Soil Health for Nebraska Wealth

The Nebraska Healthy Soils Task Force Report

(draft-Nov. 28, 2020)

Findings, Recommendations and Action Plan

For Governor Pete Ricketts and the Agriculture Committee of the Nebraska Legislature

In compliance with the requirements of Legislative Bill 243, introduced by Gragert, 40; Brandt, 32; Dorn, 30; McCollister, 20; Pansing Brooks, 28; Walz, 15, and approved by the Governor April 17, 2019. One Hundred Sixth Legislature, First Session

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Healthy Soils Task Force

Position (alphabetically)	**Name**	**City**	**County**
Academic	Dr. Ronald Bolze, Jr.	Chadron	Dawes
Academic	Dr. Charles Shapiro	Wayne	Wayne
Agribusiness; *Chair	Keith Berns	Bladen	Webster
Agribusiness	Raymond Ward	Kearney	Buffalo
Agriculture Committee	Senator Julie Slama	Lincoln	Lancaster
Environmental	Dr. Hannah Birge	Omaha	Douglas
Environmental	Nathan Pflueger	Osceola	Polk
Nat. Resources Committee	Senator Tim Gragert	Lincoln	Knox
Nebr. Dept. of Agriculture	Steve Wellman	Lincoln	Lancaster
Natural Resource District	Dr. Mike McDonald	Palmyra	Otoe
Natural Resource District	Jeffrey Steffen	Crofton	Cedar
Production Agriculture	Jerry Allemann	Wayne	Wayne
Production Agriculture	Richard Bartek	Ithaca	Saunders
Production Agriculture	Robert Bettger	Fairmont	Fillmore
Production Agriculture	Lisa Lunz	Wakefield	Dixon
Production Agriculture	Steven Tucker	Venango	Perkins
Production Agriculture	Gregory Whitmore	Shelby	Polk

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Executive Overview

This Task Force Report is about the future hope we have for Nebraska while leveraging and maintaining her strengths. It is about dreaming bigger together than each of us can dream alone. It is about encouraging communication, cooperation and learning in a world that wants to isolate us. It is about bringing experts and persons from all walks of life together around the table to discuss our land, water and environment. Together, we can dream and grow Soil Health for Nebraska Wealth!

Legislation: LB 243 passed by the 106th Legislature recognized the need to achieve more rapid and widespread adoption of soil health practices and the private and public benefits that follow. It created a 17-member Healthy Soils Task Force (HSTF) to develop a Nebraska Healthy Soils Initiative and a comprehensive action plan to carry out the Initiative.

Process: The HSTF reviewed soil health work being done in Nebraska and other states. A common theme was the need for a mechanism to bring about formalized collaboration, coordination and communication to soil health work. The HSTF subdivided into four subcommittees, taking a detailed look at Education, Economics, Ecosystem Services and the Initiative. A series of 25 input sessions were held with key stakeholders across Nebraska and the resulting feedback was analyzed and incorporated into this final report.

Definitions, Fundamentals and Principles: In order to frame the issues and address the HSTF's charge, it was necessary to define and develop the following section which are abbreviated here:

Definition: *Soil health is the capacity of the soil to function as a dynamic living ecosystem that nourishes plants, sustains animals and people, and improves the environment. A soil becomes healthier when organic matter levels are increasing (carbon sequestration), water infiltration rates are improving (reducing erosion, runoff and flooding), and the soil biological life is diverse and abundant.*

Soil health is an important component of: food production and security, weather resiliency, improved water quality, reduced erosion, human health, farm economics, wildlife and quality of life for producers. The importance of soil health is summed up by Dr. Rattan Lal: *"Soil health determines the productive capacity of any agricultural practice… By improving soil health, we can produce more from less: less land, less water, less fertilizer, less pesticides, less environmental damage, less emission of greenhouse gases."*

Principles of Soil Health and Barriers and Constraints. We recognize that the transition to these practices have challenges. We discuss them at the beginning of the main report.

The Soil Health Movement: The movement is worldwide and those associated with the soil health movement are finding that their healthier soil leads to improved yield stability, greater net financial returns over time and ecosystem benefits. In applying the soil health principles to Nebraska, it is important to develop appropriate practices that best fit the state's diversity of conditions.

The Soil Health for Nebraska Wealth Initiative:

The HSTF proposes a visible, coordinated, highly publicized statewide campaign throughout Nebraska promoting the theme, **"Soil Health for Nebraska Wealth"** This name highlights the value of soil and water resources to all Nebraskans and the connection between soil health and the economic future of her farmers and ranchers. This Soil Wealth Initiative is intended to increase producer profitability while improving the soil and protecting the environment through voluntary non-mandated means. We propose five goals that will focus on implementing the Soil Wealth theme, with increased soil health and benefits to water quality/quantity, conservation and erosion reduction. We offer this plan as a road map to a "**win-win-win"** opportunity for producers, landowners, the general public and the environment.

Soil Health for Nebraska Wealth Initiative Goals:

1. Establish the Nebraska State Soil Health Hub with Regional Proving Grounds
The Soil Health Hub facilitates coordination, collaboration and communication among existing soil health efforts in partnership with producers and non-operating landowners. The Soil Health Hub will be a mechanism to bring all soil health stakeholders together, build upon and enhance existing efforts, and create a strategic vision for shared implementation.. Initially**,** the Soil Health Hub will bring UNL, NRCS, NRDs, NDA, and other agencies, organizations, producers and landowners together into a formal partnership, utilizing a common blueprint to address the Initiative's soil health goals and timelines. Six Regional Proving Grounds across the state are proposed to facilitate more localized soil health education, demonstration and research.

The Soil Health Hub would be governed by a Board of Directors that includes representation from the principal soil health partners as well as strong producer representation. An Advisory Committee made up of additional representatives from the soil health community would be formed to offer additional input and guidance. Full-time staff would be required to carry out the directives of the Board of Directors.

2. Form a Nebraska Producer Learning Community
The Learning Community will complement the Soil Health Hub by being an organized community of progressive soil health producers that provides peer to peer relationships that will aid in improving and advancing farm economics, resource stewardship, and the management of environmental issues on working farms and ranches. The Learning Community would participate in the Soil Health Hub and would provide input into the needs and challenges of producers and non-operating landowners.

3. Develop the Next Generation of Soil Health Practitioners
It is imperative to build the systems and the frameworks to encourage, recruit and train young people who are interested in careers in soil health. We need to facilitate the development of the next generation of farmers, ranchers, technicians, conservationists, educators, entrepreneurs, agronomists, agribusiness workers and leaders to ensure a productive and sustainable future for Nebraska.

4. Recruit $50,000,000 in Additional Soil Health Funding and Incentives Over the Next 10 Years
Corporate, public and private groups are committed to helping implement soil health practices. Our objective is to recruit these funds to be used by producers to learn and implement soil health practices, The Nebraska Soil Health Hub will act as an economic development engine to recruit

funding sources to promote soil health adoption in the state. Grants, industry partnerships, carbon and environmental incentive programs, and other funding sources will be sought. The Soil Health Hub can also assist and support other entities across the state in submitting soil health grant and program applications.

5. Establish Nebraska Soil Health Measurements, Benchmarks

Appropriate criteria or metrics need to be established that reflect the soil health status of a field. There is a current lack of metrics used by all to measure and manage soils to improve soil health. The HSTF is recommending the formation of a Soil Health Measurements and Benchmarks committee that will be tasked with establishing a standard set of soil health measurements for Nebraska, determining the current benchmark levels of soil health in our state and develop a suite of tools that bring together the best and most practical key performance indicators of a soil to measure the effectiveness of the management system being used.

Outcomes and Evaluation

If the proceeding 5 goals are accomplished the HSTF believes that Nebraska will be the national leader in soil health awareness and adoption and we will become a model for other states to follow. It is beyond the scope of the HSTF to establish specific metric goals since one of our recommendations is to establish the appropriate benchmarks and indicators. Our long term goals are to decrease the 'soil health gap' in soils that have a significant separation between the reasonably achievable soil condition and the present condition. Put more positively, all Nebraska soil resources will be managed and maintained to be at the highest level, for their resource, as reasonably possible. An indirect result will be reduced leaking of contaminants to the groundwater, and improved surface water quality.

Soil Health for Nebraska Wealth Implementation Plan

The Soil Health Task Force will disband at the end of 2020, the task force is creating an Initiative Implementation Plan so that its work will continue and its goals achieved.. We will seek people to populate and lead these plans who are passionate, dedicated and invested in achieving healthy soils for a wealthy Nebraska. Implementation committees will be formed for Goal 1 (The Hub) and Goal 5 (Measurements and Benchmarks). After forming the Soil Health Hub, the remaining goals (2, 3, and 4) can be addressed by the Hub.

The Implementation Committee for the Hub will schedule a Summit meeting at which a Hub Implementation Team will be formed that includes an emphasis on producers and representation from NRCS, UNL, NRD's as well as representation from a cross section of other soil health stakeholders. Due to the scale of work required for Goal 1, the Hub Implementation Team will seek qualified applicants for a Implementation Director to drive this goal forward

Achieving Goal 5 is both an organizational and scientific challenge. Commitments by interested volunteers and professionals include representatives from UNL, NRCS, and the NRD's.

Introduction

This Task Force Report is about the future hope we have for Nebraska while leveraging and maintaining her strengths. It is about dreaming bigger together than each of us can dream alone. It is about encouraging communication, cooperation and learning in a world that wants to isolate us. It is about bringing experts and persons from all walks of life together around the table to discuss our land, water and environment. Together, we can dream and grow Soil Health for Nebraska Wealth!

The 106th Nebraska Legislature codified the need to protect and improve our soil resources for generations to come and to ensure our ability to grow quality food and fiber through the passage of LB243. This bill created the Healthy Soils Task Force (HSTF) and directed it to do the following :

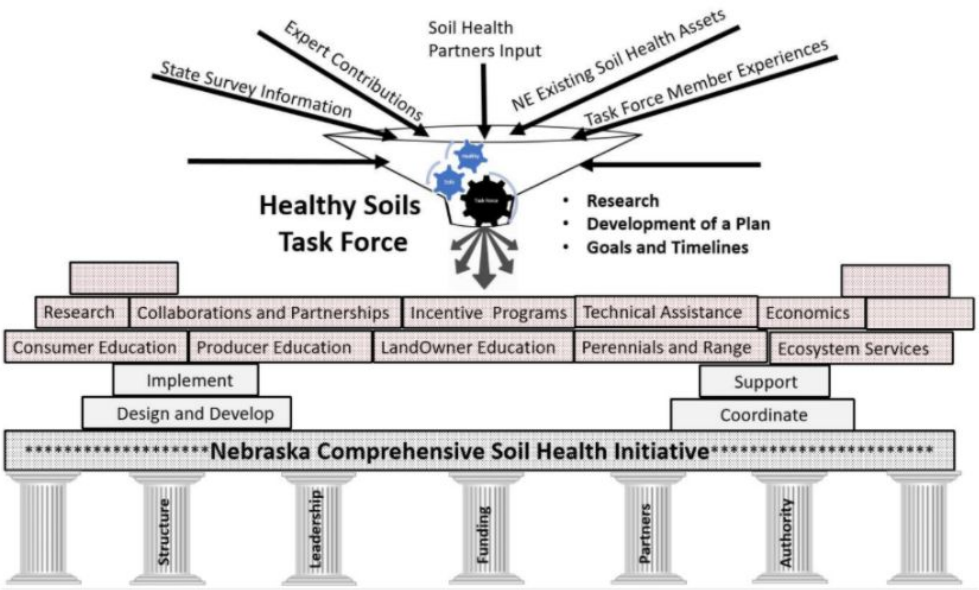
1. Develop a comprehensive healthy soils initiative for the State of Nebraska. (covered in The Initiative section)
2. Develop a comprehensive action plan to carry out the initiative. (covered in The Initiative and Implementation sections)
3. Examine issues related to providing farmers and ranchers with research, education, technical assistance, and demonstration projects. (covered in Why Is Soil Health Important and Barriers and Constraints section)
4. Examine options for financial incentives to improve soil health. (covered in Why Is Soil Healthy Important and Goal #4 sections)
5. Examine the contribution of livestock to soil health. (covered in Livestock Impact On Soil Health section)
6. Identify realistic goals and timelines for improvement of soil health in Nebraska through voluntary partnerships. (covered in The Initiative section)
7. Review the Farm Bill and identify opportunities to leverage state, local, or private funds. (covered in Goal #4 and Appendix F)

Early on in the process, the HSTF adopted the following Mission Statement: ***"To develop a positive, proactive plan for soil health to ensure an enriched, resilient, and sustainable future for the state of Nebraska."*** To this end, the HSTF, along with many key stakeholders from across Nebraska, has researched soil health programs and activities in other states, assessed current soil health work being done in Nebraska (see appendix ___) and examined the issues as directed by LB243. While the emphasis of LB 243's is improving soil health, two major resulting benefits are improved water quality/quantity and reduced erosion. Therefore, in addressing soil health the HSTF report and recommendations will naturally address these two critical factors.

The HSTF initially divided into teams to research the soil health steps by other states. After assessing the findings, more in-depth review was done on three state programs. In New York, the state's Land Grant Institution, Cornell, had significant influence on its program. In Indiana, the greatest influence came

from the state's Natural Resources Conservation Service and in South Dakota it came from its producers. A common theme through all was the need for a mechanism to bring about formalized collaboration, coordination and communication--**the 3 C's.**

The HSTF next subdivided into four subcommittees and added external stakeholders to take a detailed look at Education, Economics, Ecosystem Services and the Initiative. Drawing upon the other states best practices, subcommittee findings, assessing current soil health work being done in Nebraska and examination of issues as directed by LB243, the HSTF fashioned their recommendations. Prior to finalizing the report a series of 25 feedback sessions were held with key stakeholders/partners in soil health. This feedback was analyzed and incorporated into the final report. A listing of feedback participants is included in the appendix. The image to the right is a graphical representation of the process of gathering all the input and running it through filters to distill it down to a Soil Health Initiative.



The following report, findings and recommendations is the culmination of these efforts. It is not intended to suggest nor create mandates or regulations. By being proactive in addressing key agronomic and environmental issues, the aim is to avoid what has happened in other states where lack of voluntary action brought about public pressure resulting in strict mandates and regulations. A 2019 resolution passed by the Nebraska Farm Bureau may sum it up best: ***"Nebraska agriculture needs to be proactive in addressing natural resources challenges in the state. We support initiatives, research and education that promote soil health, water quality, and soil/water conservation, to be implemented on a voluntary basis"***.

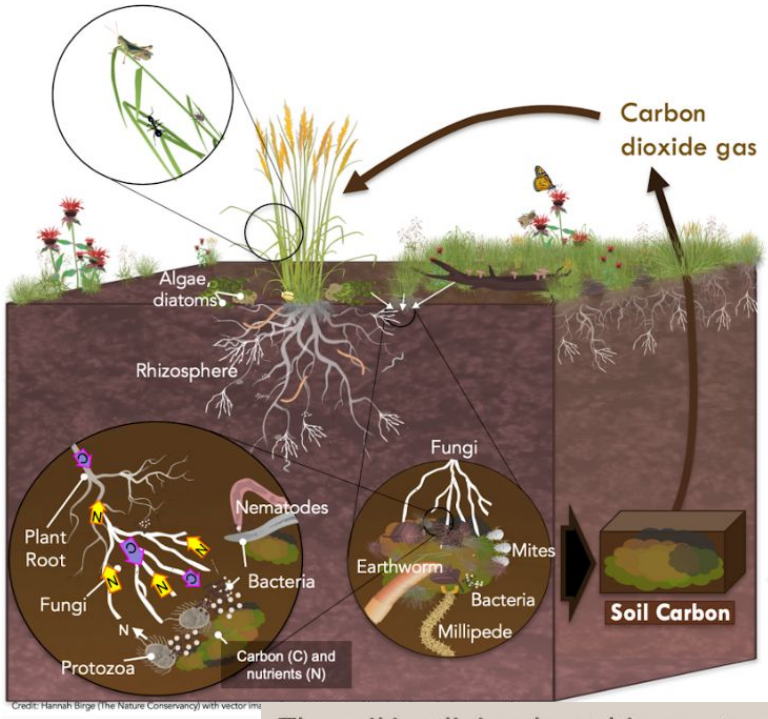
Producers and non-operator landowners are necessary partners in this effort, Agriculture is always changing and we want them to understand the numerous benefits associated with the soil health practices recommended as they evaluate management options. Foremost on the minds of the HSTF in the development of the Nebraska Initiative and Action Plans was increasing producers and non-operators bottom lines while protecting the environment for future generations.

Before outlining the key components of this Initiative, we will define and describe soil health, discuss soil health principles and explain why soil health is important and how to achieve it. We will also discuss some of the challenges and barriers to the adoption of these practices. We will look at economic examples to

support soil health. This background is important since it provides a rationale for the goals that we present as part of the Initiative.

What Is Soil Health

Soil is much more than "dirt" and goes far beyond being a medium in which to grow plants. Healthy soil is a dynamic, living, symbiotic ecosystem composed of the physical minerals (sand, silt, clay etc..), the chemical interactions between elements, and the biological organisms (bacteria, fungi, worms, plants) who live and work in the soil.



The soil is a living, breathing system teaming with life. The interactions among these living things and their surroundings gives way to a multitude of benefits to society.

The term "soil health" implies that soil is alive as the terms "healthy" or "unhealthy" describe the living and not the dead. Viewing the soil as a living ecosystem fundamentally changes the way soils are managed and valued. Understanding the plethora of benefits that accrue from healthy soils shifts public perception towards the positive contributions of agriculture.

There are many definitions of soil health but for the purposes of this report and this Initiative, soil health is defined as follows.

Soil health is the capacity of the soil to function as a dynamic living ecosystem that nourishes plants, sustains animals and people, and improves the environment.[1] *A soil becomes healthier when organic matter levels are increasing (carbon sequestration), water infiltration rates are improving (reducing erosion, runoff and flooding), and the soil biological life is diverse and abundant.*

Soil health is perhaps summed up best by Dr. Rattan Lal, Professor of Soil Science and founding Director of the Carbon Management & Sequestration Center at The Ohio State University. He states, *"I believe soil is a living thing. That's what soil health means, soil is life… As long as you are consuming the natural resources - food, water, elements - coming from the soil, you owe it to soil to put something back, to give something back, whatever you can."* [2]

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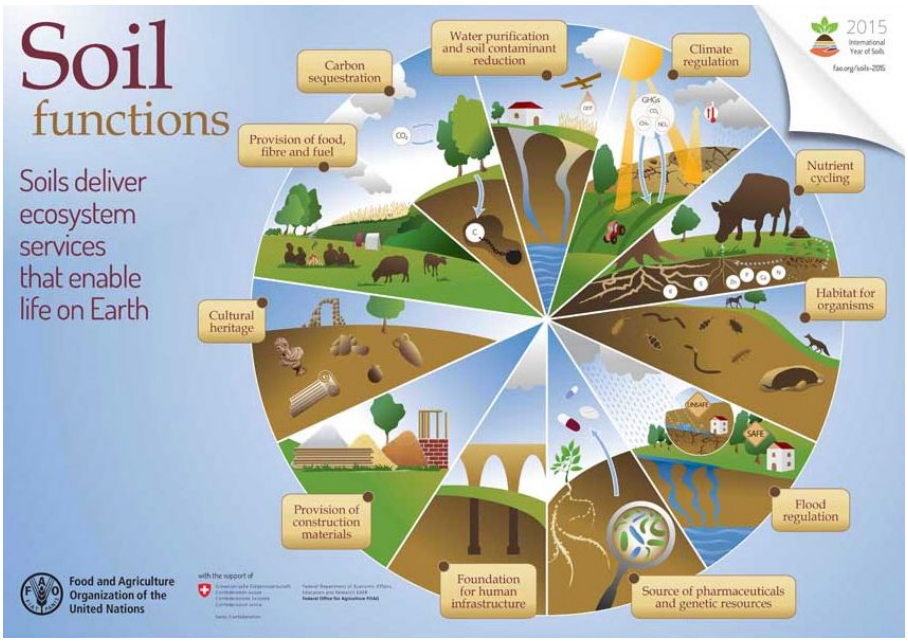
[1] Based on the current NRCS definition of soil health: "The continued capacity of soil to function as a vital living ecosystem that sustains plants, animals, and humans."

[2] *Dr. Lal is the 2020* World Food Prize *awardee* for developing and mainstreaming a soil-centric approach to increasing food production that restores and conserves natural resources and mitigates climate change. https://www.worldfoodprize.org/en/laureates/2020_lal/

Why Is Soil Health Important?



Soil is one of the most essential natural resources and affects the food we eat, the water we drink, and the air we breathe. Soil is essential for life and is the foundation for plant growth and healthy food production. Nebraska ranks fourth in total agricultural receipts and fourth in land in farms and ranches with 45 million acres (92%) of the state's total land area is dedicated to farming, ranching and livestock enterprises. This land base along with a bountiful supply of groundwater has resulted in a system of natural resources that are the lifeblood of Nebraska's way of life and agricultural economy. It is vital that we protect Nebraska's soils in order to keep them healthy and productive for Nebraskans now and in the future.

Soil health is the capacity of the soil to function as a dynamic living ecosystem that nourishes plants, sustains animals and people, and improves the environment. In large part, this definition of soil health is also a description of the native prairie ecosystem that covered Nebraska soils generations ago and built the productive carbon-rich soils that bless the state. However, there is consensus among soil scientists that our soil has lost organic carbon since the advent of the plow. Experts tell us that American soils have already lost about half of their organic matter[3], and Nebraska is no exception. Water and wind erosion have been significant factors in organic carbon loss and disturbing the soil through tillage has oxidized soil organic matter. In general these losses have not resulted in lower productivity because yields have been increased through the use of improved crop genetics, inorganic fertilizers, irrigation, precision agriculture and other agricultural advancements. However, the overuse of synthetic inputs can be detrimental to the soil biology and microbial life that are critical for the natural cycling of soil nutrients and the natural defense and health of growing plants.

Some modern farming practices have slowed down the organic matter losses and are working to restore soil carbon, improve water retention and reduce nutrient loss. No-till farming (Nebraska leads the nation in acres) reduces erosion and precision agriculture can tailor nutrient applications to reduce the possible loss and increase net profits. While these practices have been positive, more needs to be done to rebuild what has been lost.

[3] David R. Montgomery in his book, "Growing A Revolution."

Off-Farm Benefits of Soil Health

Environmental and other off-farm benefits of soil health are becoming more widely recognized. The off-farm benefits of soil health include: increased food production, weather resilience, wildlife abundance, pollinator habitats, clean water and carbon storage. Wildlife and pollinators benefit by increased food resources, improved water quality, less toxic chemical exposure, and development of cover. By combining precision conservation such as prairie strips and buffer strips to reduce nutrient loss, producers can maximize farm profitability and natural resource conservation. This unique approach also improves landscape diversity, which builds greater agroecosystem resilience.[4] For example, Schulte et al. (2017) illustrated that integration of prairie strips (i.e., 10% of croplands in perennial vegetation) into corn-soybean rotations led to a 3.5-fold increase in pollinator abundance, 2.1-fold increase in native bird species richness, 37% reduction in total water runoff, retention of 20 times more soil, and 4.3 times more retention of phosphorus. These results demonstrate the impact that strategically diversifying agricultural production can have on biodiversity and ecosystem services. [5]

Agricultural and society overall are increasingly sensitive to extreme weather events. NE's Weather Stations such as the new station at Cook by the Nemaha NRD help producers adapt, mesonet.unl.edu/ Martha Shulski, NE State Climatologist, stated that "antecedent conditions when combined with floods, droughts or extreme heat can influence the severity of impact for these weather extremes. Conservation practices, such as those that improve soil health, can lead to risk reduction and improved weather resiliency.The use of meta-data for "big-picture" decisions is needed [6]

Improved Water Quality and Reduced Erosion-Sedimentation

Approximately 88% of Nebraskans depend on ground water as their drinking water source. Healthy soil and a healthy soil microbiome provides natural filtration for precipitation that enters groundwater sources that are then utilized for drinking water. Perennial prairie soils are highly effective in water filtration however with many of these acres now converted to row crop agriculture, the decreased soil capacity to filter water has had a negative impact on groundwater quality.

The implementation of soil health practices will reduce sedimentation and nutrient and chemical losses into our lakes, streams, and groundwater. Nebraska as a state averages under the 5 ton per acre erosion loss limits (RUSLE by the NRCS) but modeling has

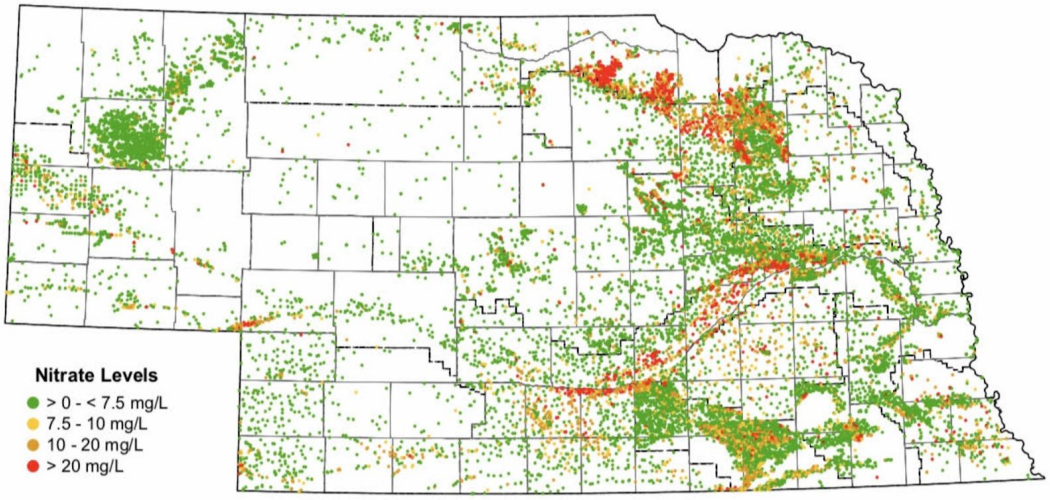
[4] Roesch-McNally, G.E., Arbuckle, J.G., and Tyndall, J.C. 2018. Barriers to implementing climate resilient agricultural strategies: the case of crop diversification in the U.S. Corn Belt. Global Environmental Change 48:206–215.

[5] Schulte, L.A., et al 2017. Prairie strips improve biodiversity and the delivery of multiple ecosystem services from corn–soybean croplands. PNAS 114:E10851.

[6] USGCRP, 2018: *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, 1515 pp. doi: 10.7930/NCA4. 2018.

shown many watersheds are over 10 ton per acre losses. Runoff water causes erosion which leads to nutrient loading of surface water and contributes to sedimentation of reservoirs and prematurely ends the lifespan and capacity of dams. Soil that is armored with a cover crop or with the residue from a past crop has much higher water infiltration rates and far lower rates of runoff. Soils higher in organic matter also use and hold nutrients more efficiently which increases productivity and profitability while decreasing the risk of nutrient loss.

The following graphic [7], shows the most recent nitrate-N concentrations for 28,754 Nebraska wells.
Sampled wells at 7.5mg/L or above (~30% of the overall wells sampled) initiates required action (ie., Phase II in NRDs).



Producer implemented soil health practices can and are making a difference! A specific example of how soil health management techniques can improve and protect water is the Shell Creek Project in eastern Nebraska. Shell Creek runs from Newman Grove to Columbus and drains more than 300,000 acres. In 2006, the Environmental Protection Agency designated the waters as impaired due to the high concentration of Atrazine. Thanks to a comprehensive watershed management plan that employed soil saving and building techniques, Shell Creek's water and aquatic life are now the healthiest they've been in decades. In 2018, the watershed made national history as the first stream to be delisted from the EPA's 'Impaired Waters' list. This accomplishment took more than 12 years to accomplish and was a collaborative effort between local producers, the NRD, UNL, NRCS and other agencies. More than 240 landowners participated in the program, putting more than 340 conservation practices on the land, including no-till farming, filter and buffer strips and cover

In 2008, the City of York purchased 400 acres of farm ground east of the city and developed into the City of York Wellfield. In the summer of 2017, the Upper Big Blue Natural Resources District approached the City of York with an idea for improving soil health which would in turn protect the city's drinking water: Project GROW (Growing Rotational crops On Wellfield).

Project GROW focuses on 160 acres of the total 400-acre wellfield and includes demonstration fields, community garden plots, a berry orchard, and an extensive pollinator habitat. Using no-till, diverse cover crops, and proven crop rotations, the project seeks to improve soil health, decrease soil erosion, and improve water holding capacity, all while maintaining profitability. One of the main goals of the project is to improve the quality of the drinking water produced from the wellfield, as a healthy soil acts as a filtering system to the aquifer and decreases nitrogen leaching and contamination.

[7] Quality-Assessed Agrichemical Database for Nebraska Groundwater
http://clearinghouse.nebraska.gov/Reports.aspx

crops. Governor Pete Rickets summed it up perfectly at the delisting ceremony held near Schuyler, NE on June 15, 2018 by saying, *"This is the perfect example of how Nebraskans pull together to solve our common challenges. Working together, local community leaders collaborated with state and federal agencies, and together they are accomplishing their goals of cleaning up the watershed and being good stewards of our natural resources."*

Healthy Soils and Healthy People

Healthy soils are critical to human health as they are the foundation of the food system and nearly all food-producing plants grow in soil. Simply stated, without soil we have very little food to eat. Healthier soils produce healthier, more nutrient dense crops that in turn nourish people and animals. Indeed, soil quality is directly linked to food quality and quantity.[8] Experts believe soil microbes could have a big impact on the nutritional content of our food. Moreover, the plants we eat and the dirt we come in contact with may also directly fortify our own gut microbiomes. The discovery of this link between soil health and human health has commanded the attention of big food companies, farmers, scientists, and environmental organizations, and it's sparked a research boom.[9] In 2018, the Soil Health Institute gathered nearly 200 scientists and organization leaders for the first ever *Conference on Connections Between Soil Health and Human Health*. One result of the conference was defining the direct connection between soil health and human health. Assessing an economic value to the environmental and human health benefits provided by soil health is challenging and more research is needed to fully evaluate the connections.

Healthy Soils and Healthy Economics

Farming and ranching are complex businesses and staying in business requires making a profit. Like any business, owner/operators make management decisions based on whether the change will pay for itself and improve the producer's bottom line. While producers are engaged in environmental stewardship, they must balance that objective with making sure they can pay the bills. Innovators in the healthy soil movement are showing that adopting healthy soil management practices can assist them in meeting both objectives. A positive return on investment (ROI) can come from an increase in yield and/or a reduction in input costs. Soil health management practices must be economically viable, however the key is to measure economic success in terms of profit per acre over time and not yield per acre.

Tables and figures need to be numbered and appropriately titled and then cited in the text.

To build or restore the soil takes time and sometimes short-term financial decisions conflict with long-term sustainability goals. Healthy soil management practices have a front-end cost in seed, equipment, and management and benefits cannot always be measured in the first

TABLE 2. Percent increase in corn and soybean yields after one, three and five years of consecutive cover crop use on a field, based on a regression analysis of data for crop years 2015 and 2016[1]

	ONE YEAR	THREE YEARS	FIVE YEARS
Corn	0.52%	1.76%	3%
Soybeans	2.12%	3.54%	4.96%

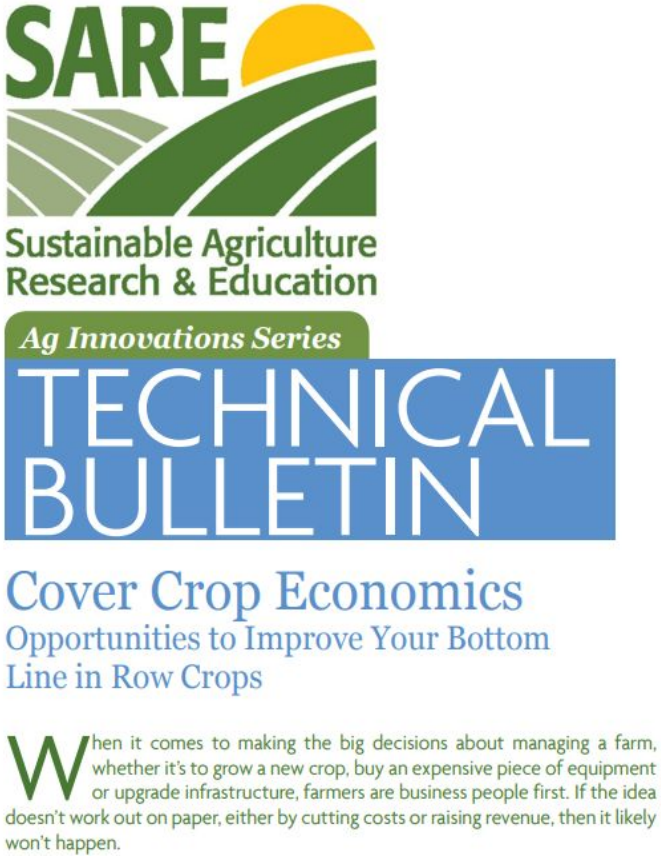
[1]Figures shown are an average of yields from the 2015 and 2016 growing seasons, with yield data obtained from about 500 farmers each year through the SARE/CTIC National Cover Crop Survey.

[8] http://www.fao.org/soils-2015/news/news-detail/en/c/277682/

[9] https://www.agriculture.com/crops/soil-health/soil-health-means-better-human-health

year or two of implementation. The amount of time needed to receive a ROI depends on many factors but because the benefits are both compounding and cascading, the returns continue to grow year after year. Evidence of this comes from a Cover Crop Economics study published by SARE[10] that showed cover crop benefits to yield increasing with each year of use. In another example, a 2019 paper published in the journal, SOIL, confirms that crop yields of corn and wheat improved over time by 20% when soil organic matter increased from 0.5% to 1% with additional significant improvements as organic matter increased to 2%. [11]

To encourage soil health practice adoption and to bridge the time gap between implementation and the positive ROI often requires some form of additional sources of revenue. This can come in the form of per acre incentive payments such as Environmental Quality Incentives Program (EQIP) and the Conservation Stewardship Program (CSP) through NRCS or discounts to an operating cost like crop insurance. Some States already have local programs in place to encourage farmers to use practices that promote soil health.



Soil health economic benefits are varied and can be challenging to measure and understand. Increased crop yields and decreased input expense are fairly straight forward. Missing from the balance sheet are the values of higher organic matter, conserved nutrients, reduced erosion, and increased resilience to weather extremes (droughts and floods). Avoiding potential losses and building future wealth through appreciated land value are also valuable but will not appear on an income statement.

The lack of economic data/ROI is one of the main reasons that the agricultural community shares for not adopting soil health practices. While some economic data exists, more case studies, testimonials and especially long-term, peer-reviewed research are needed to inform Nebraska producers when evaluating risk in trying something new and substantiating the business case. This is particularly critical considering the thin profits margins that exist in agriculture today. UNL's Department of Agricultural Economics is proposing a new unit with the mission to support informed economic decision-making in agriculture through applied research and education. As a source of agricultural

[10] https://www.sare.org/wp-content/uploads/Cover-Crop-Economics.pdf

[11] https://www.forbes.com/sites/daphneewingchow/2020/06/24/earths-rapidly-degrading-soil-is-bad-news-for-human-health/#2ae576077865

business management research and education the unit could play a vital role in analyzing and interpreting data and conducting research in support of the soil health economics.

While a number of producers are showing these practices do pay for themselves, it continues to be an area that needs advancement. Jeff Steffens, a HSTF member who farms near Crofton maintains detailed production records showing the economic benefits of using healthy soil management practices. In a 2019 interview with the NE Farmer, Steffens stated that adding cover crops to his system partially helped him exceed county corn yield averages with only 6 inches of irrigation water and 0.59# of applied nitrogen per bushel produced vs. many producers utilizing over 1# of nitrogen per bushel

> "You need a living root in the soil in order to reduce applied nitrogen...and I cut back on my nitrogen slowly over time. I've been able to go with all conventional soybeans now, saving on seed cost." Steffen added, I don't have any insecticide or fungicide treatment costs, and I'm no-till so I don't have extra fuel expenses. By keeping things covered, we are able to reduce inputs, get as good or better yields and improve water infiltration and water-holding capacity in the soils, Steffen said, to truly build organic matter with cover crops, you really need to add that small grain to the rotation. [12]

Table 2	Cost to Produce Bushel of Grain				
Crop	Lowest Cost UNL Budget				Jeff Steffen's Farm
Irrigated Corn (Pivot)	$2.91				$2.79
Dryland Corn	$3.24				$2.83
Irrigated Soybeans	$7.45				$6.52
Dryland Soybeans	$7.48				$6.38
Winter Wheat				78 Bu/A	$5.04
Oats				120 Bu/A	$2.90
Corn and Soybeans Yields in Trendline with County Averages					
source UNL 2019 Crop Budget, JEFF STEFFEN FARM DATA 2016-2018					

Image Caption: ***Utilizing cover crops and other soil health management practices allows Jeff Steffen to be a low cost producer of his crops which leads to profitability. This table shows Steffen's cost of production significantly lower than the bottom end of UNL crop budgets.***

Additional Economic studies

- A Datu Research case study analysing the Willis farm[13] from Northwest Missouri showed that cover crops had a positive impact on profit in 3 out of 4 years with an average gain in net income of $17 per acre. The adoption of cover crops over the four years of this study produced benefits including yield increases, reduction of fertilizers, herbicides, and erosion-related repairs, and savings of hay by using cover crops for cattle grazing.
- A Cover Crop Economics study published by SARE[14]

TABLE 1. Percent increase in yield for corn and soybeans following cover crops versus comparably managed fields with no cover crops[1]

CROP YEAR	CORN	SOYBEANS
2012	9.6%	11.6%
2013	3.1%	4.3%
2014	2.1%	4.2%
2015	1.9%	2.8%
2016	1.3%	3.8%

[1] Data is from the SARE/CTIC National Cover Crop Surveys conducted annually for crop years 2012–2016.

[12] https://www.farmprogress.com/cove
[13] http://www.daturesearch.com/wp-conter
[14] https://www.sare.org/wp-content/upload

showed cover crop use having positive impacts to both corn and soybean yields in 5 consecutive years and showed the most benefits in the drought year of 2012. This study goes on to evaluate the special situations (compaction issues, grazing, conversion to no-till, drought year, etc..) where cover crops and other soil health practices pay off faster and shows impressive net returns - especially the longer the practices are used. See appendix ___ for the full analysis tables.

- An American Farmland Trust case study of the Thorndike Farm in Illinois[15] analyzed the benefits and costs of adopting conservation tillage, nutrient management, and cover crops. Results showed their bottom line improved by $34 per acre across 1,400 acres by adopting the soil health practices. In addition, they have seen an increase in the water holding capacity, organic matter content, aggregate stability, and earthworm activity of their soil resources.

- In addition to increases in productivity and profitability, soil health adds long term value to the land as well. For each 1% of soil organic matter, the value of the nutrients alone is $465 per acre and the extra water holding capacity of better soils equate to higher yields as well. Consider the accumulation of wealth to the state as we build the organic matter levels back in Nebraska soils.

Value of Soil Organic Matter	
Nutrients	1% organic matter = 20,000 pounds*, 50% carbon, C:N ratio = 10:1**
Nitrogen	1000 pounds @ $0.40 per pound = $400.00
Phosphorus	100 pounds @ $0.40 per pound = $40.00
Potassium	100 pounds @ $0.20 per pound = $20.00
Sulfur	100 pounds @ $0.08 per pound = $8.00
Carbon	10,000 pounds (5 tons) @ $4/ton = $20.00
Total Value of 1% SOM per Acre	**$465.00**

*Assumptions: 2,000,000 pounds of soil in top 6 inches
**Relative ratio of nutrients: 100 Carbon/10 Nitrogen/1 Phosphorus/1 Potassium/1 Sulfur
Source: Understanding Soil Microbes and Nutrient Recycling, Hoorman and Islam, Ohio State University, SAG-16-10

THE VALUE OF SOIL ORGANIC MATTER. To calculate the value of soil organic matter, Jim Hoorman points to the nutrients found in 1% organic matter with a 10:1 carbon-to-nitrogen ratio. While fertilizer prices fluctuate, using modest averages, the value of soil organic matter would be in the hundreds of dollars.

- The recent ***reThink Soil A Roadmap to U.S Soil Health*** study[16] organized by The Nature Conservancy gathered soil health economic information from a wide variety of sources for three important field crops: corn, soybean, and wheat. The study estimated that for each 1% of these crop acres that adopted soil health practices, the annual economic benefits would amount to $226 million of societal value through increased water holding capacity, reduced erosion and nutrient loss,

Water Holding Capacity Value of Extra 1% SOM			
Crop	**Price**	**Yield**	**Value**
Corn	$3.25	7 bushels	$22.75
Wheat	$5.00	6 bushels	$30.00
Canola	$9.00	4 bushels	$36.00

POTENTIAL PROFITS. The water in each additional 1% of soil organic matter has the potential to deliver more bushels.

[15] https://farmlandinfo.org/publication

[16] https://www.nature.org/content/dam/tnc/nature/en/documents/rethink-soil-executive-summary.pdf

and reduced greenhouse gas emissions. The study concludes that soil health could ultimately deliver $50 billion on social and environmental benefits every year. The large economic benefits that accrue to the non-farming public is evidence that tax revenue should be used to assist producers and landowners making the challenging transition to soil health practices.

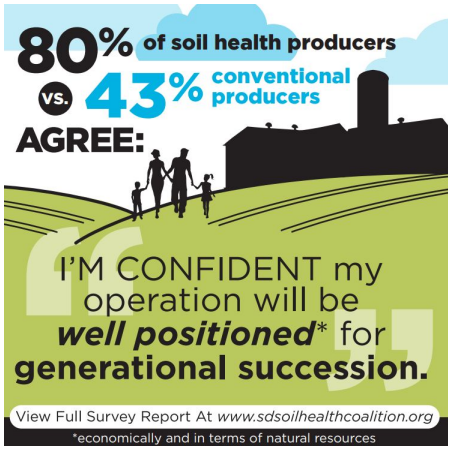
While more academic economic studies will be important, case studies and testimonials such as this can inform and influence the emotions, trust and motivation of other producers deciding whether to try something new.

Soil Health and Organic Farming

An increasing number of Nebraska farmers are transitioning to certified organic production to meet a growing demand and to increase profitability. Certified organic operations in NE sold $185 million in products in 2019 which is up 92% from 2016. The number of operations increased 47% during the same time period. Most recently, 110 farmers responsible for over 1.83 million acres attended a UNL Organic Transition Workshop at Mead in January, 2020. While the interest is growing, traditional organic practices are heavily reliant on tillage which can be detrimental to soil health. However, a growing subset of organic producers are implementing soil health management strategies such as cover crops, roller crimpers, weed flamers, diverse rotations and livestock integration which are reducing the amount of tillage required and restoring the health of their soils. As interest in organic grows, it is imperative that these producers understand and implement as many soil health management practices as possible.

Improved Quality of Life

A 2019 poll conducted by South Dakota State University, in partnership with the South Dakota Soil Health Coalition queried both conventional-practice producers and soil health practice producers to assess their stress levels on a range of issues from market price volatility to extreme weather events. They were also asked to assess current and future operation profitability, input cost pressure and natural resource conditions for generational succession. Results indicate that a significantly higher percentage of farmers implementing soil health-improving practices in their operations experience less stress, are more satisfied with farming and are more optimistic about their futures than their conventional farming peers. Even among producers who reported using some soil health practices on their operations, the ones using more of those practices reported less stress, greater farmer satisfaction and greater optimism. The soil health producers were also almost twice as confident that their operation is well positioned for generational succession[17] The importance of this was underscored in the SHTF 2020 Statewide Producer Survey more than 80% of 267? producers gave a High or Very High rating for "I want to leave my land better for the next generation" as an incentive to make changes that improve soil health. See appendix __



Perhaps the best summation of why soil health is important is another quote from Dr. Rattan Lal: *"Soil health determines the productive capacity of any agricultural practice… By improving soil health, we can produce more from less: less land, less water, less fertilizer, less pesticides, less environmental damage, less emission of greenhouse gases."*

17 https://www.sdsoilhealthcoalition.org/farmer-rancher-stress-survey-results/

The Principles of Soil Health

While the art and science of implementing soil health practices will be unique to each producer, the basic principles of soil health are universal. There are five widely recognized Soil Health Principles which are summarized by the NRCS North Dakota Soil Health Specialist Jay Fuhrer.[18] These soil health principles do not replace but rather complement and strengthen structural conservation practices such as terraces, grassed waterways, riparian buffers and windbreaks. These more permanent conservation practices can further protect soil and water resources and ensure the effectiveness of individual farm production systems based on site specific needs.

Keep the Soil Covered

Soils need to be covered or armored with residue from previous crops or from a living canopy of a growing crop or cover crop. This armor protects the soil from the sun and weather, reduces or eliminates wind and water erosion, increases water infiltration, reduces evaporation, moderates soil temperatures, reduces compaction, suppresses weed growth and provides a habitat for soil biology.

Minimize Soil Disturbance

Any productive ecosystem or economy must have limited disturbance or disruptions in order to thrive. Minimizing soil disturbance can help restore soil organic matter. Soil disturbances can be physical (tillage, erosion, compaction), chemical (over application of nutrients and pesticides) or biological (overgrazing and monocultures). While it is impractical to eliminate all disturbance from a production agriculture system, the amounts and the effects should be minimized whenever possible.

Maximize Diversity

Our soils were built over time when diverse plant communities grew in harmony with diverse soil microbial populations to create a symbiotic ecosystem that provided forage for an abundance of wildlife. Production agriculture has resulted in the polyculture perennial landscape being replaced by a monoculture annual landscape which has led to a less diverse soil microbiome. Diverse crop rotations and diverse cover crop mixes are needed to broaden the biological community of our soils. More diverse rotations also allow for easier livestock integration, manure applications and timely cover crop plantings.

Maximize Life and Growth of Plants

A healthy soil ecosystem requires plants to be continually living, growing and capturing sunlight, carbon dioxide and water and turning it into carbohydrate sugars and oxygen (photosynthesis). Much of this sugar is released into the soil to support the microbiome which in turn nourishes and protects the plant community. Most Nebraska farms grow cool or warm season annual crops, which have a dormant period before planting and/or after harvest. Cover crops can fill that dormant period and maximize both photosynthesis and the biological life of the soil.

[18] https://www.nrcs.usda.gov/wps/portal/nrcs/main/nd/soils/health/

Integration of Livestock

Animals have long played a collaborative role with plants and biology to develop our soils over time. Livestock's impact on soil health is the cumulative effect of plant biting, saliva, urination, defecation, trampling and all the other ways that grazing animals impact plants and soil. Using livestock manure to fertilize fields can substantially increase the soil's organic matter with improved water-holding capacity.

A sixth principle of context integrates the five agronomic principles and the diversity of individual operations and regions. It is not an agronomic principle but it is necessary to fully understand and effectively apply the Five Principles of Soil Health.[19]

Know The Context

The agricultural, economic, and social context that each producer operates within must be considered when implementing soil health principles. Nebraska resources are very diverse and differences in climate, topography and soil types matter when it comes to soil health management. The five preceding principles will successfully work in every county in Nebraska, but they need to be skillfully applied within the local context to target the specific goals and objectives of each producer.

These principles of soil health are often practiced in a system of agriculture referred to as Regenerative Agriculture, which is a system of farming principles and practices that increases biodiversity, enriches soils, improves watersheds, and enhances ecosystem services. Conservation tillage, cropping system diversity, minimized field traffic, or any practice that increases the soils' resiliency to drought or other extreme weather events are considered regenerative practices. Large food companies such as General Mills, Cargill, Walmart, Unilever, Dannon, and Nestle are encouraging and subsidizing regenerative agriculture practices for producers in their supply chains.

6 Core Principles of Soil Health and Regenerative Agriculture

(image credit to General Mills)

[19] https://understandingag.com/

Livestock Impact On Soil Health

Livestock have always been part of the ecosystem that has produced food for humans and developed the deep, productive soils found in the Great Plains. However, because of economies of scale, specialization, and policies fewer Nebraska farming operations now include livestock as part of the overall enterprise. Without integrating livestock in some way into a farming system, implementing a successful and profitable soil health improvement plan is more difficult.

There is no substitute for the positive effects of animals grazing growing plants; their hooves break up the soil crust, crushing plant matter and creating mulch, cycling nutrients and allowing sunlight to reach new plants. Livestock saliva, urine and dung add valuable biology to the soil and provide for natural fertility. Livestock integration can be very profitable as animals perform very well and the cost per ton of feed from a grazed cover crop is usually far less than the cost of harvested hay or silage. Including livestock in a statewide soil health initiative is critical since close to half our land resource is devoted to the feeding of animals through forages or grazing.

Cattle grazing cereal rye and winter peas cover crop planted after oats harvest. A win for the soil, a win for the cattle and a win for the environment. Photo by Jolene Steffen

Practice and research is showing that when managed with the other principles, adding livestock back can enable a more self-reliant farming system. Ron Bolz, HSTF member, Chadron State College professor and the Nebraska Grazing Lands Coalition Coordinator stated, “The reintegration of livestock has management challenges but the potential benefits to soil and profitability are significant. Using proven grazing principles, soil health can be increased on pastures, native range and grazed crop acres. With 22 million of Nebraska’s 45 million farm and ranch acres in rangeland and pastureland, half in the sandhills, the potential impact is significant. **Incorporating the grazing ruminant has the potential for the greatest enhancement in soil health over time”** (Bolz, 2020)

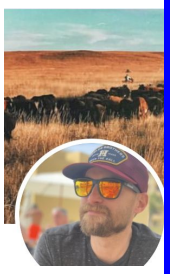
Grazing management of perennial plants is continually improving. Managed rotational grazing techniques benefit both the land and the animals and results in increased native grass production and restoration of vegetation on degraded land, thereby increasing soil organic matter. Dr. Richard Teague, Texas A&M AgriLife Research, has shown that ranchers practicing proper grazing principles have been able to increase organic matter levels by 50% in a 10 year period compared with conventional grazing practices while at the same time greatly improving profitability.[20] Results from

[20] https://www.ncat.org/wp-content/uploads/2016/11/1Teague2016.pdf

studies conducted by Arizona State University School of Sustainability[21] show that with just 5 years of managed grazing, significant improvements are achieved with increases in soil organic matter, soil carbon, root structure, depth and mass, soil structure, aggregation, and apparent soil life.

Another opportunity for many farms in Nebraska is to utilize the manure produced from the many livestock (cattle, swine and poultry) facilities across our state. Manure application to crop land can improve the soil's physical, biological and chemical properties. The high concentration of organic carbon and nutrients in manure make them a soil amendment that can't be duplicated by commercial fertilizers. The nitrogen and phosphorus supplied is typically in a slow release organic form that is less susceptible to environmental losses than most commercial fertilizers. As with any fertilizer, application rates must be matched to crop nutrient requirements. Distance to fields is a challenge since raw manure is expensive to haul and apply. Developing inexpensive composting and dewatering systems or ways to decentralize some feeding operations will be crucial to getting the manure benefits on more farms.

Producer Profile



Logan Pribbeno @Nebraskero and his family operate the Wine Glass Ranch in Chase County, north of Imperial, NE. It consists of 5,000 acres of dryland acres, rents irrigated corn, and manages 1,200 cows and 4,500 steers/heifers on 18,000 acres plus hunting/outfitting opportunities. Logan believes that cattle integration is the "magic" that turns soil health into profit; Wine Glass no longer applies phosphorus or potassium to its field, and has also reduced nitrogen. Additionally, Logan has opted not to apply nitrogen to his fields in the fall. Fifty years ago, farmers integrated cows in their operation through farmer-to-farmer partnerships and he'd like to see that popularized today.

[21] https://www.sciencedaily.com/releases/2015/02/150214184521.htm

The Soil Health Movement

Farmers and ranchers around the world are experiencing a number of challenges. These range from shrinking profit margins to increased public scrutiny concerning the impact current agricultural practices have on the environment. It is a huge task and a delicate balancing act for Nebraska's farmers and ranchers to produce food and fiber for a growing world population while maintaining profitability and protecting natural resources and health. Soil quality, erosion, water quality and net income are all issues that are inextricably linked to the soil. The increased knowledge through educational programs on the value of healthy soils and the restoration of carbon has led to a growing soil health movement.

The movement is worldwide; in applying these soil health principles to Nebraska, it is important to develop a mix of principles that best fit the state's diversity of conditions. In Nebraska, innovative farmers, ranchers, researchers, government agencies, non-government organizations, and agribusiness are taking the lead at developing and promoting a widespread focus on soil health. Those associated with the soil health movement are finding that their healthier soil leads to improved yield stability and greater net financial returns over time. Healthy soils improve soil structure resulting in increased infiltration rates and water storage capacity in the soil profile. This makes the soil more resilient to drought, flooding and erosion, thereby reducing runoff of sediment and chemicals into surface water which protects the public investment made in flood control structures and dams by keeping the sediment and other contaminants out of the reservoirs. These producers are building wealth in their land through enriched soil and protecting both the economic engine and the environment for future generations.

Recently, there has been an increased interest in proposing or creating programs that reward producers to implement soil health practices. In early 2020, the USDA announced a new Innovation Initiative that includes enhancing carbon sequestration through soil health and forestry, using innovative technologies and practices to achieve net reduction of the agricultural sector's current carbon footprint by 2050 without regulatory overreach and reducing nutrient loss to improve water quality. Additionally, multiple carbon sequestration programs are being launched where farmers will be able to generate additional income by selling carbon credits.

The Growing Climate Solutions Act[22] was introduced into the US Senate in June 2020 and is designed to break down barriers for farmers interested in participating in carbon markets so they can be rewarded for climate-smart practices. The bill has the support of the American Farm Bureau Federation, National Corn Growers Association, McDonald's, Microsoft, and over 40 farm groups, environmental organizations, and Fortune 500 companies. The House version of the Act was also introduced in June with Nebraska congressman Don Bacon as a lead sponsor and Jeff Fortenberry as an original sponsor. The educational programs of the Initiative would assist producers in learning the climate-smart practices and qualifying for the carbon credit markets. Zippy Duvall, American Farm Bureau President says: "America's farmers and ranchers have made tremendous strides in reducing our carbon footprint, with overall greenhouse gas emissions under 10 percent for our industry. As we

[22] https://www.congress.gov/bill/116th-congress/senate-bill/3894

endeavor to do more with less, we are always focused on doing better and working together to protect the natural resources we all enjoy."

Many Nebraska commodity groups and farm representative organizations have developed solid sustainability plans as well. For example, one of the main components of the strategic vision plan for the Nebraska Corn Board is "Ensuring Sustainability."[23] They state that Nebraska corn farmers are faced with the challenge of producing crops necessary to meet local, national, and international demands while maintaining the quality and quantity of resources for future generations. Improved soil health and improved quality of water resources are listed as long term results of improved production practices.

Barriers and Constraints

With the many demonstrated benefits of implementing soil health practices, one might ask why the adoption and application rate of these principles is not higher than it currently is. The 2017 Census of Agriculture reports the overall national use of cover crops at 15.4 million acres of cover crops grown on acres of harvested cropland, which is about a 5% adoption rate. While Nebraska has led the nation in no-till adoption, less than 5% cropland acres across the state utilize cover crops. While soil health practices have many positive benefits, there are many barriers and constraints that are keeping Nebraska farmers from more broadly implementing cover crops and other soil health practices. These barriers are discussed below.

Education and Information Availability vs. Producer Awareness

Nebraska key stakeholders (UNL, NRCS, NRDs, Nonprofits, Agribusiness) provide data and informational resources and conduct soil health education events. However, a relatively small percentage of producers take advantage of these opportunities. Additionally, very little outreach and education has been directed toward crop advisors, coop agronomists, farm managers, lenders and non-farming landowners. More education opportunities are needed for all groups but to maximize this investment, greater coordination and awareness between the key stakeholders is needed.

Understanding the Soil Health Impacts to Economics

Producers see the immediate expenses involved in implementing soil health practices, but the return on that investment (ROI) is not always observed immediately and is not as easily measured or understood (as compared with conventional crops). ROI on physical investments such as equipment, terraces or tiling are easier to see but many soil health benefits are compounding and cascading and can not be measured in the first year or two of implementation. More data is needed to impart that knowledge to producers.

Non-operating Landlords

40% of Nebraska's agricultural land is tenant farmed. Economically it is often difficult for the tenant to invest in soil health practices that will improve long term productivity and value of the land when their farming tenure may be short. Landlords need to understand the value of soil health and encourage longer term leases to encourage adoption of practices.

Lack of Adequate Incentives and Discounts for Adoption

[23] https://nebraskacorn.gov/wp-content/uploads/2017/04/CORN-Strategic-Plan-Final2.pdf

Implementation of soil health practices may require initial investments of equipment and education. These investments need to be encouraged and partially offset with incentive programs that encourage ongoing use of soil health management even after the incentive program has expired.

Universal Soil Health Measurement Standards

Much like assessing human health through various medical tests, having an appropriate, well defined, and well-understood set of soil health measurement tests will allow better monitoring and evaluation of soil health needs and on farm progress in Nebraska fields and rangeland. Soil health measurement standards need to be widely agreed upon, adopted, and promoted within Nebraska by all of the soil health stakeholders.

Corn-Soybean Rotation and Cover Crop Implementation

The dominant crop rotation on the majority of Nebraska crop acres is corn and soybeans. When the fall harvest is late, the time needed to establish a successful cover crop is limited. This reason was identified as the top barrier to overcome in the response of over 120 farmers from surveys conducted by the HSTF and UNL Extension events. (see Appendix D for full survey results) Some innovative producers are experimenting with interseeding cover crops in corn prior to harvest, and while this sometimes works, much more research on this practice is needed. Cereal rye is very cold hardy and can be planted later in the season or frost seeded and is often successfully used as a cover crop prior to soybeans. Cereal rye before corn can also work well but is much more challenging. In arid environments, there are legitimate concerns that cover crops may compete for limited moisture.

Increased Management Requirements for Soil Health Practices

The increased management and labor required to implement soil health practices can be a barrier. Cover crops typically require an additional equipment pass after harvest for seeding, which is often difficult when labor and appropriate seeding time is limited. Maintaining existing no-till acres is also challenging as herbicide-resistant weeds have become a major issue and decreased effectiveness and increased cost of herbicides have driven some producers back to tillage. Management considerations and training is also needed to expand crop rotations, improve nutrient and manure management, irrigation efficiency, and cover crop termination.

Integration of Crops and Livestock

Lack of infrastructure (fences and water) and the lack of time and management capacity have kept many Nebraska producers from integrating livestock into their systems. When farm incomes are down overall, the extra risk of beginning these practices becomes a barrier to implementation. Present, NE NRCS EQIP rules do not allow for portable fencing and water. This need on row-crop lands and other grazing areas is pressing and a drawback that needs to be addressed particularly with land-owners.

Soil Health Education for Pasture and Range Management

Soil health research and education has focused largely on cropland acres, but our grassland resources are just as important to protect and improve. More educational resources need to be developed towards soil health in pasture and range. The expanded use of portable fencing and water systems on row-crop lands are being developed which would provide another manner to support producers.

The Initiative - Soil Health for Nebraska Wealth -

www.soilhealthnebraska.com (.org) www.nebraskasoilhealth.com (.org)

Considerable efforts are being made to restore Nebraska soils to a healthier state, however the scope and rate needs to increase. A multitude of entities are currently involved in providing education, technical assistance, research and demonstration on various aspects of healthy soil principles and practices (see Appendix A). Some excellent programs have been created and made available but adoption is still limited. More communication and awareness is needed as research findings show that positive predictors of conservation practice adoption included positive attitudes and awareness of conservation practices and programs.[24] The HSTF concluded that the following factors need to be addressed in order to bring about more rapid, widespread adoption of soil health practices.

1. Develop better methods to measure and quantify soil health
2. Improve coordination, collaboration, communication (the 3 C's) between existing programs
3. Be more tactical in determining who the audience is, what programs are offered and how
4. Increase producer, non-operating landlord and public soil health awareness and knowledge
5. Demonstrate best soil health practices and benefits in real life situations on a regional basis
6. Focus on economic benefits of soil health through research, case studies, and testimonials
7. Enhance learning through peer-to-peer, mentoring and train the trainer methods using latest technology
8. Increase research around soil health
9. Actively pursue multiple sources of funding for new programs and incentives

Addressing these factors is the basis for a Healthy Soils Initiative to remove adoption barriers and constraints and accelerate the adoption of soil health awareness and adoption. Identifying how we can do better is the essence of the Initiative's goals and corresponding action plan to make it happen.

Thirty-five states[25] have and/or are developing Statewide Soil Health Initiatives. Our approach is based upon best-practices but particularly one key mantra---the direct, consistent and foundational involvement of producers in the systems change process. Farmers, ranchers and non-operating landowners are the ones who have the "final say" on their management practices. This was stressed in a recent research project led by Andrea Basche, UNL Assistant Professor of Agronomy, where staff and board members of the Nebraska NRD's were interviewed. A majority of respondents felt that soil health would best be impacted by "more interest from farmers" but surprisingly, did not see increased funding or personnel as the top influence. Several comments stressed investing in relationships with producers would result in immeasurable benefits.[26]

The HSTF proposes an Initiative that is a visible, coordinated, highly publicized statewide campaign throughout Nebraska to protect and enhance the health of its soils by increasing awareness and

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[24] Prokopy L.S., et al . 2019. Adoption of agricultural conservation practices in the United States: Evidence from 35 years of quantitative literature. *Journal of Soil and Water Conservation* 74(5):520-534, doi:10.2489/jswc.74.5.520.
[25] (Steven Keleti, www.soil4climate.org, 2019)
[26] Andrea Basche and Morgan Wirth-Murray, Journal of Soil and Water Conservation, July 2020, 75 (4) 88A-93A; DOI: https://doi.org/10.2489/jswc.2020.0512A)

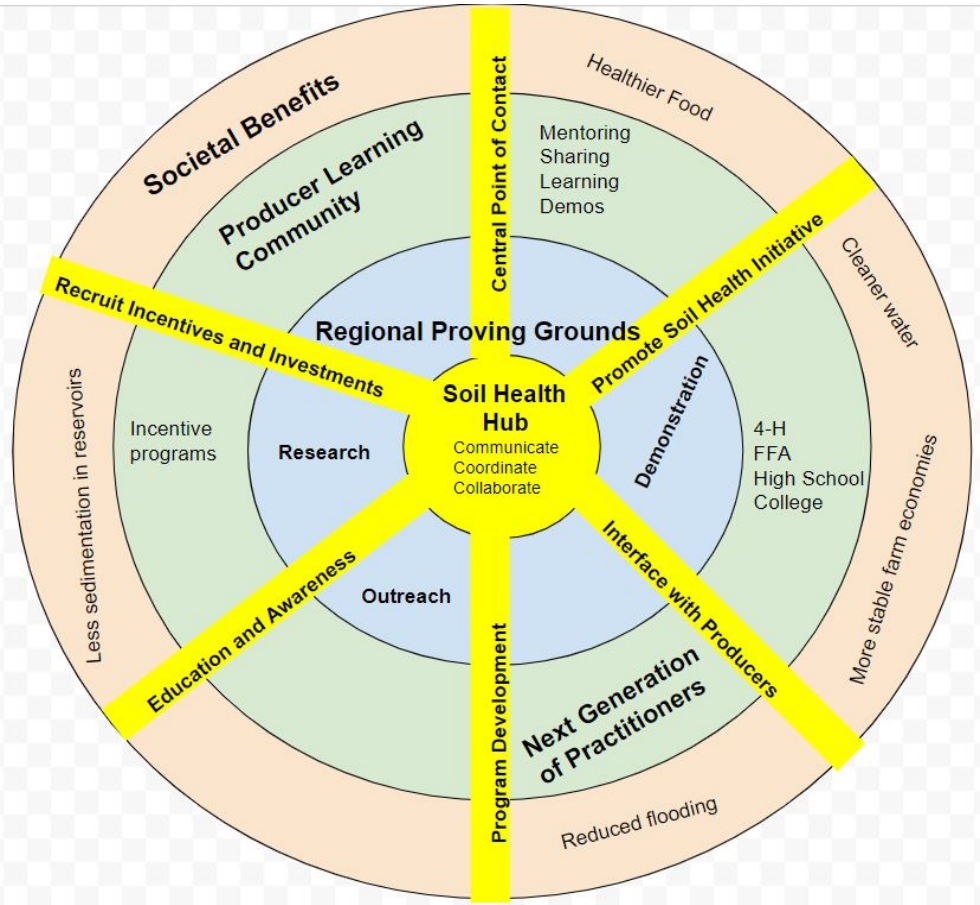
adoption of soil health principles. With input from the feedback sessions the theme, selected by the HSTF to promote the Initiative is **"Soil Health for Nebraska Wealth."** This theme stresses the value of soil and water resources to Nebraska and the importance of soil health to the economic future of her farmers and ranchers.

In compliance with Legislative intent and to meet "best practice" from across the nation, participation in the proposed Initiative will not be achieved through mandates or regulations but rather through voluntary partnerships and participation with producers, key stakeholders and the public. While there will be many complexities to the adoption of soil health management principles and practices, the Initiative considers all farmers, ranchers and landowners as potential participants and all other interested and concerned parties as potential stakeholders. The goals will build capacity and collaboration and not add bureaucratic layers to help producers learn.

Initiative Goals

1. **Establish a Nebraska Soil Hub with Regional Proving Grounds**
2. **Form the Nebraska Statewide Producer Learning Community**
3. **Develop the Next Generation of Soil Health Practitioners**
4. **Recruit $50,000,000 in additional soil health funding and incentives over the next 10 years**
5. **Create Nebraska Soil Health Benchmarks and Measurements of Success**

The following graphic depicts the interaction of the goals within the Initiative



Action Plan for “Soil Health for Nebraska Wealth”

Goal 1 Establish the Nebraska State Soil Hub with Regional Proving Grounds

Rationale
After analyzing existing efforts, (see Appendix A for list of existing activities) the HSTF concluded there is potential for these groups to have greater impact by working more cooperatively and in step with a common plan of action. By working collectively, the resources of NRDs, UNL, NRCS, and other stakeholders in soil health would be better utilized. These factors were repeatedly stressed during conversations with national leaders and the review of other state’s Soil Health Initiatives. A general theme that emerged from the research confirmed that coordination of soil health efforts is often lacking but will be needed to ensure Nebraska’s status as a powerhouse agricultural state and be the leader in natural resource conservation.

The HSTF recommends the formation of a formal “Nebraska Soil Hub” (The Hub) within the overall Initiative. The Hub creates a centralized means to facilitate enhanced coordination, collaboration and communication among these entities in partnership with producers and non-operating landowners to carry out the goals of the comprehensive Initiative. The Hub should not be another layer of bureaucracy or duplicate what is already going on, but a mechanism to bring all soil health stakeholders together, build upon and enhance existing efforts with the addition of new, voluntary approaches to fill missing gaps.

Soil Health Hub Purposes and Structure

- The purpose of the Hub is to bring UNL, NRCS, NRDs, NDA, and other agencies, organizations, producers and landowners together into a formal partnership, utilizing a common blueprint to address the Initiative’s soil health goals and timelines.
- Promote the Initiative as a statewide campaign to enhance efforts to protect and improve soil health.
- Working in partnership will reduce chances for duplication of effort and disconnected programming, ensure the delivery of a consistent message, and reduce chances for programmatic gaps.
- Including producer input and involvement in the process will enhance and strengthen the effectiveness of the education, technical assistance, in-field demonstrations, and applied research programs.
- The creation of this Hub should increase the competitive position of Nebraska in obtaining funds from grants, corporate partnerships and ecosystem service programs (refer to Goal #4) as it creates a point of contact for those wanting to connect to Nebraska’s soil health

programs. These funds would focus on incentives and markets to help producers in the soil health journey.

- The Hub would be governed by a Board of Directors that includes representation from the principal soil health partners as well as strong producer representation.
- An Advisory Committee made up of additional representatives from the soil health community would be formed to offer additional input and guidance.
- Full time staff would be required to carry out the directives of the Board of Directors. Potential and eventual staff could include an Executive Director along with staff having expertise in economics, fundraising, communications and administrative support.
- A 501(c)(3) organization would likely need to be formed to ensure the staff is independent and equally responsible to each of the partners with direction given and performance evaluated jointly by the Board.

Soil Health Hub Activities

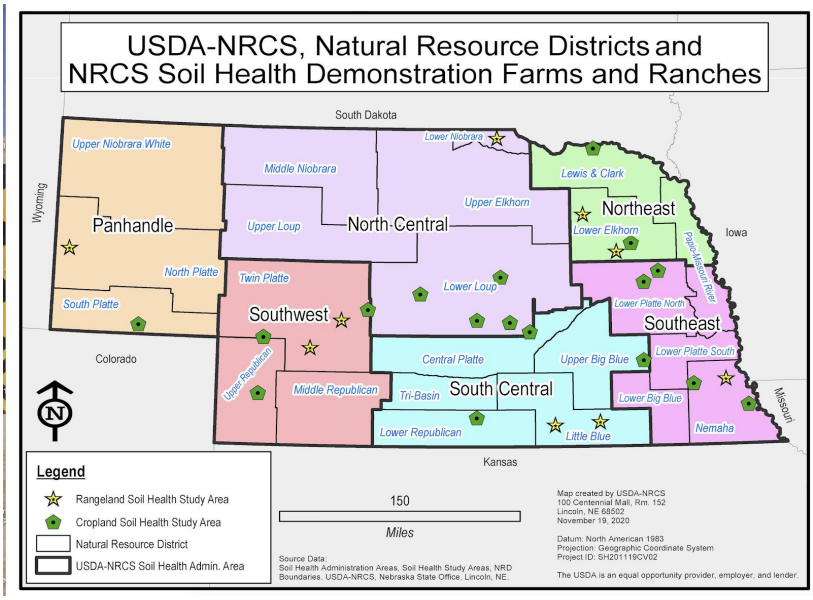
The activities of the Soil Health Hub will be set by the Board of Directors but may include but not be limited to:

- Coordinating, collaborating and communicating planned soil health activities across Nebraska.
- Promote soil health benefits, principles and practices to producers, landowners and consumers.
- Document the economic viability of adopting healthy soil management practices.
- Identify and initiate projects where more research is needed to remove adoption barriers
- Create and facilitate the Producer Learning Community (Goal #2).
- Recruit soil health market incentives and investments for producers and landowners (Goal #4)
- Seek and acquire the financial resources needed to carry out the Initiative.
- Develop and maintain centralized website for Nebraska soil health information
- Facilitate, coordinate and communicate the six regional soil health proving grounds.

Soil Health Regional Proving Grounds (RPG's)

Nebraska has a unique diversity of soils, topography, rainfall, cropping systems and other environmental factors. While soil health principles apply statewide, one set of practices will not fit the entire state and can differ region by region, farm by farm and ranch by ranch depending on what practices are needed to reach the desired healthy soils standards. The HSTF recommends the creation of Regional Proving Grounds (RPG's) to provide ground truthing of soil health practices. A

proving ground is a term used throughout industry and the military as a “place for scientific experimentation or testing or a place where something is developed and tried out.”[27]



The HSTF suggests dividing the state into six regions (Panhandle, South West, North West, North Central, South Central, North East and South East). These six regions correspond to Nebraska’s six distinct agro-environmental regions, NRCS land management areas, Natural Resource District boundaries and the Nebraska Extension Engagement Zones. Allow for region-specific experimentation, testing and demonstration to “prove” and analyze the agronomic, economic and environmental viability of soil health practices.

Characteristics and Functions of Regional Proving Grounds

- Study and understand how livestock can best be integrated into farming systems.
- Develop, demonstrate and educate best practices for managed grazing.
- Address areas of greatest need first within each region.
- Show how soil health management systems can be beneficial to wildlife populations.
- Living classroom to educate producers, landowners and consumers.
- Leverage and utilize existing infrastructure of NRD’s, UNL Research, and NRCS research and demonstration farms.
- Direction and coordination of the RPG’s would fall under the Hub with extensive use made of appropriate existing personnel, including UNL Extension Engagement Zone Coordinators and Agents, NRCS field personnel, and NRD staff.
- The UNL Onfarm Research Network should also be utilized. This network works with 60 producers each year to conduct 80-100 on-farm research studies and has gained a reputation as a reliable and unbiased source of information.[28]
- The Rogers Memorial Farm, a long term no-till research farm owned and operated by UNL should be used as an example model of how effective these RPG’s could be.

[27] https://www.merriam-webster.com/dictionary/proving%20ground
[28] https://cropwatch.unl.edu/on-farm-research

- NRCS and UNL have partnered since 2017 to establish 17 soil health demonstration farms and 9 research ranching sites (labeled on the map). The successes and experiences of this partnership should be utilized as well to develop unique long-term sites on producers' fields and grassland.
- Explore activities that inform state and national NRCS programs to enhance the support for producers for portable fencing, water on row-crop lands, alternative programs (ie., 5 year + EQIP) to better support the risks involved in soil health management systems.

Goal 2: Form a Nebraska Producer Learning Community (PLC)

Rationale

Concern for agricultural productivity and profitability, food quality and security, environmental resilience, ecosystem sustainability and increasing weather variability has resulted in soil health moving to the forefront of many producer conversations. One outcome is that producers in several states have formed producer led organizations to address soil health. States surrounding Nebraska such as Colorado and South Dakota have formed such organizations and can serve as models. Most of these producer organizations were formed because the members wanted to learn and enhance their working knowledge and advocate for and promote soil health practices to others.

The HSTF recommends the creation of a Statewide Producer Learning Community (PLC). The PLC would bring together like minded people to foster learning, capacity building and knowledge gathering and generate information to guide informed decisions. A formal organization of progressive producers in soil health will provide leadership in addressing farm economics, resource stewardship, and the management of environmental issues on working farms and ranches. Working together producers will be more empowered and can have greater influence than working alone.

The Nebraska approach will be somewhat different from other states' producer groups in that the PLC would not be a stand alone organization. It is a key component of a three pronged approach, along with the Hub and RPGs, to increase the pace of healthy soil management practice adoption. The producers themselves will be integral to the educational and change process. Farmers and ranchers trust what other farmers and ranchers tell them and they talk to one another. Today's technology allows interaction with producers utilizing best soil health practices wherever they reside. Although this would be a statewide organization, it might be useful to subdivide the Community along the RPG lines for smaller, more targeted meetings and learning.

Like many producer groups, a small fee ($50 or less) from members to show commitment to the organization and provide operating capital for programs and services is recommended. The majority of the operating and administrative cost of the PLC would be funded by the Hub and administrative and coordinator duties would fall to Hub personnel as well. Potential members would include farmers and ranchers who are using healthy soil management practices in their crop and or grassland operations or those who are interested in learning more. Landowners, agriculture support workers, agribusiness and consumers would also be welcomed as members in the PLC.

The PLC would work closely with the Hub to communicate the needs and challenges of producers and non-operating landowners. Their involvement as a formal component of the Healthy Soil Initiative

may be the most important factor leading to success. One member from each RPG region could serve as a representative on the Hub Board of Directors.

Outcomes
A successful Producer Learning Community would have the following outcomes:

- Sponsor formal workshops, courses, field days, educational programs, mentoring, informal networking events, online groups, etc... to provide members with the latest soil health information and developments (with the assistance of the Hub).
- Allow members to serve as mentors and provide tours and sponsor education and training events on their farms.
- Provide practical and local resources for producers who are interested in beginning to implement soil health practices
- Leverage and extend the influence and the work of UNL, NRCS and NRD education programs
- Participate and Inform the NE NRCS Soil Health Producer Advisory Board and the Local Working Groups of the NRD/NRCS regions to collaborate and deepen soil health understanding with technical service providers.

Goal 3: Develop the Next Generation of Soil Health Practitioners

Rationale

Whereas the first two goals focus on the existing soil health producers and technicians, we wanted to also look to the next generation of soil health practitioners as well. We feel that it is imperative to build the training systems and the educational frameworks to encourage, recruit and train young people who are interested in careers in soil health. Additionally we want to expose all young people to the benefits of soil health to prepare the next generation of consumers to be soil health savvy. We need to facilitate the development of the next generation of farmers, ranchers, technicians, conservationists, educators, entrepreneurs, agronomists, agribusiness workers and leaders to ensure a productive and sustainable future for Nebraska.

Throughout our input-listening sessions the entities and organizations (ie., NE Coop Council and NRDs) indicated it was extremely difficult to find qualified employees with backgrounds and/or experience with soil health. This shortage of workers is magnified with the increased need to find qualified people for open positions. Couple this with the increasing average age of the Nebraskan farmer/rancher (56.4 years old) and there is a looming workforce crisis that needs to be addressed.[29]

[29] The USDA National Agricultural Statistics Service 2017 Census of Agriculture reports the average age of farmers has increased from 58.3 in 2012 to 59.4 in 2017. In Nebraska, it was 55.7 in 2012 vs. 56.4 in 2017.
https://www.nass.usda.gov/Publications/Highlights/2019/2017Census_Farm_Producers.pdf

Activities and Outcomes

- Develop programs with FFA, 4-H and other K-12 programs to nurture relationships with producer learning community members to teach soil health principles and share agricultural experiences.
- Collaborate with UNL, Community Colleges and other Post-secondary educational systems to establish soil health scholarships, internships, and job placement to support students as they progress through high school and post secondary education.
- Facilitate post high school soil health internships between graduates and agribusinesses, NRCS, UNL, NRD's, Vocational Agriculture instructors and other organizational stakeholders within the soil health realm

An example of what we need more of is a project recently completed at the Lewis and Clark NRD. It is a pilot project with UNL, NE Game and Parks, NRCS, Bazille Water Management Project, local Coops and Agronomists, producers and students from Dr. Andrea Basche's Ag Business 405, the senior capstone course on integrated farm management. Over the course of the semester, students met and interviewed five producers. They analyzed soil tests, yield maps, marketing and livestock. Their challenge was to make three recommendations for areas that the producer wanted to address as well as challenges that were identified by the students. By establishing a real-world soil health experience for future producers, agronomists, teachers and conservationists, we can give them a head start into their careers.

- Support young producers through Beginning Farmer-Rancher soil health incentive programs and mentoring programs.
- Assist in the transition of land stewardship for retiring farmers to young soil health producers.
- Develop capacity with UNL Extension, NRCS Support, NRD staff and other core agricultural community networks to support rural communities in building leadership and resiliency.
- Develop and deliver annual "Soil Health Educator Boot Camps" for all interested K-12 educators and trainers.
- Develop training sessions for ag bankers, ag insurance, farm management companies, etc., on soil health and involve the RPGs as a lab-based approach over multiple years.
- Utilize digital and social media platforms to tell positive soil health stories to all audiences but specifically young people….
- Encourage programs like UNL's Engler Agribusiness Entrepreneurship Program to spend sufficient time focusing on soil health related facets of agriculture.

Goal 4: Recruit $50,000,000 In Additional Soil Health Funding And Incentives over the next 10 years.

Rationale

The HSTF believes it is far better to incentivise farmers and ranchers to adopt healthy soil management practices rather than to regulate them into it. Incentives can be an effective way to encourage producers to try new things, but wide spread incentive programs require large scale funding. NRCS programs like EQIP and CSP are effective, but limited with less than 8% of all cover crop plantings in Nebraska being program funded. Additional incentives beyond these existing programs are needed to advance soil health in Nebraska. One of the priorities of the new established Soil Hub will be to research and recruit additional incentive funding sources for producers.

The Hub can also assist and support other entities across the state in submitting soil health grant and program applications. The objective is to get the vast majority of the money to the producers to encourage soil health practice adoption. The goal of recruiting $50,000,000 of soil health incentive money and getting 90% of it directly to the producers is big but doable as there are a number of sources to draw from. The additional 10% would be needed for program administration for various grants and programs across all entities who are working in the soil health space.

Grants: There are many Soil Health grant opportunities worth hundreds of millions of dollars available today. The Soil Hub will be a coordinating body and will both write grants and coordinate and assist in writing with other entities. Some of the larger possibilities are:

- Conservation Innovation Grants (CIG) are a USDA Farm Bill provision that directs $25 million for on-farm trials, including soil health demonstration trials.

- Regional Conservation Partnership Program (RCPP) promotes coordination of NRCS conservation activities with partners that offer value-added contributions to expand the collective ability to address on-farm, watershed, and regional natural resource concerns.

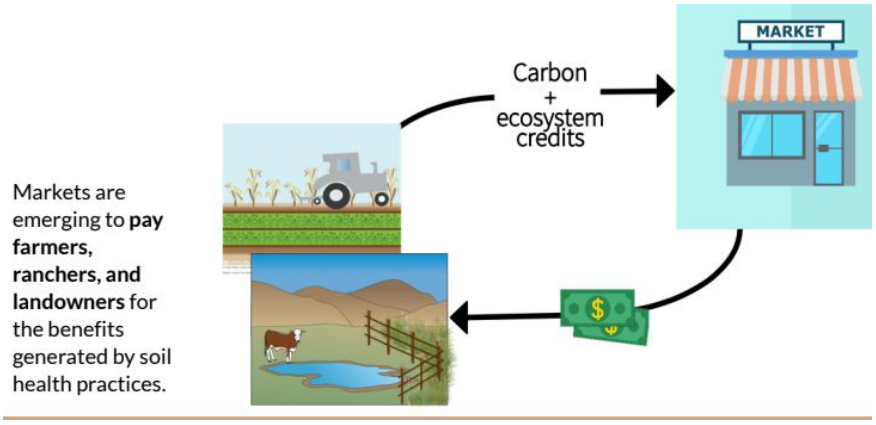
- 319 Grants are federal grants for non-source point water pollution mitigation projects. More than $150 million per year have been awarded over the last 30 years.

- Nebraska Environmental Trust (NET) was established in 1992 to conserve, enhance and restore the natural environments of Nebraska and has awarded more than $300 million in grants. Soil Health practices directly address 3 of the 5 funding categories and well written and coordinated grants administered by a Soil Hub should have an excellent chance of being funded.

- Sustainable Agriculture Research and Education (SARE) grants. Since 1988, SARE has invested $6.1 million and funded 1,670 projects in Nebraska to advance agricultural innovation that promotes profitability, stewardship of the land, air and water, and quality of life for farmers, ranchers and their communities. We believe that with assistance and encouragement from a Soil Health Hub, Nebraska farmers and ranchers could get even more projects funded.

- Private Foundations who are supportive of conservation projects.
- The Water Sustainability Fund is a source of financial support to help local project sponsors achieve the goals set out in Neb. Rev. Stat. § 2-1506 and is administered by the Nebraska Natural Resources Commission.

Environmental Incentive Programs: Trillions of dollars have been pledged by corporations who are serious about reducing their carbon footprint (see Appendix E for a listing) One of the most effective ways for a company to reduce their carbon footprint is to work with farmers to sequester carbon into their soils and thus offset their own emissions. Soil health practices have the potential to return the carbon dioxide in our atmosphere to the "magic number" of 350 parts per million, while feeding people, building more fertile soils, and contributing to ecosystem health.[30]



While carbon markets have been explored in the past, new concerns have driven interest to new heights over the last five years. In response to growing public awareness of the value of soil carbon and its impact on the environment, various market-based incentive structures, or ecosystem services carbon markets are emerging to pay farmers, ranchers and landowners for adopting soil health practices. Producers get paid when they manage their systems in a way that allows plants to capture and store more atmospheric carbon then what the system uses and generates.

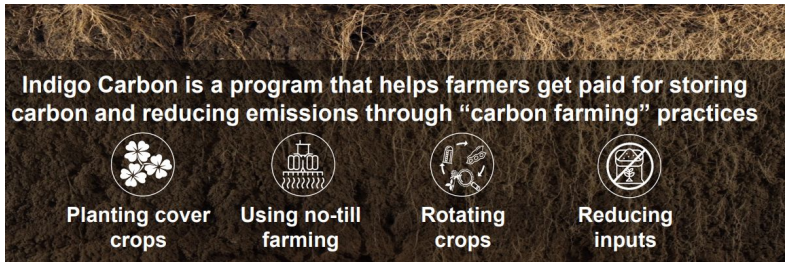
There are currently 19 multinational, national, regional and local emissions trading systems that are operating or being considered around the world, but four of them have the most promise for Nebraska producers.

1. **Nori:** Launched in 2019, Nori's goal is to create a new way for anyone in the world to pay to remove excess carbon dioxide from the atmosphere. The company does so by connecting buyers and suppliers in the world's first carbon removal marketplace. The first methodology on Nori's platform is regenerative agriculture and soil health.

2. **Indigo Carbon:** Indigo Ag launched The Terraton Initiative in 2019. This is an effort to use agricultural soil to sequester 1 trillion tons (1 terraton) of carbon dioxide. The plan aims to pay farmers in this program $15 to $20 per ton of carbon that they sequester using practices like diverse crop rotation, input reduction, no-till, cover crops and managed grazing. Payments

30 Toensmeier, Eric, and Hans Rudolf Herren. *The Carbon Farming Solution: a Global Toolkit of Perennial Crops and Regenerative Agriculture Practices for Climate Change Mitigation and Food Security*. Chelsea Green Publishing, 2016.

could tally an estimated $15 to $45 per acre. Initial interest in this program has exceeded 17 million acres in the first 6 months.



3. **Bayer Carbon**
   In 2020, Bayer will start rewarding farmers in Brazil and the U.S. for generating carbon credits by adopting climate-smart practices – such as no-till farming and the use of cover crops – designed to help agriculture reduce its carbon footprint. Bayer's Carbon recognizes the pivotal role growers and their land can play in helping to create lasting, positive environmental impacts. Incentivizing farmers to embrace no-till, precision nitrogen use or cover crops helps further sequester carbon into the soil, reduce fossil fuel usage and reduce greenhouse gases. Farmers participating in the Bayer Carbon Initiative will have the opportunity to be rewarded for their best farm management practices and other sustainability efforts.

4. **Ecosystem Service Market Consortium (ESMC)**
   The consortium is made up of more than 40 major agribusinesses and agricultural trade associations and the Foundation for Food and Agriculture Research (FFAR). $20.6 million is being invested for both research and development of environmental markets for farmers and the ESMC should be on-line for farmer participation sometime in 2022.

Corporate Partnerships

In addition to large corporations investing in soil health through the Environmental Incentive Programs, there are additional opportunities for direct funding to producers through corporate partnerships. Examples of programs that are currently underway include:

- In October 2020, The Upper Big Blue and Central Platte NRD's announced that they were partnering with Nebraska NRCS and The Nature Conservancy on a soil health initiative called Resilient Futures for Nebraska Soil. The goal of the program is to improve soil health in the Central Platte Valley on 100,000 acres of Nebraska cropland over the next five years. The funding will provide $4.4 million for technical and financial assistance for producers who have the option of receiving assistance to implement cover cropping, reduced tillage, and diversified crop rotations. Payments will vary from $15 to $40 per acre depending on the type of soil health practice implemented. An exciting component to this partnership is the access it will provide producers to the newly created Ecosystem Services Market Consortium. This carbon marketplace will connect companies looking to shrink their carbon footprint with producers who are implementing soil health practices that capture carbon. Payments in this project will not be tied to carbon storage but will be guaranteed by acre. This will give producers a low-risk way to explore carbon marketplaces. Participating companies will include Cargill, Target, and McDonald's.

- In 2020, Practical Farmers of Iowa partnered with Cargill and Pepsico to pay Iowa farmers $40 per acre to give low carbon corn farming a try.

- A similar program with ADM and Unilever will pay qualified Iowa farmers $40 per acre to implement a sustainable soybean program.

- No-till on the Plains and Country Crock®, launched a three-year program to support farmers with soil health education and cost-share to plant cover crops to improve soil health on fields to cover 13,000 acres in the first year alone in eastern Kansas and western Missouri on soybean fields that have not been previously planted with a cover crop.

- The Midwest Row Crop Collaborative consists of companies such as Kellogg's, Walmart, McDonalds, PepsiCo, The Nature Conservancy and others. Their mission is to test and demonstrate solutions for removing barriers to adoption of good farming practices that can viably benefit the environment, using science-based approaches for systems change. HSTF members have met with Collaborative representatives and they would be very interested in working with and funding projects for Nebraska producers who want to increase their soil health practices. The Collaborative also indicated that having a statewide coordinating body like the Nebraska Healthy Soils Hub would be a great benefit to attracting corporate investment into soil health programs in the state.

- The Soil Health Partnership is a joint effort of National Corn Growers, Bayer, The Nature Conservancy, National Wheat Foundation and the Environmental Defense Fund. This partnership funds and supports soil health at the field level by providing education, testing and financial support directly to farmers in the program. A number of Nebraska farmers are already a part of this program and that number could be expanded.

- General Mills has publicly committed to advancing regenerative agriculture practices on 1,000,000 acres by 2030. To that end they have invested $5.5 million and launched pilot programs in North Dakota, Kansas and Michigan to provide farmers with the tools, training and testing to advance soil health practices on their farms.

The HSTF believes that these corporately funded partnerships will continue to grow and expand and provide significant amounts of funding for Nebraska producers to adopt and implement soil health practices.

Programs and Provisions from the 2018 Farm Bill:
Title II of the 2018 Farm Bill provides assistance to agricultural producers and landowners to adopt conservation activities on agricultural and forest lands to protect and improve water quality and quantity, soil health, wildlife habitat, and air quality. A number of programs exist to incentivize soil health for Nebraska producers including CRP, CSP, and EQIP. While there will be billions of dollars invested in these programs, applying for them and implementing them can sometimes be difficult. The Soil Hub and the PLC can assist producers to navigate these programs and make the best decisions for their operations. See Appendix F for additional Provisions of the Federal Agriculture Improvement Act of 2018, Public Law 115-334.

Goal 5: Establish Nebraska Soil Health Measurements and Benchmarks

Rationale
From the inception of the HSTF, we identified the lack of widely accepted, consistent soil health measurements and consequently there is no benchmark for the current state of soil health in Nebraska. In order to communicate the status of our soil's health and the actions we are taking to improve it, we need to measure the continuous improvement of a soil's health by tracking change and documenting the management system at the field level.

The HSTF is recommending the formation of a Soil Health Measurements and Benchmarks (SHMB) committee that will be tasked with establishing a standard set of soil health measurements for Nebraska and determining the current benchmark levels of soil health in our state. Implementation steps for this are outlined in the implementation section.

Prescribing specific remedies and tracking success is difficult due to the different natural conditions and the levels of adoption and intensity of current management. It is also unknown, at times, how to determine the most effective management changes. The HSTF supports further efforts to calibrate soil health monitoring allowing the documentation of change to be publicized and recognizing how changes in management improve soil health.

Outcomes
There are three major objectives for this goal

1. To establish standardized soil health measurements and protocols for Nebraska.

   To accomplish this objective, the SHMB will evaluate existing tools and protocols in use or in development and determine which ones are most effective and appropriate for Nebraska. These examples include but are not limited to:

   - Current soil health measurement standards that are currently being used by NRCS, UNL and the NRD's.
   - The Soil Health Gap theory developed by Bijesh Maharjan, Soil Scientist, Panhandle. This innovative concept measures a gap between the functionality of the soil when it was in prairie to its present condition. This system allows for each field to be compared to its natural best and not the best soils in other geographic or ecological regions.
   - The North American Project to Evaluate Soil Health Measurements which is the result of a $9.4 million grant from the Foundation for Food and Agriculture Research to the Soil Health Institute, the Soil Health Partnership and The Nature Conservancy. The project convened a "blue ribbon panel" of experts from the USDA, several universities, and the private sector to develop consensus on how 30 different soil health indicators should be measured.[31]

[31] https://soilhealthinstitute.org/north-american-project-to-evaluate-soil-health-measurements/

- Resources and standards developed and used by the NRCS National Soil Survey Center.
- Tests and measurements being used by soil labs in Nebraska, including the Haney test and the PLFA test.
- Soil health evaluation tools like Land O Lakes Truterra, COMET Farm, Cornell CASH test, Indigo Ag Insight Tool

2. Using the measurement tools and protocols, establish a soil health benchmark for Nebraska.
    - Quantify the acres of adoption and resultant successful improvement in natural resources.
    - Develop a benchmark map of soil health in Nebraska with maps of the critical soil properties.
    - Conduct county level Natural Resources Management Surveys which involve remote sensing tools. A timeline will be developed for periodic assessments by region.
3. Develop a suite of Nebraska Soil Health Management Monitoring Tools that bring together the best and most practical key performance indicators (KPI's) of a soil to measure the effectiveness of the management system being used.
    - Identify ways to develop and implement rapid assessment tools for land managers to use to identify and monitor their soil's health.
    - Develop a protocol to monitor the adoption of management techniques that improve the health of Nebraska's Soils.
    - Evaluate and adopt a land management assessment tool for Nebraska that incorporates public and private sector efforts, such as the S.T.A.R. assessment tool[32] that is being used by other nearby states. Using a tool like S.T.A.R. as a starting point is effective and reduces re-inventing procedures.
    - Utilize the RPG sites to develop Ecological Site Description Reference Sites that will function as 'field validation' to determine what changes are possible and how to achieve them. These will allow site specific 'Soil Health Gaps' to be determined.
    - Develop a Nebraska Rapid Assessment of Soil Health digital tool that will supplement a management questionnaire. Visual sensing of soil color has shown promise as a rapid assessment tool elsewhere in the US. Correlations between Nebraska soils soil property data and soil color predominantly soil organic matter need to be validated.

[32] https://ilsustainableag.org/programs/five-star/

Outcomes and Evaluation

If the proceeding 5 goals are accomplished the HSTF believes that Nebraska will be the national leader in soil health awareness and adoption and we will become a model for other states to follow. To judge the effectiveness and success of this Initiative we suggest the following outcomes as a way to evaluate success. It is beyond the scope of the SHTF to establish specific metric goals since one of our recommendations is to establish the appropriate benchmarks and indicators. Our long term goals are to decrease the 'soil health gap' in soils that have a significant separation between the reasonably achievable soil condition and the present condition. Put more positively, all Nebraska soil resources will be managed and maintained to be at the highest level, for their resource, as reasonably possible. An indirect result will be reduced leaking of contaminants to the groundwater, and improved surface water quality.

Measurable goals are defined by the five specific goals outlined above. By 2025 the Soil Health Hub should be functioning and working with an active network of proving grounds, and producer learning groups. One or more Nebraska higher education entities should take on the challenge to create an academic path to producing future leaders and practitioners in soil health areas. Metrics and benchmarks will be developed and agreed upon by the agricultural community, and periodic statewide reports on the current status of Nebraska soils will be published.

Implementation and Timeline

Sadly, at times action plans are developed, placed on a shelf, and never acted upon. Therefore an implementation plan and timeline is a critical step to enact the Initiative and goals. We feel the best approach is to have the implementation process be driven by those who are passionate, dedicated and invested to see healthy soil management practices adopted throughout the state.

December 2020

- *Initiate the Benchmark and Metrics Technical Committee*
  The Task Force will appoint at least three members to coordinate a Nebraska Soil Health Benchmarks and Measurements technical committee to commence work on this goal. This committee would be open to individuals who are interested and passionate about the topic.

- *Initiate the Nebraska Soil Hub Formation Committee*
  The Task Force will appoint at least three members to coordinate a Hub formation meeting to be held prior to February 1st. This committee will be responsible for contacting stakeholders, scheduling the meeting and providing frameworks for beginning the process of forming a Nebraska Soil Hub.

2021

- ***Institutional Recognition***
  Introduce a Resolution in the Nebraska Legislature to accept the HSTF report and recommendations on behalf of the Agriculture Committee to support a grassroots effort to implement the goals of this Initiative.

- ***Hub Formation Steps***
  The following have been identified as potentially needed steps to form the Hub but the implementation of these steps would be the responsibility of the Implementation Team and they can be modified as deemed necessary and best.

  - A Nebraska Soil Health Hub Formation Summit meeting for all interested parties will be scheduled, advertised and held prior to Feb 1. Hub formation committee solicits support and interest from potential participants
  - At the Summit meeting, a Hub Implementation Team will be formed that includes an emphasis on producers and representation from NRCS, UNL, NRD's as well as representation from a cross section of other soil health stakeholders. Ex officio representatives could be invited from the NDA, and the Chair of the Agricultural Committee or their designee and the Chair of the Natural Resources Committee or their designee. The team can solicit input and expertise from other individuals and resources as needed.
  - Identify an existing legal entity to serve as a pass-through administrator for the Nebraska Healthy Soils Initiative until a Hub legal entity can be formed. This entity would receive and disburse funds at the direction of the implementation team.
  - Initial funding partners will be sought to launch the Hub implementation process.
  - Hire a Temporary Implementation Director for a term of no more than 12 months.
  - Implementation team begins initial planning for the Hub.
  - Fundraising campaign led by Implementation Director to permanently fund the Hub.
  - Implementation team appoints willing stakeholders to serve on the initial Hub Board of Directors that would include producers as well as NRCS, UNL, and NRD's.
  - An organizational meeting of the Board of Directors is held and officers are selected. The Implementation Team is phased out.
  - Board finalizes By-laws and files for 501(c)(3) tax-exempt status
  - Staff positions are identified, job descriptions are written, and advertising/ recruitment begins for inaugural Executive Director/Initiative Coordinator.
  - Advisory Committee is identified and meets with the Board.
  - Hire Executive Director/Initiative Coordinator.

Appendix A: Existing Soil Health Work in Nebraska

UNL and UNL EXTENSTION:

- ENREC Midwest Soil Health Clinic
- ENREC Soil Health-Cover Crop Conference
- Cover crop tailgates
- Cattle and cover crops research by Mary Drewnoski
- Agronomy/Horticulture research into cover crops and soil health
- Paul Jasa and the Rogers Farm - notill and cover crop research
- Water & Soil Resource Management Team
- The Soil Health Nexus – North Central Region

NRCS

- NRCS State Soil Health Specialist, Aaron Hird
- 17 Soil Health Demonstration Projects located across the state
- Rainfall Simulators, Soil Tunnels and Earthworm Tunnel Kits.
- Soil Profile Cards for outreach to kids
- Soil Monoliths of working lands
- Soil Health Test Bucket for Educators
- Nebraska NRCS Soil Health Assessment Protocol
- Soil health demonstration projects throughout the state
- Unlock the Secrets in the Soil Campaign and Info Graphics
- The Science of Soil Health Video Series
- The Profiles of Soil Health Video Series
- Micro Mini Soil Health Coloring Book Campaign
- Keep the Stubble – NoTill November Campaign

NRD's

- Soil health programs and projects such as Project GROW, Project SENSE, etc..
- Groundwater quality and quantity projects
- Cover crop cost share in some areas

NGO's

- Soil Health Partnership - Nebraska Corn Board
- National Association of Conservation Districts Soil Health Champions
- The Nature Conservancy soil health related projects
- Pheasants Forever and Ducks Unlimited soil health programs
- Soil and Water Conservation Society chapter and programs
- Midwest COver Crop COuncil
- Howard G. Buffet Foundation soil health promotions
- Nebraska Environmental Trust emphasis on soil health projects
- SARE grants for farmers working in soil health

Agribusiness

- Soil health related programs from companies such as Ward Labs, Arrow Seed, Green Cover Seed
- Soil health programs and education from various Cooperatives across the state

Appendix B: Input Session Participants

Throughout October-November, 2020, approximately 25 input “Input-Listening Sessions” were completed. Note, some sessions included overlapping groups. The Virus restricted us to holding one-hour, Zoom sessions. The participants were identified as organizations that directly tied to the areas of LB 243 and whom had an interest in the HSTF work. The groups were asked to provide feedback on four areas: the goals, the action steps, any gaps and the slogan. Their feedback and themes guided many areas of the Task Force Report including: economics (mentioned as a priority in every session), coordination of state soil health activities, identifying the key soil health indicators, having a “go to” site for soil health and leveraging funding private and grant money on a bigger-scale and adapting incentives to support the heightened risk in the change of production systems among other invaluable points.

Groups (30)

Cargill	Center for Rural Affairs	Farm Credit Services
General Mills	Midwest Row Crop Collaborative	Nebraska and National Izaak Walton League
Nebraska Bankers Association	Nebraska Cattlemen Association	Nebraska Corn Board
Nebraska EPA	Nebraska Farm Bureau	Nebraska Farmers Union
Nebraska Game and Parks Association	Nebraska Grazing Land Coalition	Nebraska NRCS
Nebraska Association of Resources Districts	Nebraska Natural Resources Commission (twice)	Nebraska Natural Resource Districts (NRDS), twice with the State Manager’s group; and various NRDs
Nebraska Regenerative and Common Ground	Nebraska Soybean Board	Nebraska Sustainable Agriculture Society
Nebraska Wheat Board	The Nature’s Conservancy	Nebraska Dept. of Environment and Energy
UNL Water and the Daugherty Institute	UNL Ag. Economics	UNL Agronomy and Horticulture Dept.
UNL Extension	UNL Precision Ag., Wildlife and Conservation	The Sandhills Task Force

Appendix C: Cover Crop Economics: Opportunities to Improve Your Bottom Line in Row Crops

https://www.sare.org/wp-content/uploads/Cover-Crop-Economics.pdf

TABLE 4. Impact of cover crops on costs, returns and net profit for corn following one, three and five years of cover crop use and with various management scenarios

BUDGET ITEM	YEARS OF COVER CROPPING		
All figures are per acre	One	Three	Five
Estimated input savings when using cover crops			
Fertilizer[1]	$0	$14.10	$21.90
Weed control[2]	$0–$15	$10–$25	$10–$25
Erosion repair[3]	$2–$4	$2–$4	$2–$4
Subtotal	**$2–$19**	**$26.10–$43.10**	**$33.90–$50.90**
a. Savings on inputs (the low end of the subtotal range from above)	$2	$26.10	$33.90
b. Income from extra yield in normal weather year (survey data)[4]	$3.64	$12.32	$21
c. Cost of seed and seeding (survey data)[5]	$37	$37	$37
Net return in a normal weather year (a + b - c)	**-$31.36**	**$1.42**	**$17.90**
Special situations where cover crops can pay off faster			
I. When facing severe herbicide-resistant weeds[6]	$27	$27	$27
Adjusted net return	**-$4.36**	**$28.42**	**$44.90**
II. Potential grazing income[7]	$49.23	$49.23	$49.23
Adjusted net return	**$17.87**	**$50.65**	**$67.13**
III. Compaction addressed by cover crops[8]	$15.30	$15.30	$15.30
Adjusted net return	**-$16.06**	**$16.72**	**$33.20**
IV. Assisting the conversion to no-till from conventional[9]	$23.96	$23.96	$23.96
Adjusted net return	**-$7.40**	**$25.38**	**$41.86**
V. Income from extra yield in a drought year (survey data)[10]	$58.70	$75.73	$92.55
Adjusted net return	**$27.34**	**$77.15**	**$110.45**
VI. Extra fertilizer savings from improved fertility[11]	$15.20	$15.20	$15.20
Adjusted net return	**-$16.16**	**$16.62**	**$33.10**
VII. Federal or state incentive payments received[12]	$50	$50	$50
Adjusted net return	**$18.64**	**$51.42**	**$67.90**

1 Assumes no fertilizer savings in year one, then a savings of 15 pounds of nitrogen per acre in year three and 30 pounds per acre in year five, at $0.38 per pound. Also assumes a phosphorus saving of 20 pounds per acre in year three and 25 pounds per acre in year five, at $0.42 per pound.

2 The first year assumes a reduction of one herbicide pass if sufficient cover crop biomass is achieved. Savings are higher in later years due to reducing by two passes or by using less-expensive herbicide products.

3 Based on the cost of machinery operations and labor to repair gullies and clean ditches (assumes average cost, but fields will vary).

4 Assumes a corn price of $3.50 per bushel and a 200-bushel yield times the percent yield increases shown in Table 2.

5 Costs for seed, seeding and termination can vary from a low of about $10 to over $50 per acre; most farms estimated to be $25–$40 per acre.

6 In a field with a severe herbicide-resistant weed infestation, this figure assumes that a thick-biomass cover crop will reduce herbicide and labor costs and will reduce dockage for weed seed at harvest.

7 Assumes that grazing a cover crop (cereal rye in this example) results in a reduction of 1,093 pounds of hay fed per acre of cover crops. This is based on 1,500 pounds per acre of dry matter generated by rye, then reduced effective use of the rye by 50% due to hoof action and selective grazing. Assumes average feedlot waste of 22% for hay fed (88% dry matter). The hay is valued at $80 per ton. Additional savings of approximately $5.50 per acre generated due to lower labor, fuel and machinery depreciation from reduced hay fed. Assumes grazer already has water access for their grazing area and an electric fencing system.

8 This is based on a University of Minnesota machinery cost estimate for subsoiling at $15.30 per acre (2017 data used for machinery costs).

9 No-till savings versus conventional: No fall chisel plow ($11.22 per acre) and savings on two field cultivator passes in the spring (2 x $6.37 per acre).

10 Assumes a corn price in drought of $6.89 per bushel and reduced base yield of 142 bushels per acre x percent yield increase for drought. Numbers are based on actual national average corn yield for 2012 and national average corn price in the 2012–13 marketing year (USDA-NASS).

11 Assumes using legumes as a cover crop and that overall improved soil health allow nitrogen to be cut by an extra 40 pounds per acre over basic fertilizer savings.

12 The basic NRCS EQIP rate in the majority of Corn Belt states starts at $50 per acre or higher; some states have lower rates.

TABLE 5. Impact of cover crops on costs, returns and net profit for soybeans following one, three, and five years of cover crop use and with various management scenarios

BUDGET ITEM	YEARS OF COVER CROPPING		
All figures are per acre	One	Three	Five
Estimated input savings when using cover crops			
Fertilizer[1]	$0	$6.30	$8.40
Weed control[2]	$0–$15	$10–$25	$10–$25
Erosion repair[3]	$2–$4	$2–$4	$2–$4
Subtotal	**$2-$19**	**$18.30-$35.30**	**$20.40-$37.40**
a. Savings on inputs (the low end of the range from above)	$2	$18.30	$20.40
b. Income from extra yield in normal weather year (survey data)[4]	$11.45	$19.12	$26.78
c. Cost of seed and seeding (survey data)[5]	$37	$37	$37
Net return in a normal weather year (a + b - c)	**-$23.55**	**$0.42**	**$10.18**
Special situations where cover crops can pay off faster			
I. When facing severe herbicide-resistant weeds[6]	$27	$27	$27
Adjusted net return	**$3.45**	**$27.42**	**$37.18**
II. Potential grazing income[7]	$49.23	$49.23	$49.23
Adjusted net return	**$25.68**	**$49.65**	**$59.41**
III. Compaction addressed by cover crops[8]	$15.30	$15.30	$15.30
Adjusted net return	**-$8.25**	**$15.72**	**$25.48**
IV. Assisting the conversion to no-till from conventional[9]	$23.96	$23.96	$23.96
Adjusted net return	**$0.41**	**$24.38**	**$34.14**
V. Income from extra yield in a drought year (survey data)[10]	$65.24	$69.80	$74.36
Adjusted net return	**$41.69**	**$70.22**	**$84.54**
VI. Extra fertilizer savings from improved fertility[11]	$7	$7	$7
Adjusted net return	**-$16.55**	**$7.42**	**$17.18**
VII. Federal or state incentive payments received[12]	$50	$50	$50
Adjusted net return	**$26.45**	**$50.42**	**$60.18**

1 Assumes no fertilizer savings in year one, then a savings of 15 pounds of phosphorus per acre in year three and 20 pounds per acre in year five, at $0.42 per pound.

2 The first year assumes either no herbicide savings or a possible saving of $15 per acre by avoiding a fall herbicide pass ($7.50 per acre for the chemical and $7.50 per acre for application). The third and fifth years assume using a less expensive residual chemistry that costs $10 per acre, with the possibility of saving $15 per acre in the fall.

3 Based on the cost of machinery operations and labor to repair gullies and clean ditches (assumes average cost, but fields will vary).

4 Assumes a soybean price of $9 per bushel and a 60-bushel yield times the percent yield increases shown in Table 2.

5 Costs for seed, seeding and termination can vary from a low of about $10 to over $50 per acre; most farms estimated to be $25–$40 per acre.

6 In a field with a severe herbicide-resistant weed infestation, this figure assumes that a thick-biomass cover crop will reduce herbicide and labor costs and will reduce dockage for weed seed at harvest.

7 Assumes that grazing a cover crop (cereal rye in this example) results in a reduction of 1,093 pounds of hay fed per acre of cover crops. This is based on 1,500 pounds per acre of dry matter generated by rye, then reduced effective use of the rye by 50% due to hoof action and selective grazing. Assumes average feedlot waste of 22% for hay fed (88% dry matter). The hay is valued at $80 per ton. Additional savings of approximately $5.50 per acre generated due to lower labor, fuel and machinery depreciation from reduced hay fed. Assumes grazer already has water access for their grazing area and an electric fencing system.

8 This is based on a University of Minnesota machinery cost estimate for subsoiling at $15.30 per acre (2017 data used for machinery costs).

9 No-till savings versus conventional: No fall chisel plow ($11.22 per acre) and savings on two field cultivator passes in the spring (2 x $6.37 per acre).

10 Assumes a soybean price in drought of $14.40 per bushel and reduced yield of 39.6 bushels per acre x percent yield increase for drought. Numbers are based on actual national average soybean yield for 2012 and national average price in the 2012-13 marketing year (USDA-NASS).

11 Assumes that overall improved soil health allows an additional reduction in phosphorus of 10 pounds per acre ($0.42 per pound) and 10 pounds per acre of potassium ($0.28 per pound) over basic fertilizer savings.

12 The basic NRCS EQIP rate in the majority of Corn Belt states starts at $50 per acre or higher; some states have lower rates.

Appendix D- Survey and Poll of NE Producers at State Soil Health Workshops, Spring 2020

Slido Poll and Survey Results of Producers and Agriculture-related roles (127) at State Soil Health Conferences--Mead, Hickman and Broken Bow, March, 2020

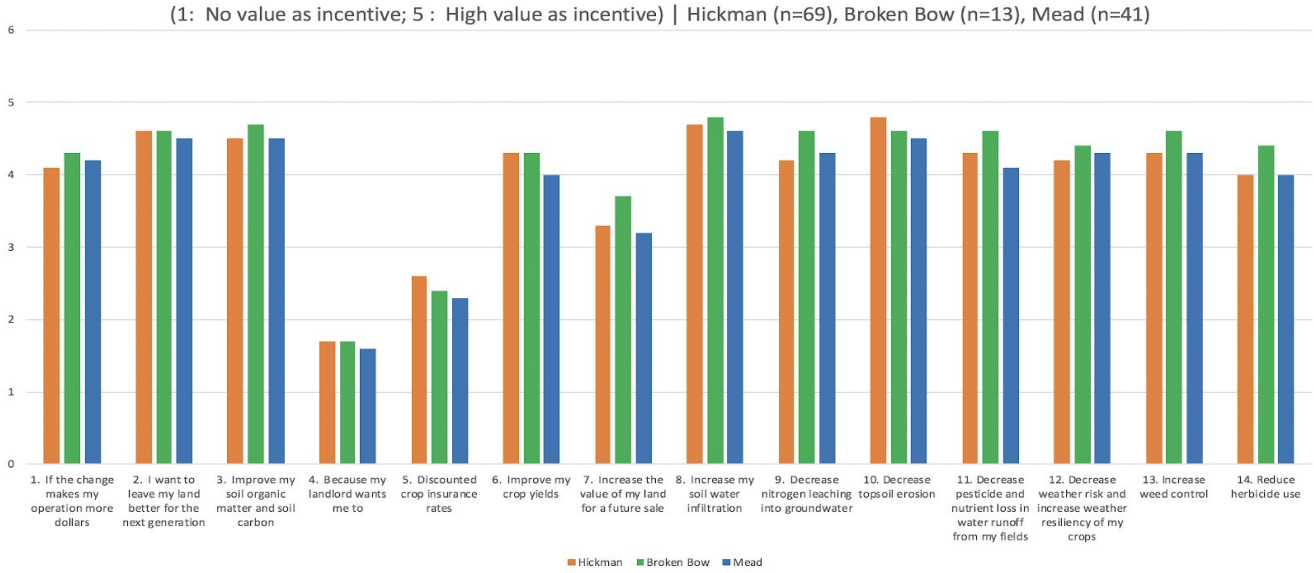
The producers identified soil erosion and increasing water infiltration as the top priorities/incentives (4.7 aver.). The top challenges were the lack of window to plant cover crops after harvest and the ability to integrate livestock (4.2 and 3.7 aver., respectively). The top factor to reduce the rate of N, P and K was the soil test and previous "N" credits (4.5 aver.). Note, the high average was listed.

Occupation	Hickman (n=70)	Broken Bow (n=14)	Mead (n=43)
Farmer/Producer	79%	71%	58%
Landowner (Not a Farmer)	9%	0%	7%
Crop Consultant/Adviser	7%	0%	19%
NRCS/UNL/Government	3%	21%	9%
Other	3%	7%	7%
Number of crop acres that you directly manage or influence--PRODUCERS ONLY	**Hickman (n=69)**	**Broken Bow (n=13)**	**Mead (n=37)**
zero acres	4%	23%	14%
1 - 199 acres	14%	15%	24%
200 - 999 acres	32%	15%	27%
1000 - 3,999 acres	41%	31%	19%
4,000 & greater total crop acres	9%	15%	16%
List the number of total acres that you advise."--- ADVISOR ONLY	**Hickman (n=30)**	**Broken Bow (n=8)**	**Mead (n=22)**
zero acres	27%	38%	14%
1 - 9,999 crop acres	60%	50%	36%
10,000 - 99,999 crop acres	13%	13%	32%
100,000 - 999,999 total crop acres	0%	0%	14%
1,000,000 total crop acres or more	0%	0%	5%

	Hickman	Broken Bow	Mead
Utilize livestock in their operation	**59%** (n=70)	**83%** (n=13)	**45%** (n=40)
Total acres that you advise that are seeding cover crops for soil health and/or livestock-- ADVISOR ONLY	Avg. Per Advisor (n=18) **950**	Avg. Per Advisor (n=5) **750**	Avg. Per Advisor (n=29) **1333**
The number of cover crop acres that I routinely plant is ____? -- PRODUCER ONLY	Avg. per producer (n=58) **209**	Avg. per producer (n=11) **54**	Avg. per producer (n=29) **231**

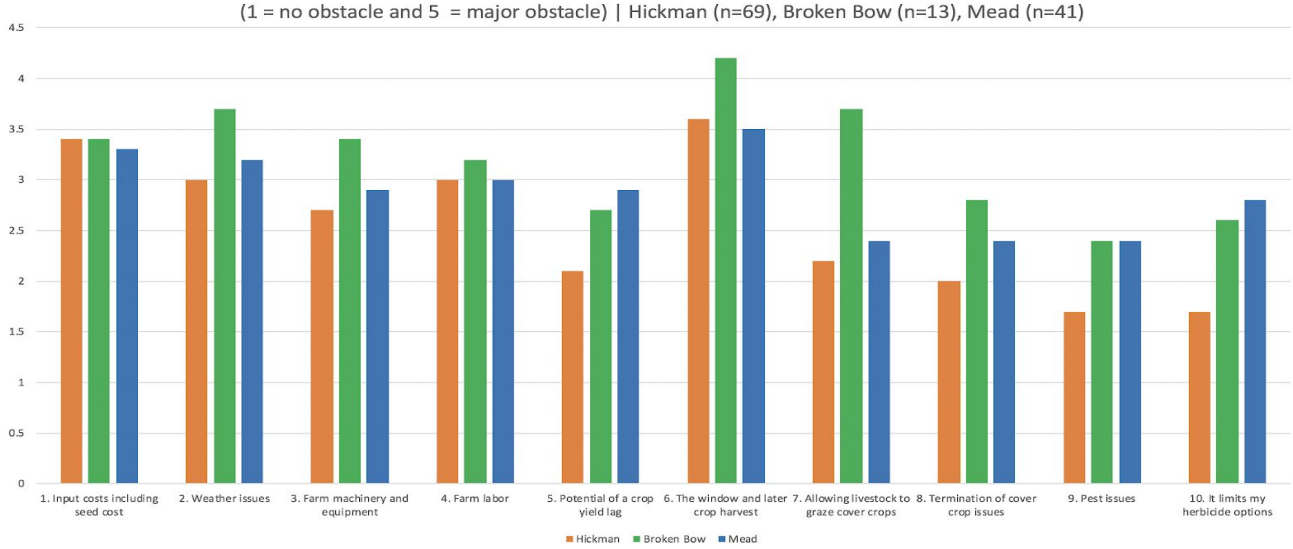
What incentives most drive you in making changes to improve soil health?

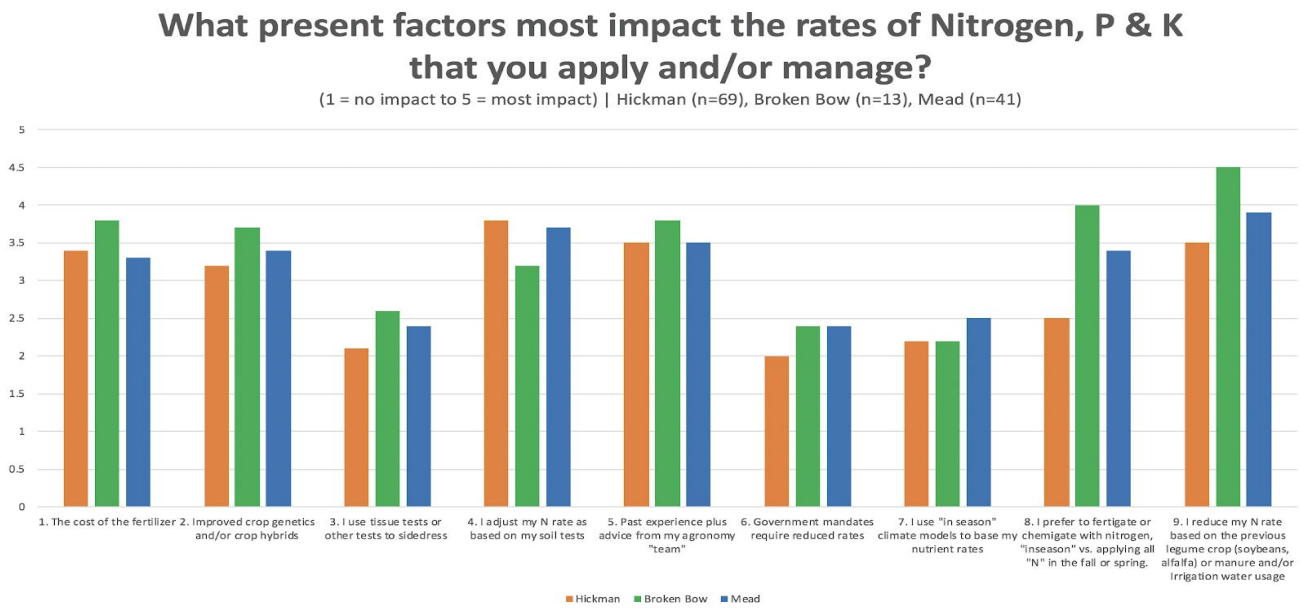
(1: No value as incentive; 5 : High value as incentive) | Hickman (n=69), Broken Bow (n=13), Mead (n=41)



As a Tenant or Landowner, rate the most pressing obstacles to increase cover crop use in your farming operation?

(1 = no obstacle and 5 = major obstacle) | Hickman (n=69), Broken Bow (n=13), Mead (n=41)





Credit Bijesh, Tyler W. and ?.

Soil Health Task Force 2020 Statewide Survey Report

There were total of 275 respondents to the survey of which 64% were producers (Table 1). Survey result highlights that not only agronomic and environmental interests drive the adaptation to improve soil health but also the stewardship to sustain soil resources for future generation (Figure 1). About 85% of respondents raise cover crops to certain extents (Figure 2). Seeding cost, labor issues, narrow window for main crop, yield lag in main crop were ranked high among hindrances to adopt cover crops (Figure 3). Detailed analyses of the survey will be presented through other publication by Bijesh Maharjan and Saurav Das at UNL.

Table 1. Number of participants with their primary occupation from different county, location, and geographical location of Nebraska.

	Eastern Nebraska					Central Nebraska	Western Nebraska
County	**Madison**	**York**	**Lancaster**	**Saunders**	**Lancaster**	**Custer**	**Morrill**
City/Town	**Norfolk**	**York**	**Hickman**	**Mead**	**Lincoln**	**Broken Bow**	**Bridgeport**
Producers	48	24	55	25	4	10	10
Landowner	1	0	6	3	3	0	0
Consultant/Advisor	5	7	5	8	0	0	5
UNL/NRCS/Agencies	14	10	2	4	7	3	5
Other	5	0	2	3	0	1	0
Total count	73	41	70	43	14	14	20

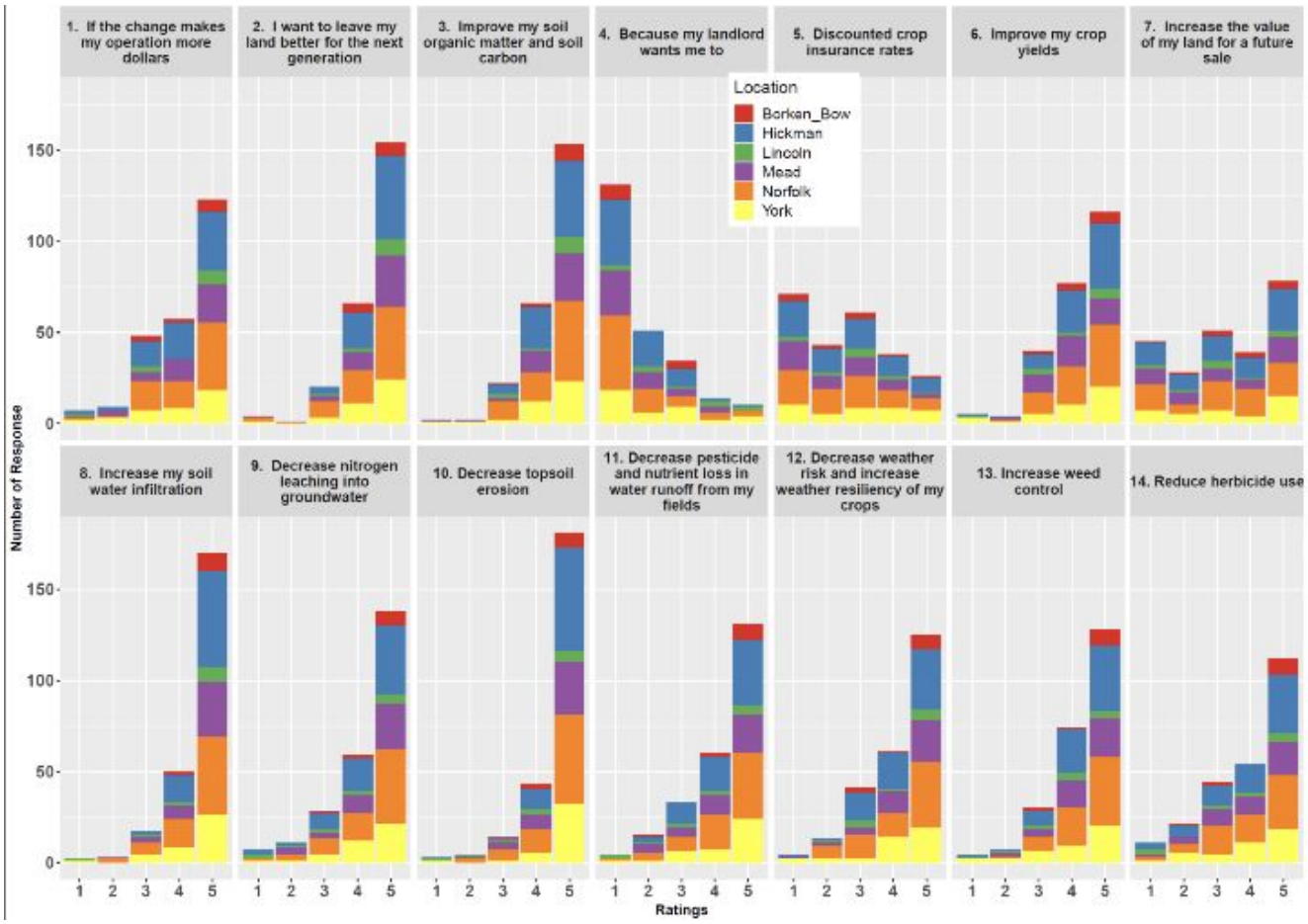
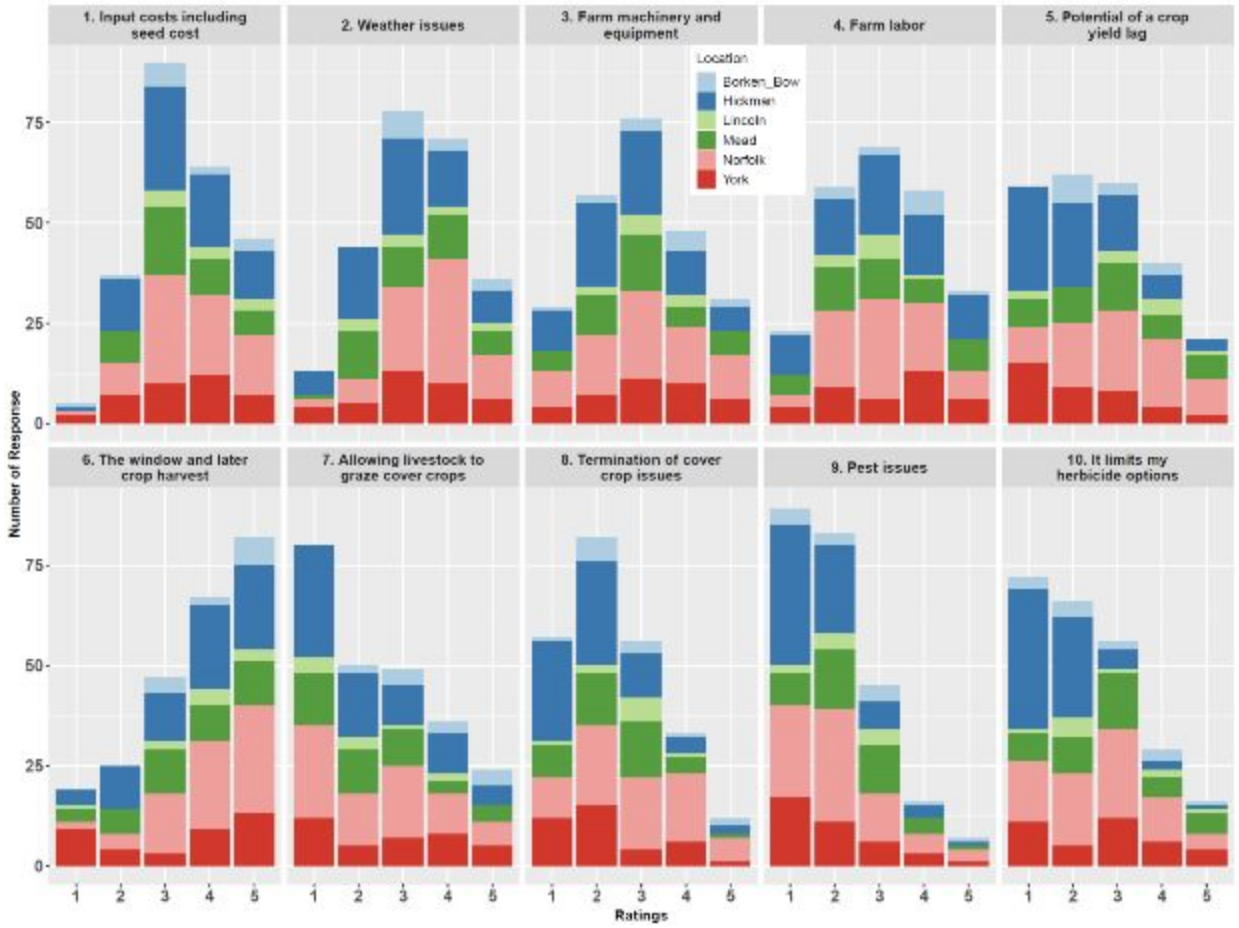


Fig.1. Incentives that drive changes to improve soil health. Ratings range 1-5 where 1 is no incentive and 5 is high incentive.

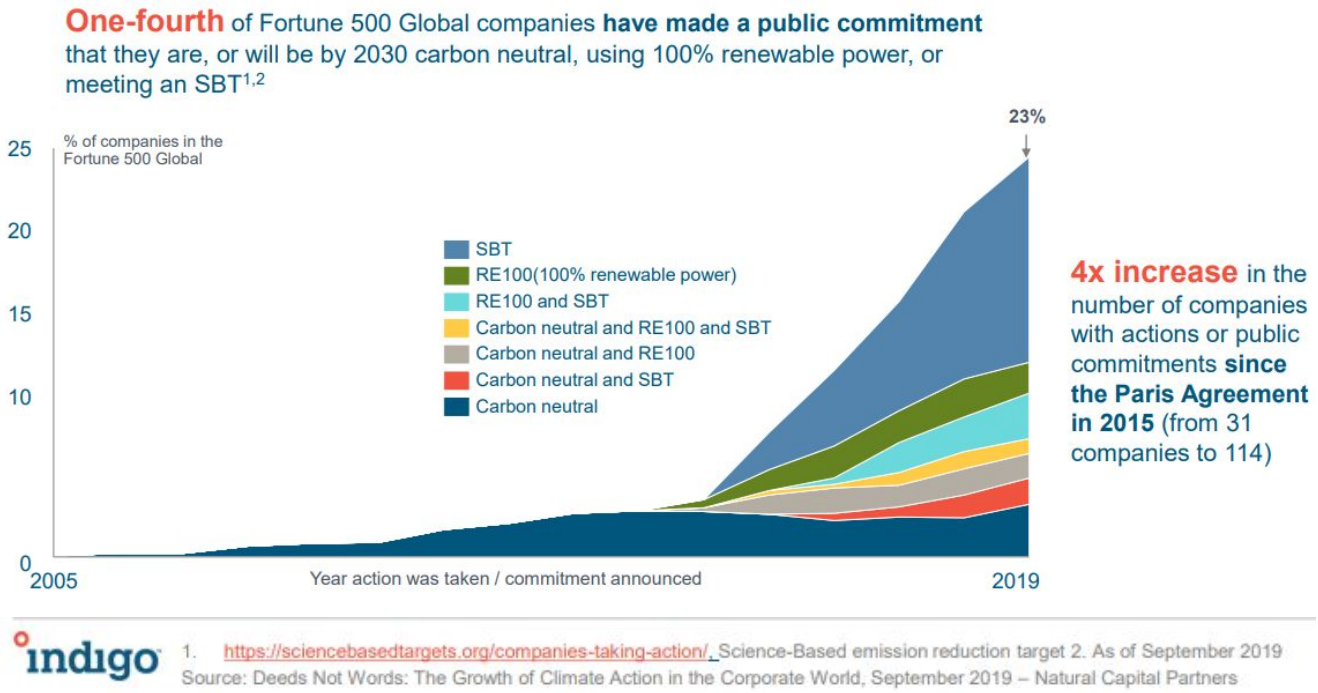
Fig.2. Cover crop coverage.


1. Input costs including seed cost
2. Weather issues
3. Farm machinery and equipment
4. Farm labor
5. Potential of a crop yield lag
6. The window and later crop harvest
7. Allowing livestock to graze cover crops
8. Termination of cover crop issues
9. Pest issues
10. It limits my herbicide options
Location
Borken_Bow
Hickman
Lincoln
Mead
Norfolk
York
Number of Response
0
25
50
75
1
2
3
4
5
Ratings

Appendix E: Corporate Pledge List Towards Carbon Offsets

These are just a few examples of corporations who have made Carbon Pledges….

- Microsoft: Be carbon negative by 2030; by 2050, remove all the carbon the company has ever emitted
- Amazon: Reach net carbon neutrality by 2040. Jeff Bezos commits $10 billion to a climate change fund
- Apple is committed making its products and supply chain carbon neutral by 2030.
- Delta: Commits $1 billion to become the first carbon neutral airline
- Jet Blue: Offset all carbon dioxide emissions from all domestic flights starting July 2020
- Lyft: Make all rides carbon neutral
- Lundin Petroleum: Be carbon neutral by 2030
- British Petroleum: Zero out all its carbon emissions by 2050
- Shell Oil: reduce the Net Carbon Footprint of its energy products by 20% by 2035 and 50% by 2050
- Verizon pledges to be carbon neutral by 2035
- Walmart: Zero emissions by 2040 and protect, manage or restore at least 50 million acres of land and one million square miles of ocean by 2030.
- Best Buy: Reduce carbon emissions in our operations by 75% (over 2009 baseline); carbon neutral by 2050



Appendix F: Provisions of the Federal Agriculture Improvement Act of 2018, Public Law 115-334

Title II of the 2018 Farm Bill provides assistance to agricultural producers and landowners to adopt conservation activities on agricultural and forest lands to protect and improve water quality and quantity, soil health, wildlife habitat, and air quality. Funding may be increased roughly 2% per year through 2023 and a number of programs exist to incentivize soil health for Nebraska producers. CRP, CSP, and EQUIP are all potential programs that Nebraska producers could qualify for.

Conservation Reserve Program (CRP)—Continues funding for payments to producers who maintain cropland, marginal pasture, or grassland in grass or tree cover for 10-15 years. The overall acreage cap is gradually increased from 24 million acres to 27 million acres in FY2023. Within the overall cap for FY2023, goals are established of 8.6 million acres for continuous signup and 2 million acres for grasslands. Land that was in CRP under a 15-year contract that expired in 2017 or 2018 is eligible for enrollment. A general signup is required each year. After each general signup, a ranking of grassland contract offers for enrollment is also required (grassland contract offers are accepted continuously).

The 2018 Act requires, to the maximum extent practicable, that 60 percent of acres available for CRP enrollment each year be allocated across States based on historical State enrollment rates. At least 40 percent of continuous enrollment is to be in water quality practices under the Clean Lakes, Estuaries, and Rivers (CLEAR) initiative to the maximum extent practicable. Expiring CRP contracts enrolled under CLEAR or other related water quality practices may also be enrolled in contracts of up to 30 years under a new CLEAR 30 Pilot Program. The Conservation Reserve Enhancement Program (CREP), which has been implemented administratively by USDA, is required by statute under the 2018 Act, which also includes a definition of eligible partner to include both state and nongovernmental partners.

The 2018 Act also sets upper limits on the county average soil rental rates used to set field-specific maximum annual payment rates and sets even tighter restrictions on maximum payment rates for re-enrollments. Incentive payments for continuous signup contracts continue; a payment of 32.5 percent of the first annual payment is required. $12 million is provided for a forest management incentive. Opportunities for routine harvesting, grazing, and other commercial activities on CRP land are expanded (with a reduction in annual payment).

The Soil Health and Income Protection Pilot Program (SHIPP) provides payments for farmers who establish grass cover on less productive cropland for a period of 3-5 years. The CRP Farmable Wetlands Program (FWP) is extended through 2023. The Transition Incentives Program (TIP), which supports the transition of land under expiring CRP contracts from contract holders to beginning or socially disadvantaged farmers, is continued with $50 million in funding. Under the 2018 Act, land can be transitioned from any contract holder (not just retired or retiring farmers).

Conservation Stewardship Program (CSP)—Continues financial assistance to producers who meet stewardship requirements on agricultural and forest lands. Under the 2014 Farm Act, CSP could enroll as many as 10 million new acres each year, at an average cost of $18 per acre. The 2018 Farm

Act replaces the acreage cap with a funding cap and provides mandatory funding of $700 million for FY2019, $725 million for FY2020, $750 million for FY2021, $800 million for FY2022, and $1 billion for FY2023. CSP funding was $1.32 billion in FY2018 (estimated) and, had the 2014 Act provision been extended, was projected to be roughly $1.75 billion per year, on average, for FY2019-FY2023 according to the Congressional Budget Office (CBO). CSP contracts will no longer be eligible for a one-time automatic renewal. Producers seeking contract renewals will be required to compete with others seeking new or renewed contracts. Cover crop payments are increased, and supplemental payments are authorized for advanced grazing management, as are payments for the development of comprehensive conservation plans. A new Grassland Conservation Initiative is established within the CSP to assist producers in protecting grasslands for grazing and wildlife.

Environmental Quality Incentives Program (EQIP)—Continues financial assistance to producers to install and maintain conservation practices on eligible agricultural and forest land. The 2018 Act mandates funding of $1.75 billion in FY2019, $1.75 billion in FY2020, $1.8 billion in FY2021, $1.85 billion in FY2022, and $2.025 billion in FY2023. EQIP funding was $1.76 billion in FY2018 (estimated) and, had the 2014 Act provision been extended, was projected to be roughly $1.75 billion per year for FY2019-FY2023, according to the CBO. The share of funding set-aside for livestock-related practices is reduced from 60 percent to 50 percent while the set-aside for wildlife habitat practices is increased from 5 percent to 10 percent.

The new legislation also: (1) provides for higher incentive payment rates (up to 90 percent of costs) for highly beneficial practices; (2) establishes Conservation Incentive Contracts that provide both annual and cost-sharing payment for 5-10 years to encourage adoption of practices with broad resource benefits (e.g., cover crops, transition to resource conserving crop rotations); (3) allows irrigation districts, irrigation association drainage districts, and acequias (a political subdivision of a State organized to manage irrigation ditches; acequias cannot impose taxes or levies) to participate in EQIP for water conservation or irrigation efficiency practices; and (4) requires $25 million in Conservation Innovation Grant funding to be used for on-farm trials, including a soil health demonstration trial.

Letters of Support for Soil Health for Nebraska Wealth Initiative