Life Cycle Assessment Confirms Continuous Improvement in Sustainable U.S. Wheat Production

U.S. farm families are, first, stewards of their land. With a calling to wisely use the gifts of soil, water, and seed to produce a crop and a livelihood, they feel responsible for continually nourishing and improving the land for the next generation.

That responsibility drives U.S. wheat farmers every day to produce more and higher-quality wheat in ways that are better for the planet we share.

Measuring the Trends

The facts confirm the commitment to continuous production improvement. U.S. wheat yields per acre are up 25% since 1993 while converting 68% of total planted area to no-tillage and other conservation tillage systems. Winter wheat provides a living soil cover, and wheat crop residue adds organic matter and tilth to the soil. In addition, farmers produce 93% of U.S. wheat without irrigation.

Yet, it is important to the global wheat trade to quantify and share trends in sustainability metrics for U.S. wheat production. So, to establish a baseline of data, U.S. Wheat Associates, the National Association of Wheat Growers, and the National Wheat Foundation chose to conduct a "life cycle assessment" of changes in the environmental impact of U.S. wheat production over a 40-year period from 1978 to 2018.

Methodology

In 2021, the sponsors selected a respected team of researchers at Texas A&M University AgriLife Research and Colorado State University AgNext Institute to conduct the "U.S. Wheat Production Life Cycle Assessment" (LCA).

The study team made a significant effort to ensure they could compare modern practices to retrospective practices across the diversity of U.S. wheat production. The team carefully considered the distinct differences in wheat classes, production seasons, protein levels, and end-use functionality that were likely to affect the metrics evaluated.

Ultimately, the team created 110 "archetype farms" across representative wheat-producing counties and collected data on both retrospective and modern practices in each county over time. The final conclusions were derived using a widely accepted model called Agricultural Policy Environmental Extender (APEX1) and "openLCA" life cycle assessment software.

Continuous Improvement

The results provided an estimate of changes in five Key Performance Indicators that confirm U.S. wheat producers are continuously improving the crop's environmental footprint. Specifically:

- Greenhouse gas emissions are down 33% based on a combination of improved nitrogen (N) application efficiency and higher yields per unit of nitrogen.
- Energy use is down 57% from fewer equipment field passes due to more conservation tillage and higher fuel efficiency.
- Water use is down 46% as farmers reduced their use of irrigation, and yield per unit of water is higher because of improved varieties.
- Soil erosion is down 60% from reduced tillage and other soil conservation practices and incentives.
- Land use is down 45% from reduced planted area and improved wheat varieties with higher yield potential.

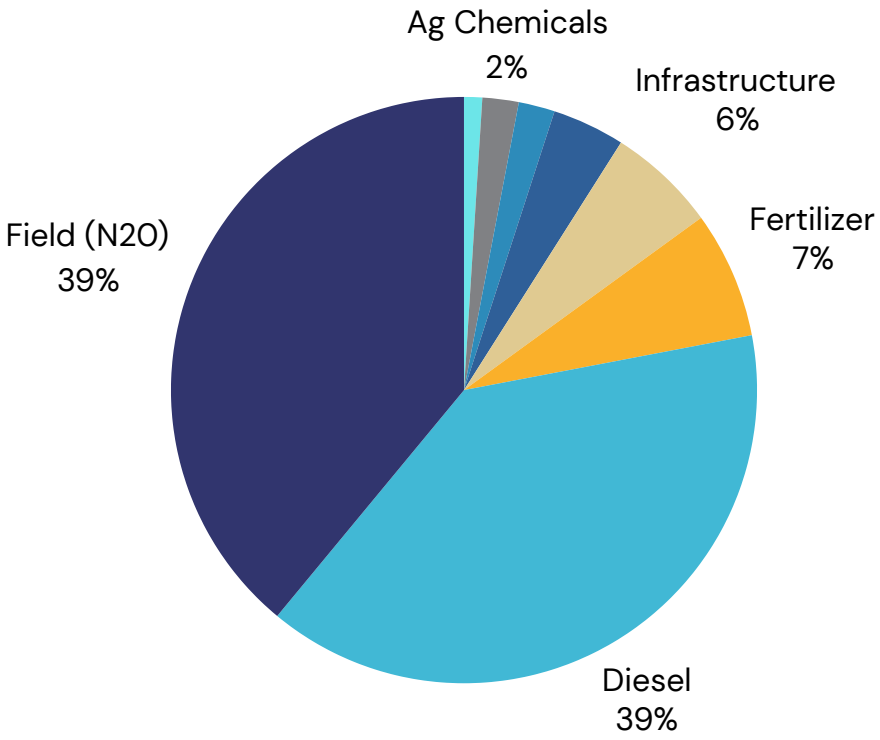
Important Advancements Drive Lower Emissions

The LCA includes specific indicators of change that have helped reduce greenhouse gas emissions from U.S. wheat production. The study showed that 78% of the overall reduction in emissions resulted from less off-gassing of N2O from fields and cleaner diesel fuel (see chart below). Also contributing is a consistent decline in emissions from fertilizer due to more prescriptive use and precision application systems.

The sponsors are sharing the results of this first-ever U.S. wheat life cycle assessment with the global grain trade in the spirit of transparency and shared commitment to sustainable food

sources. We invite customers and stakeholders to join U.S. wheat industry organizations in continuing to measure and share the positive sustainability trends in U.S. wheat production.

Contributions to Overall Reduction in GHG From Retrospective to Modern



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