SUSTAINABILITY ANALYSIS

2021 ON-FARM PRACTICES REPORT

EXECUTIVE SUMMARY

About the Project

United Sorghum Checkoff supports growers that are implementing conservation practices, in-field and edge-of-field, on their farms. Farms quantified in the project participated in one of three partner programs: Pheasants Forever, specialty sorghum markets, or Pork Checkoff.

Pheasants Forever was tailored to quantifying edge-of-field habitat to support wildlife and biodiverse areas. Specialty sorghum markets was quantifying the environmental impact of sorghum grain. The third project was aligning across commodity checkoffs, such as the **Pork Checkoff**.

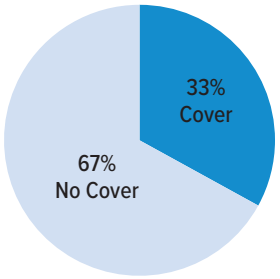
Quantifying the Impact of Actual Farm Practices

The benefits were determined through Sustainable Environmental Consultants' unique EcoPractices® platform that is able to pinpoint the influence of specific agricultural practices. While agricultural practices have progressed to better care for natural resources, the ability to quantify the influence these practices have on sustainability has not kept pace. Having such data brings more depth to decision-making. Short- and long-term goals can be based upon more meaningful information.

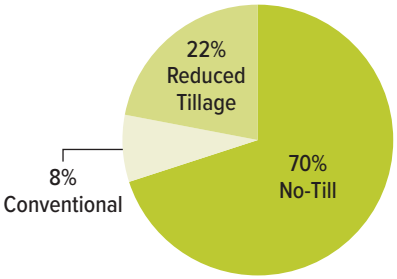
CROP	YIELD
Corn Grain	251 bu/ac
Fallow	-
Hay	5.9 T/ac
Sorghum Grain	70 bu/ac
Sorghum Silage	2.7 T/ac
Soybean	50 bu/ac
Winter Wheat	59 bu/ac

10 farms with **20,001 acres** from **161 fields**

COVER CROPS



TILLAGE



Due to rainfall, cover crops are challenging to implement in this environment. According to the 2017 U.S. Ag Census, the national average is **4% cover crop** adoption, **37% no-till** adoption and **35% reduced till** adoption.

SOIL CONDITIONING INDEX (SCI)

SCI is a tool from NRCS that shows the trajectory of soil health. A positive SCI means a positive trajectory of soil health and vice versa.

The fields in the project are an overall **+ trajectory** for **SCI.**

WATER QUANTITY CONSERVATION

92% of **acres** are **dryland acres.** **8%** of **acres** are **irrigated** via **pivot** at an average rate of **15.2 ac-in/ac.**

CONSERVATION PRACTICES

94 acres of **buffers** and **29 acres** of **grassed waterways** resulted in new acres of perennial vegetation, which provides environmental benefits including **pheasant** and **quail habitat**.

ABOUT SORGHUM

One of the biggest benefits of growing sorghum is its **drought tolerance**. It originated in northeastern Africa and therefore is **greatly adapted** to arid-semiarid regions. It also requires **less inputs**, such as nitrogen fertilizer, compared to other grain crops. Sorghum is in the top 5 cereal grains by production and acreage internationally.[1]

MANURE APPLICATION & SAVINGS

14% of acres received liquid manure fertilizer. The average **cost savings** from manure applied to **2,733 acres** was estimated to be **$289 per acre** based on a reduced need for commercial N, P & K resulting in **a total savings** of **$789,123.**

MANURE BENEFITS

Manure produced from livestock, such as swine or beef, have multiple benefits. Manure provides macro- and micro-**nutrients** to the crops that are grown. The soils applied receive **organic matter** which increases **carbon** storage and **microbial activity**.

Weather, Soils, and In-Field Management Practices influence the following environmental metrics

IN-FIELD ENVIRONMENTAL OUTCOMES

The data is reflective of weather and soils influence in addition to implemented in-field management practices for the project year.†

	Overall Farm
Net GHG Emissions	**-1.31 T CO_2e/ac**
Soil Carbon Sequestered	**0.51 T C/ac**
Soil Erosion Rate	**0.57 T/ac**

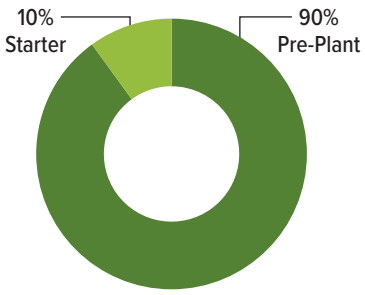
EROSION AVERAGE

*The USDA National Resources Inventory provides estimates on average erosion for different systems across the U.S.**

KS Cropland	NE Cropland	National Cropland
5.0 T/ac	**4.3 T/ac**	**4.6 T/ac**

SORGHUM NITROGEN TIMING & RATE

Split applying N can improve productivity and profitability and can reduce losses to the environment. This chart represents the percent of total N applied at different points in the growing season.



Across **9,987 sorghum acres, 93% of acres** were applied at an average rate of **74 lbs/ac of nitrogen.**

AVERAGE APPLICATION RATE

Across **20,001 acres, 83% of acres** were applied at an average rate of **77 lbs/ac of nitrogen.**

IN-FIELD PRACTICE COMPARISON IMPACTS

When compared to conventional practices (i.e. conventional tillage, no cover crop scenario), in-field farm practices generated:‡

11,009 fewer tons of CO_2e, *which is the same as*

2,138 average passenger cars off the road for a year

2,948 tons of soil carbon sequestered

35,932 tons of soil saved instead of being lost to erosion, *which is the same as*

2,246 dump trucks of soil

19 lbs/ac of nitrogen saved instead of being lost through leaching and runoff.

4 lbs/ac of phosphorus saved instead of being lost through runoff.

SUSTAINABLE Environmental Consultants

Powered by EcoPractices

Data provided by 10 sorghum growers for the 2021 growing season and calendar year.

‡‡Sustainable Environmental Consultants, through its EcoPractices platform, estimates an environmental impact value for reducing greenhouse gas emissions, reducing soil erosion, and reducing nutrient loss due to reduced leaching. These estimates adhere to processes that are documented by the NRCS Technical Guides and publications from the EPA. These values are tailored to a specific location and participant's operation. Models used are supported by USDA, NRCS, other government agencies, and major universities. Modeled results include input data from public resources for weather, soils, and historical crop rotation. Greenhouse gas simulations were produced from the Greenhouse Gas Inventory (GGIT) tool developed by Soil Metrics, LLC (2021) https://soilmetrics.eco. The GGIT tool implements the USDA-sanctioned greenhouse gas inventory methods described in Eve et al. (2014) 'Quantifying Greenhouse Gas Fluxes in Agriculture and Forestry: Methods for Entity-Scale Inventory". The GGIT tool utilizes greenhouse gas modeling technology developed for the COMET-Farm tool, licensed by Colorado State University to Soil Metrics, LLC.

†Kansas State University, Department of Agronomy | *USDA, NRCS 2017 National Resource Inventory