

FY23 Nitrogen Footprint Report for Colorado State University

With specific considerations for CSU Residential Dining Services

Introduction

Purpose and Scope

This report quantifies the nitrogen emissions of Colorado State University (CSU) operations for FY23. The calculated results provide a detailed analysis of the nitrogen footprint from the university's operations including food procurement and highlight key areas for the reduction in nitrogen emissions.

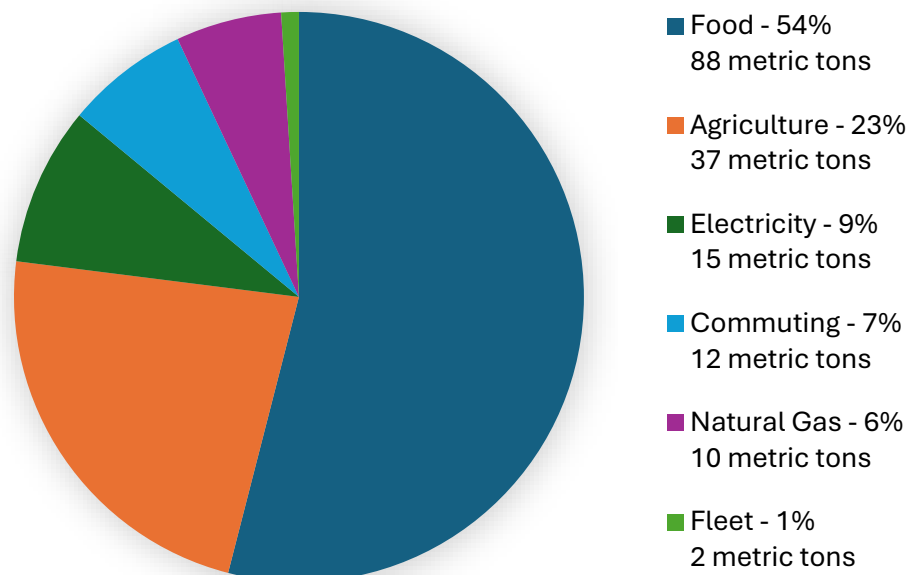
Importance of Measuring Nitrogen Footprint

Nitrogen is a critical element in agricultural production, but excessive nitrogen emissions can lead to environmental issues such as air and water pollution, climate change, and biodiversity loss. By focusing on the nitrogen footprint from food purchases, energy consumption, and agriculture, CSU can enhance sustainability initiatives, improve resource efficiency, reduce operational costs, and foster a culture of sustainability among the campus community.

Key Findings and Results

For FY23, the total nitrogen footprint from university operations, including food purchases made by CSU Residential Dining Services (RDS) was 164 metric tons. Food purchases make up the single largest category, accounting for 88 MT or 54% of the university's overall nitrogen footprint. This significant percentage underscores the importance of addressing the nitrogen impacts from foods procurement to achieve nitrogen reductions and broader sustainability goals.

FY23 Nitrogen Footprint for Colorado State University



Because foods are the single largest source category of nitrogen emissions, here is a closer look at the nitrogen emissions from each food category for FY23:

Food Category	Food Weight kg	Pounds	Total N (kg N)	N by %
Beef	78,777	173,674	26,305	30%
Chicken	187,077	412,434	22,653	26%
Pork	70,711	155,891	9,695	11%
Cheese	73,021	160,984	7,144	8%
Coffee & Tea	86,970	191,736	5,383	6%
Grains	235,710	519,652	4,256	5%
Milk	157,216	346,602	3,236	4%
Eggs	43,857	96,688	2,808	3%
Vegetables	223,377	492,462	2,038	2%
Liquids	291,182	641,946	1,601	2%
Potatoes	206,659	455,605	1,327	2%
Fish	11,705	25,805	972	1%
Fruits	129,470	285,432	400	<1%
Beans	46,304	102,083	313	<1%
Sugars	59,892	132,039	120	<1%
Nuts	5,671	12,502	78	<1%
Spices	924	2,037	26	<1%
Oils	73,082	161,118	25	<1%
Totals	1,981,605	4,368,690	88,380	100%

Meat products account for 67% of the total food emissions for FY23. Beef 30%, Chicken 26%, and Pork 11% of the nitrogen emissions contributions. Note that in FY23, Dining Services purchased a total of 336,565 kg, or ~742,000 total pounds of these three meat products. Meat products have the highest emissions impacts due to the extensive use of nitrogen-based fertilizers for growing animal feed crops, methane emissions from livestock digestion, and nitrogen waste from manure.

Methodology

Data Collection and Conversion

The basis of the annual nitrogen footprint is the CSU Greenhouse Gas (GHG) Inventory, i.e. the Carbon Footprint. Every category accounted for in the GHG inventory also has a corresponding nitrogen impact. What makes the nitrogen footprint a unique calculation is the inclusion of food procurement data. Food procurement data was obtained from RDS and included detailed records of all food purchases made during FY23. This data was sorted into categories (spend, weight, and food category). Prioritized by spend, all weights and volumes were converted into kilograms to standardize the analysis by food category. The analysis covers 18 food categories, detailing their contributions to the total nitrogen footprint. By examining these food categories, Housing & Dining Services (HDS) can identify key areas for potential reduction in nitrogen emissions.

Data Entry into SIMAP

The categorized, standardized data is entered into a SIMAP (Sustainability Indicator Management and Analysis Platform) food template. SIMAP calculates the nitrogen footprint by applying specific emission factors related to each food category, accounting for production and procurement, and generates a comprehensive report that provides detailed insights into nitrogen emissions.

Institutional Context

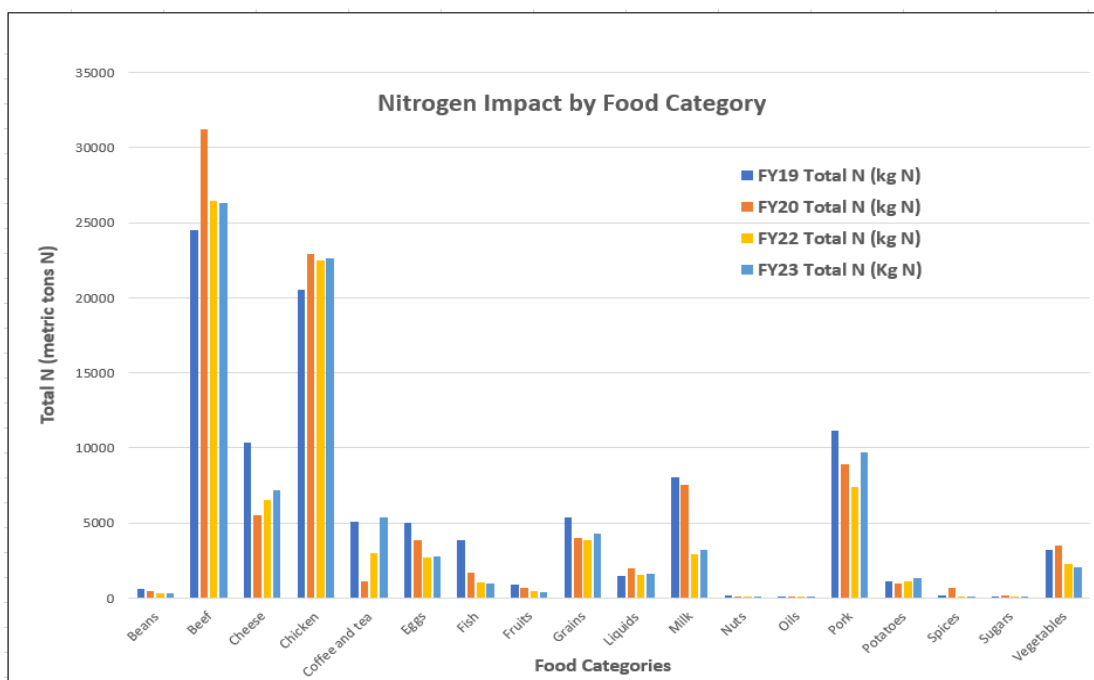
CSU is a leading public research university in Fort Collins, Colorado. With a commitment to sustainability, CSU aims to reduce its environmental impact through initiatives such as energy efficiency projects, waste reduction programs, and sustainable food procurement practices. During FY23 CSU served a community of more than 33,000 students, and 7,600 employees. And Residential Dining Services spent over \$9,000,000 on food procurement, serving almost 2.5 million meals.

Residential Dining Services plays a pivotal role in CSU's sustainability efforts by providing nutritious and sustainable food options, managing dining facilities, and implementing initiatives to reduce the environmental impact of dining services.

Comparative Analysis

Comparing the nitrogen footprint data from FY19 through FY23 provides insights into trends and related emissions from food purchases. Significant changes in certain categories indicate areas where sustainability initiatives may have been successful or where further efforts are needed. The following table summarizes the changes in nitrogen emissions for each food category.

Note: The data from FY21 has been removed from the table due to the significant impact of COVID-19 on RDS operations and procurement activities.



Interpretation of Results

Major Contributors

Meat products like beef, chicken, pork, and dairy products are the largest contributors to the food portion of the nitrogen footprint. These categories have high nitrogen emissions due to the extensive use of nitrogen-based fertilizers in their production processes. Energy consumption and animal agriculture also significantly contribute to the overall nitrogen footprint.

Increase in Nitrogen Emissions

Categories such as coffee and tea, pork, and sugars saw significant increases in nitrogen emissions from FY22 to FY23. For example, coffee and tea emissions increased by 80%, pork by 32%, and sugars by 71%. These substantial percentage changes suggest areas where more sustainable procurement practices could be implemented. However, it is important to note that despite these large percentage increases, the overall impact on the total nitrogen footprint remains relatively small.

Decrease in Nitrogen Emissions

Categories like beans, fish, fruits, and vegetables saw a decrease in nitrogen emissions. Beans saw an 8% decrease, fish 10%, fruits 12%, and vegetables 9%. These reductions may indicate areas where costs drove procurement decisions. However, these are also perhaps the categories where increased procurement would reflect a positive shift towards more plant-based and lower nitrogen emissions category options and meals. Although the noted lower percentage changes are notable, the overall impact on the total nitrogen footprint is relatively small.

Implications for CSU

- **Focus on High-Impact Categories:** Targets to reduce purchases from the highest nitrogen emissions categories (meat products) can yield significant reductions in overall nitrogen.
- **Sustainable Procurement Practices:** Increasing certain categories (plant-based and low nitrogen contributing food categories) results in more sustainable procurement practices.
- **Educational Campaigns:** Raising awareness about the environmental impact of food choices can drive behavioral changes that contribute to reducing the nitrogen footprint.
- **Supplier Engagement:** Working with food suppliers to adopt sustainable farming practices can help reduce nitrogen emissions. Also, strive for organic and/or locally sourced products – each have lower nitrogen impacts.

Recommendations for HDS

- **Increase Plant-Based Food Options:** Promote and increase the availability of plant-based menu options.
- **Implement Sustainable Food Procurement Policies:** Develop policies that prioritize sustainably produced foods (organic and/or locally produced).
- **Enhance Food Waste Reduction Programs:** Implement additional programs and/or refine existing programs to minimize food waste – especially of meat products.
 - Do 'To-Go' meals increase or decrease the overall amount of food waste?
- **Collaborate with Suppliers:** Ensure or encourage suppliers to adopt practices that minimize nitrogen emissions.
- **Conduct Regular Monitoring and Reporting:** Continuously monitor and report on the nitrogen footprint – and analyzing procurement trends considering categories of food purchases by weight as a proxy for nitrogen impacts.

Conclusion

This FY23 Nitrogen Footprint Report highlights the significant impact of food purchases on the university's overall nitrogen footprint. With a total nitrogen footprint of 164 metric tons for FY23, food purchases account for 54% of the university's nitrogen emissions. The analysis identifies beef, chicken, pork, and dairy products as the largest contributors to nitrogen emissions, emphasizing the need for targeted strategies to address and reduce nitrogen emissions from these high-impact categories.

Implementing the recommendations provided—such as increasing plant-based food options, adopting sustainable food procurement policies, reducing food waste, collaborating with suppliers, and conducting regular monitoring—will enable CSU to significantly reduce its nitrogen footprint. These efforts align with the university's broader sustainability goals and commitment to environmental stewardship. By continuing to prioritize sustainability and engaging the campus community, CSU and HDS can lead by example in reducing nitrogen emissions and promoting a healthier, more sustainable environment.

Acknowledgements

This Report was prepared by Sylvester Worlanyo Gbadrive, Impact MBA Corporate Sustainability Fellow to CSU Facilities Management Sustainability & Energy Management and, Stacey Baumgarn, CSU Campus Energy Coordinator. We would like to extend our gratitude to Housing & Dining Services at Colorado State University for their cooperation and for providing the necessary data. We also appreciate the support of Carol Dollard, whose insights were invaluable. This report reflects a collective effort to enhance CSU's sustainability initiatives and reduce its environmental impact. Thank you to all contributors for their dedication and commitment to sustainability.

