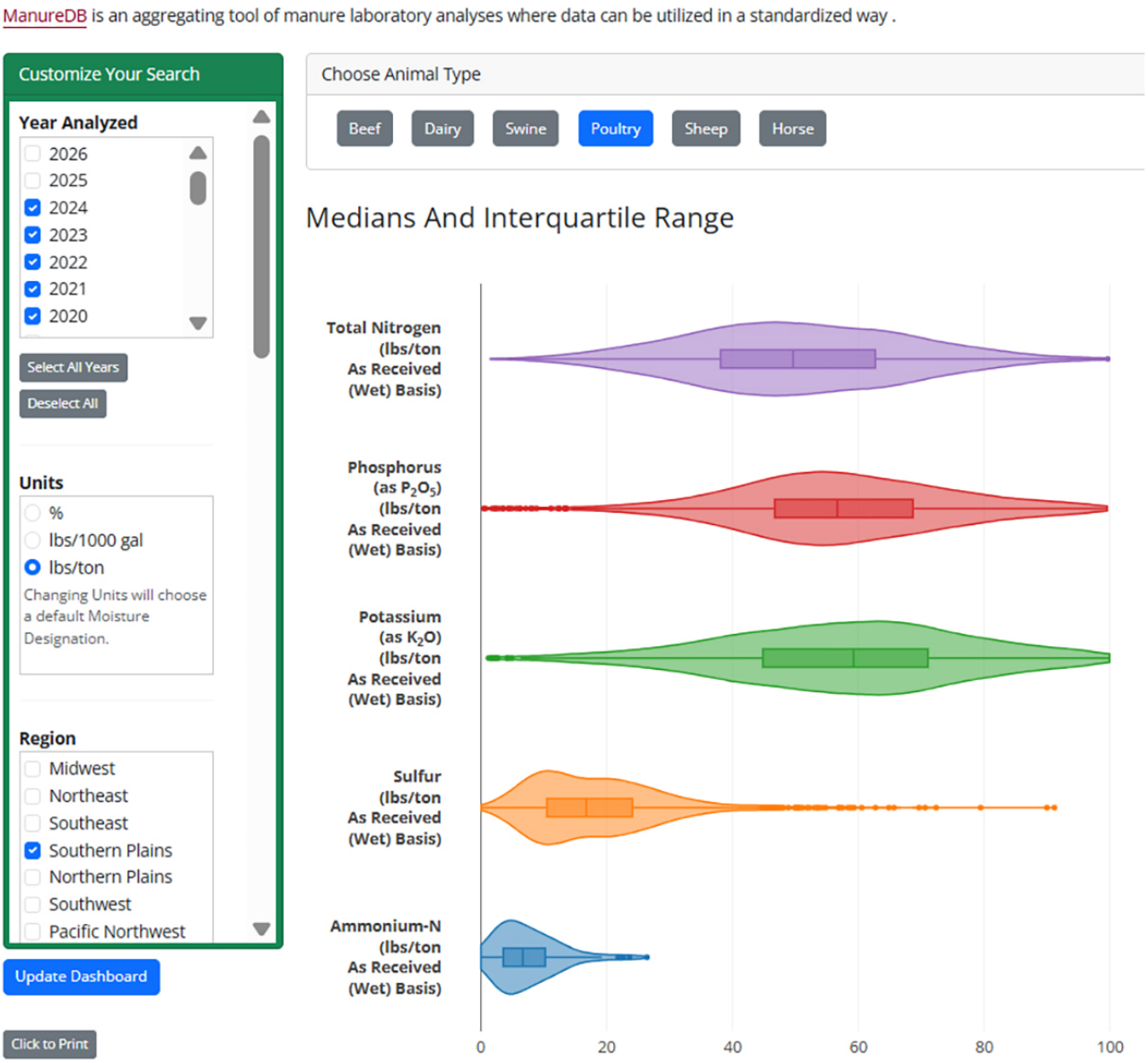
Region	Samples
Midwest	235,117
Northeast	40,713
Northern Plains	5,051
Pacific Northwest	2,749
Southeast	256,754
Southern Plains	11,809
Southwest	3,322
Undisclosed Region	2,070

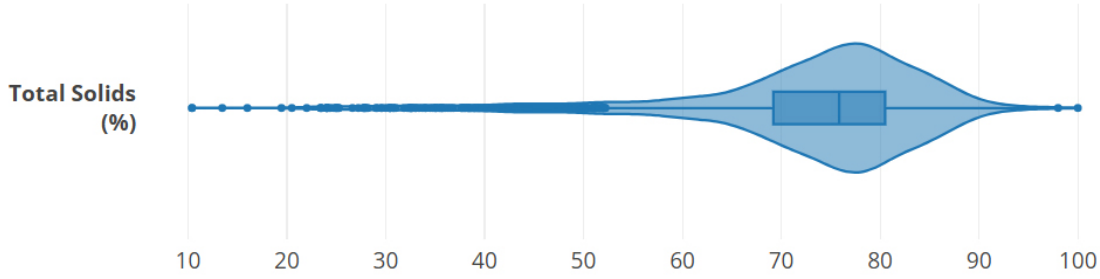
If an animal or other amendment type <5 for the USA, it is labeled as an "Undisclosed Region" for a given year.

How to use the ManureDB website

On the ManureDB homepage, known as the Dashboard, there are multiple options to view manure data from the animal combined categories of beef, dairy, swine, poultry, sheep, or horse currently.

For this example, select the animal type of “Poultry”, 2020–2024 for years, “lbs/ton” for the reporting units, and “Southern Plains” for the region. This will bring up the following dashboard data visualizations and tables:



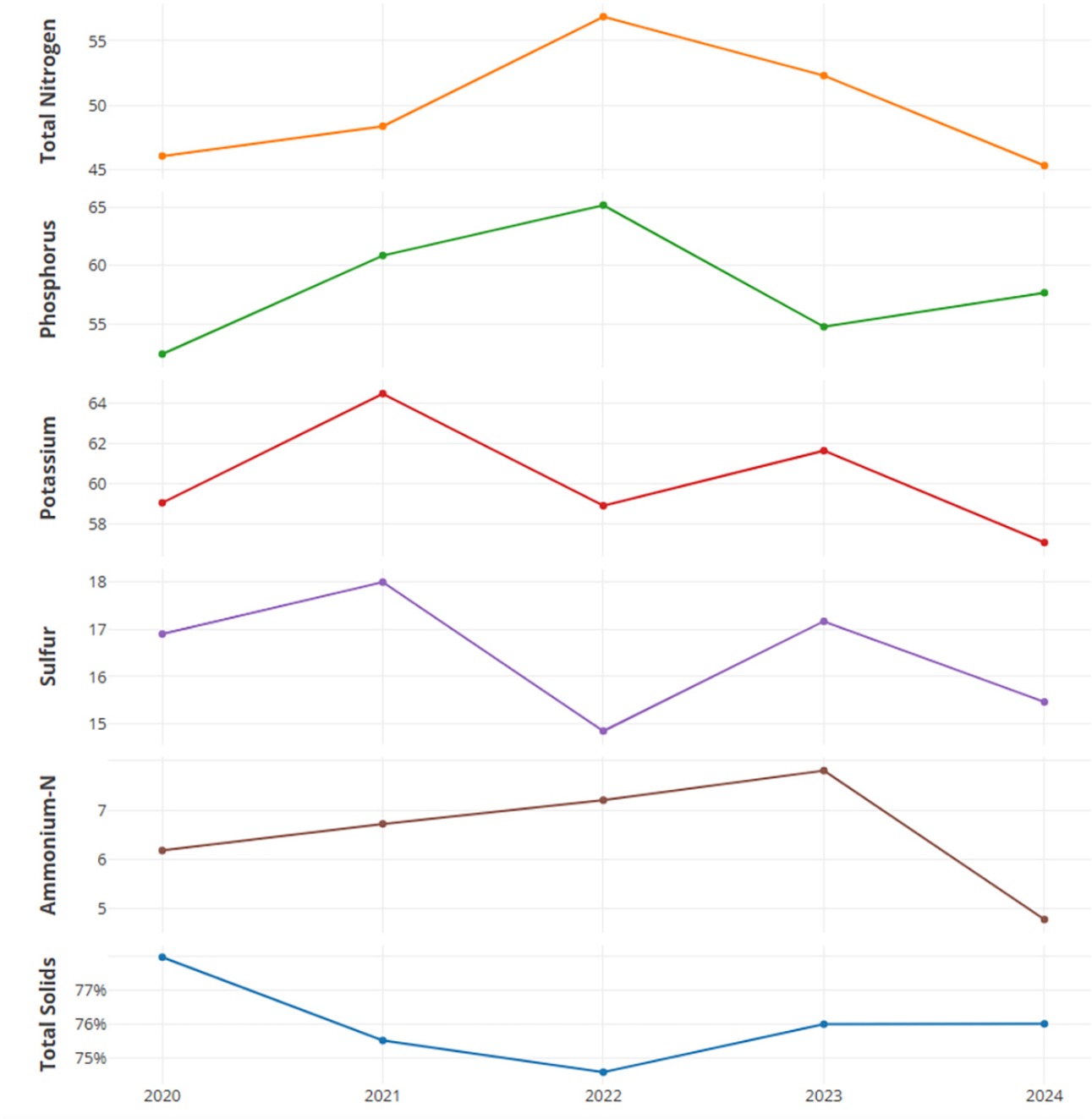


Medians and Interquartile range

Assay Name	Min	Max	Average	Count	IQR 25%	Median IQR 50%	IQR 75%
Total Solids (%)	10.4	100.0	72.9	2,602	69.2	75.9	80.5
Total Nitrogen (lbs/ton As Received (Wet) Basis)	1.5	181.5	50.6	2,591	38.1	49.7	62.9
Phosphorus (as P_2O_5) (lbs/ton As Received (Wet) Basis)	0.5	241.2	61.2	2,590	47.2	57.8	70.9
Potassium (as K_2O) (lbs/ton As Received (Wet) Basis)	1.2	226.2	61.7	2,590	46.1	60.4	74.2
Sulfur (lbs/ton As Received (Wet) Basis)	0.1	102.9	18.4	2,426	10.5	16.8	24.1
Ammonium-N (lbs/ton As Received (Wet) Basis)	0.0	26.4	7.5	121	3.6	6.7	10.2

Years selected: 2020, 2021, 2022, 2023, 2024

Medians Over Time



Medians Over Time

Year	Total Solids (%)	Total Nitrogen (lbs/ton As Received (Wet) Basis)	Phosphorus (as P_2O_5) (lbs/ton As Received (Wet) Basis)	Potassium (as K_2O) (lbs/ton As Received (Wet) Basis)	Sulfur (lbs/ton As Received (Wet) Basis)	Ammonium-N (lbs/ton As Received (Wet) Basis)
2024	76.0	45.3	57.7	57.1	15.5	4.8
2023	76.0	52.3	54.8	61.6	17.2	7.8
2022	74.6	56.9	65.2	58.9	14.8	7.2
2021	75.5	48.4	60.9	64.5	18.0	6.7
2020	78.0	46.0	52.5	59.0	16.9	6.2
Median	75.87	49.7	57.82	60.41	16.8	6.68
Count	2,602	2,591	2,590	2,590	2,426	121

Moisture Designation: Solid, Semi-solid
Animal Type: Poultry

Toggle Details

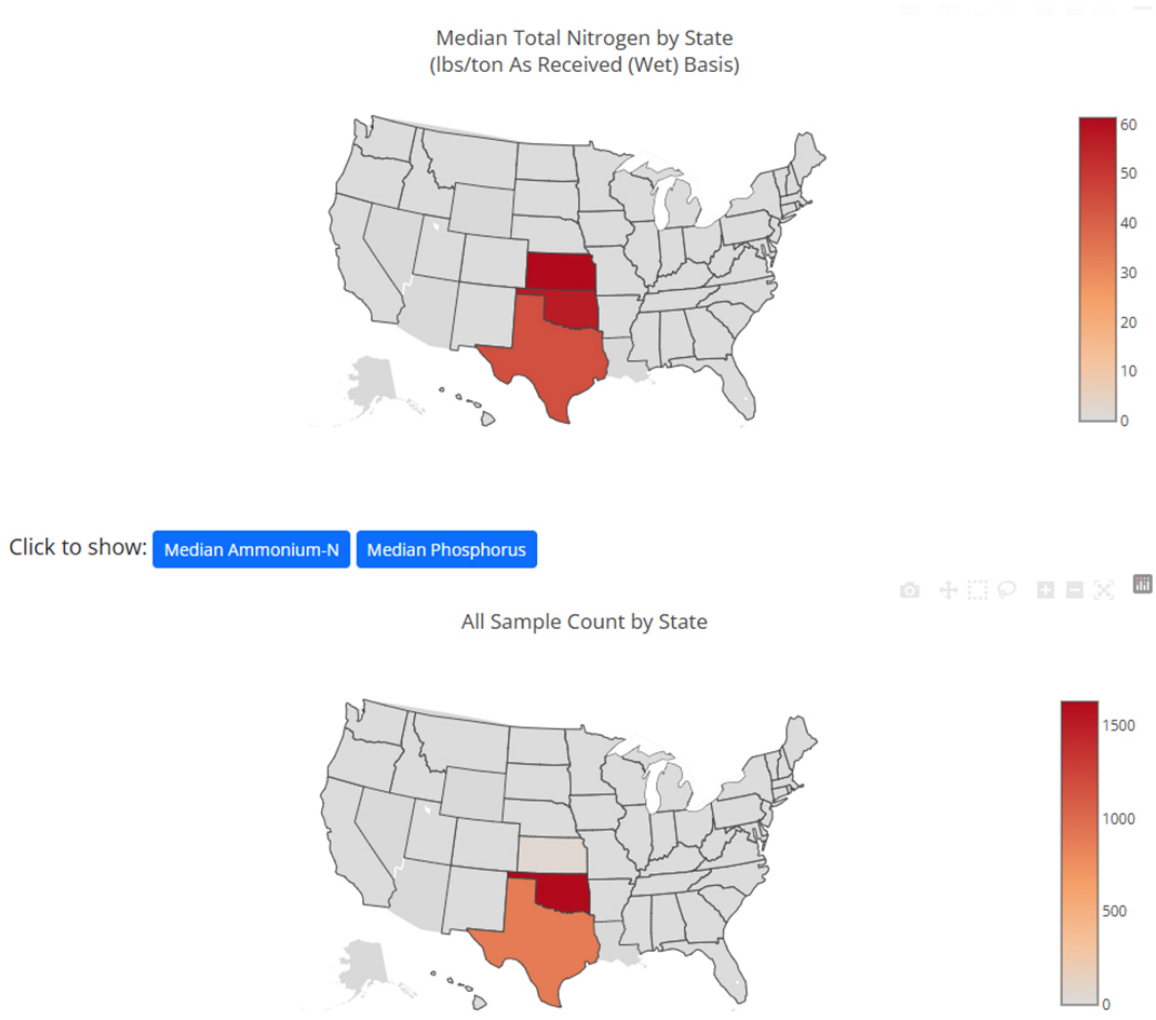
Medians By Location

Medians By Location

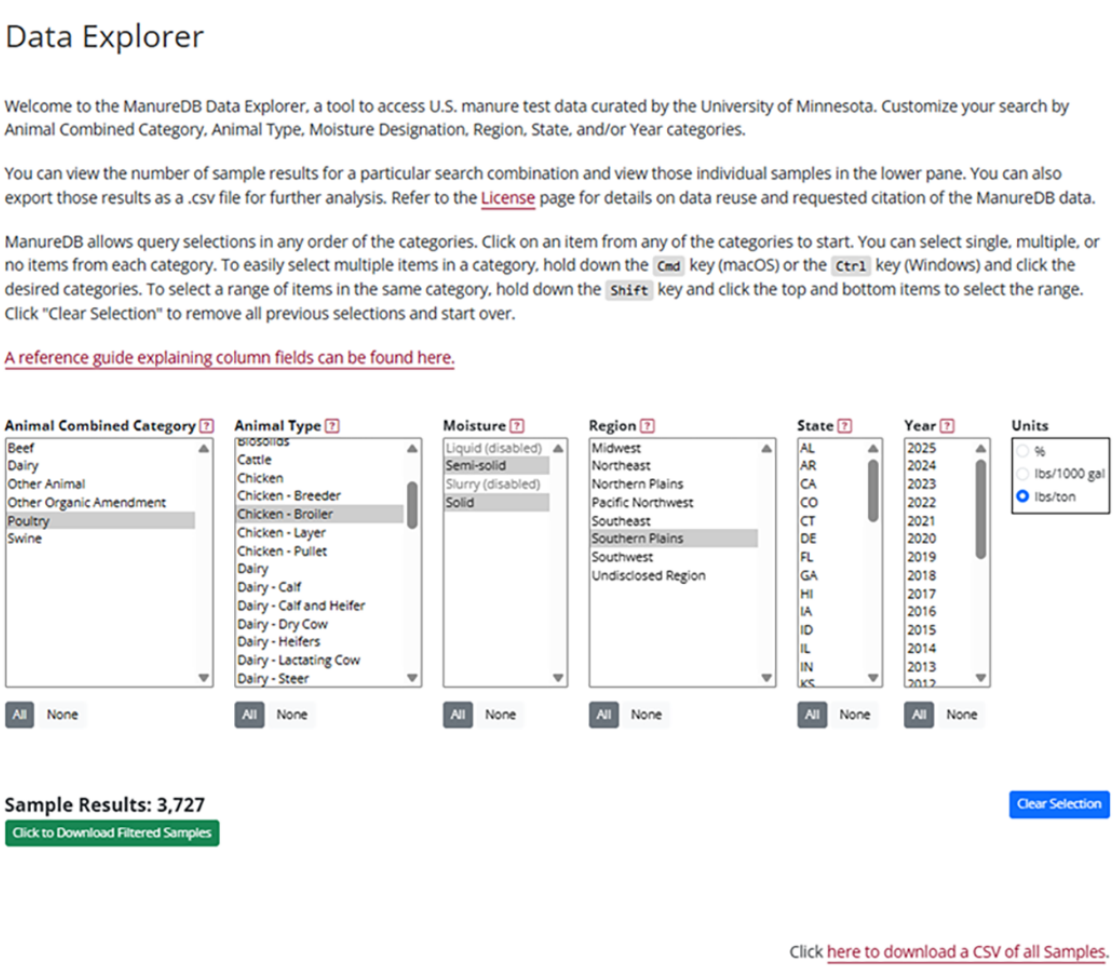
State	Total Solids (%)	Total Nitrogen (lbs/ton As Received (Wet) Basis)	Phosphorus (as P_2O_5) (lbs/ton As Received (Wet) Basis)	Potassium (as K_2O) (lbs/ton As Received (Wet) Basis)	Sulfur (lbs/ton As Received (Wet) Basis)	Ammonium-N (lbs/ton As Received (Wet) Basis)
KS	63.5	61.4	48.5	48.8	7.4	6.1
OK	74.4	56.9	58.8	56.1	14.1	7.0
TX	78.0	44.2	57.1	70.7	20.0	5.5
Median	75.87	49.7	57.82	60.41	16.8	6.68
Count	2,602	2,591	2,590	2,590	2,426	121

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Toggle Details



If you are interested in checking out sample quantities for different scenarios or downloading certain datasets, click on the Data Explorer tab. Here you can select the animal combined category, animal type, moisture designation, region, state, year, and reporting units:



More explanations and examples are available in video below:

ManureDB data uses

ManureDB offers a means to compare your farm's manure to others in different regions or categories. Manure can vary greatly by operation due to animal life stage and sex, animal diets, climate, manure handling and storage, bedding, agitation, and treatments for example. The wide array of sample results highlight that manure sampling on individual farms is still a key component to a nutrient management plan best tailored to that specific operation. However, this dataset offers some manure nutrient

concentration approximations for nutrient management planning when no samples are available yet, such as for new construction or management changes.

ManureDB offers an improved information source for agricultural and environmental modeling with data in greater quantities and more locations than previously available. This data will be foundational in updating manure characteristic publications such as ASAE D384.3, ASABE's Manure Production and Characteristics Standard. There are still challenges with animal-naming conventions, a variety of submittal forms across the country that capture various details, minimal sample information, different label definitions, and areas of the country with minimal data.

How can you assist with the project?

Do you have connections with industry groups, laboratories, researchers, or other potential collaborators? Do you work with manure samples? Are you using ManureDB data? We would love to hear from you! Please email the team at manure@umn.edu (send a message). This is your chance to partner and help strengthen the data foundation for your state or animal of interest. We send out a newsletter periodically, which you can sign up for.

ManureDB is supported through USDA NIFA Award 2020-67021-32465 and Cooperative Ecosystem Studies Unit program [grant no. NR253A750008C001] from the U.S. Department of Agriculture–Natural Resources Conservation Service

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