

2019 Annual Report of Accomplishments and Results

Nebraska

University of Nebraska-Lincoln

University of Nebraska Combined Research and Extension Annual Report

I. Report Overview

The NIFA reviewer will refer to the executive summary submitted in your Plan of Work. Use this space to provide updates to your state or institutions as needed.

1. Executive Summary (Optional)

The Institute of Agriculture and Natural Resources (IANR) is a part of the University of Nebraska-Lincoln and encompasses the three-part mission of teaching, research, and extension. Strategic planning is integral to IANR's function as a land-grant institution, and it prides itself on working as an integrated system and collaborative environment across the three mission areas. IANR strives to combine research, teaching and extension in a transdisciplinary, collaborative environment that encourages creativity and innovation from across the University and private enterprise to ensure Nebraska's competitiveness in addressing global challenges and wicked problems. Six communities of practice were formed in 2011. Faculty from all IANR departments came together and rather than focus on individual department needs, they agreed to focus on areas of relevance and strengths that the institution as a whole could build upon. That type of bold collaboration and transdisciplinary thinking is propelling Nebraska forward. We are striving to excel and achieve excellence across these communities of practice and invite collaborators and learners to become part of the conversation. We welcome feedback, ideas, engagement, and support in our ongoing endeavor to make IANR a global leader in these key areas.

Communities of Practice:

- Computational Sciences
- Drivers of Economic Vitality for Nebraska
- Healthy Humans
- Healthy Systems for Agricultural Production and Natural Resources
- Science Literacy
- Stress Biology

To ensure that IANR's priorities reflect the needs of the state's residents we are continuously engaging in strategic and dynamic discussions between IANR and our stakeholders in the state. In 2018, strategic discussions moved to a new, higher plane as Vision for 2025 was implemented

to ensure Nebraska's competitiveness in addressing global challenges. This visioning process was created to determine how IANR will contribute to the critical need of doubling the world's food supply to feed over 9 billion people; address the shifting climate, climate extremes (e.g., floods and droughts) and environmental stresses; respond to the increasing need for renewable energy sources; and consider how to help increase economic income opportunities for communities and thus the long-term economic growth and prosperity for Nebraska. In Nebraska, one in four jobs is directly tied to agriculture or agribusiness, and the state strives to increase job opportunities in this field of expertise. IANR informs and engages partners and clientele in our focus areas of IANR are food, fuel, water, landscapes, and people.

These five focus areas are representative of the societal challenge areas of the National Institute of Food and Agriculture (NIFA). For example, in the Nebraska planning process "food" represents the continuum of food from farm to fork, which included production, food security and hunger, childhood obesity, nutrition and food safety, and science/food literacy. Resilient Food Production and Ecological Systems represents the productivity, resilience and sustainability of all of our agro-ecosystems and natural resources. Water is highlighted because of its importance to our agro-ecosystems and natural resources in Nebraska. Fostering Healthy and Productive People represents the well-being of children, youth, and families as they interact with their environment.

The Future of Rural Communities is a crosscutting thread in each of these five focus areas. The importance was highlighted in 2013 by the establishment of a University of Nebraska system-wide initiative, the Rural Futures Institute (RFI), and the hiring of its executive director and support staff. Nebraska Extension established a new community-focused faculty team called the Community Vitality Initiative for partnering with RFI and Nebraska communities. In 2019, the Vice Chancellor of IANR challenged all the Institute's rural community resources to explore how we could deepen our commitment, better articulate with how we work with rural communities and expand our impact. Community engagement dialogue is currently exploring the next generation of this work focused on rural community prosperity.

Recent conditions have proven challenging for many agricultural producers and other stakeholders: flooding, extreme weather events, and an economic downturn have taken their toll on Nebraskans and their communities. In response, Nebraska Extension developed and launched an initiative focused on strengthening Nebraska's agricultural economy in 2017. Research-based information from across multiple disciplines is helping producers mitigate weather extremes, reduce input costs, increase efficiencies, improve productivity, resiliency and sustainability of farm operations. Agricultural economic systems educators are serving to enhance our capacity to complete this work. The Agricultural Research Division (ARD) is supporting critical research and infrastructure to address these emerging issues and challenges, and the Nebraska Extension served as a key statewide collaborator during the historic flooding response and recovery efforts in 2019 and continuing in 2020.

IANR combines research, teaching and extension in a multidisciplinary, collaborative environment that encourages transdisciplinary efforts from across the University and private enterprise; to ensure Nebraska's competitiveness in addressing prevalent, current and emerging global challenges. The Vision for 2025 is IANR's guide for the next decade.

Through the dedicated and innovative research of our ARD community across IANR, we continue to build on our strengths to support new technologies and discoveries, translate basic to applied science, and use transdisciplinary systems approach to address complex problems related to the grand challenges of global food security, resilience and healthy humans under changing climate and declining natural resources. Across the broadly diverse expertise of our Faculty, and through their strong collaborative spirit and the support of our Stakeholders, we are effectively applying Team Science 'from Healthy Fields and Landscapes to Healthy Communities'. We understand that Big Data is key for solving many of these complex problems and for moving IANR to the next frontier in research, discovery, innovation, and impact. ARD is being instrumental in contributing to IANR and UNL's efforts in developing the foundation for "Big Data" architecture in agriculture.

Engagement with Nebraska government leaders, stakeholders, representatives of organizations, faculty and students/youth continues. Listening sessions, surveys, departmental reviews, and input from advisory groups maintain public involvement which are critical to this vision's success. IANR identified eleven engagement zones in 2019 and hired engagement zone coordinators to elevate engagement internally and externally. Engagement zone coordinators will foster employee success in Extension programming, build strong stakeholder engagement and connect local people to the University of Nebraska-Lincoln.

In addition to focusing on priority areas, IANR strived to meet the needs of its Nebraska citizens through engagement in internationally recognized science and education. This mission is being met by: advancing knowledge along a continuum from fundamental research to application; engaging learners in education that addresses the current and emerging needs of the state's residents; and teaching tomorrow's professionals through formal and nonformal learning settings. The ongoing cultivation of public-public and public-private partnerships helps make our mission achievable.

The importance of integrated mission is evident in our scholarly output and discoveries, patents, broader impacts, the continued upward trajectory of grant/contract dollars received, the high quality publications and profile of our community, the rigor/impact of educational programs delivered in both formal and nonformal settings, and in the placement of graduates in careers.

II. Merit and Scientific Peer Review Processes

The NIFA reviewer will refer to your Plan of Work. Use this space to provide updates as needed or activities that you would like to bring to NIFA’s attention.

Process	Updates
<p>1. The <u>Merit Review Process</u></p>	<p>Interdisciplinary extension issue teams, comprising of faculty representing interest groups (beef systems; 4-H youth development; the learning child; community vitality initiative; cropping and water systems; food, nutrition and health; community environment, reaching one, reaching all; next generation extension; and disaster education), update their team plans annually using stakeholder input and evaluation results from delivered programs.</p> <p>Faculty members (either as individuals or teams) who hold research appointment in ARD, each has an active peer-reviewed research project in their area of expertise. The peer review process for research projects includes the Unit and (if applicable) Research and Extension Center head, at least two faculty members with relevant expertise, and an Associate Dean of ARD. Following the review and acceptable revisions (if necessary), the project is approved by ARD and is forwarded to USDA-NIFA for inclusion in the REEport database.</p>
<p>2. The <u>Scientific Peer Review Process</u></p>	<p>Academic units (subject matter departments and research, extension and education centers) complete a comprehensive five-year review to ensure program quality and relevance. Teams of three to six external panel members and two or three faculty panel members from other academic units conduct these reviews. The review team assesses the work of the academic unit to ensure that programmatic efforts and research are relevant and focus on Nebraska, national and global most critical needs. The review team completes its assessment with the development of a report that helps the administrative unit focus its work for the next five years. It is the responsibility of the IANR Deans to assist the unit administrator and faculty to accomplish the goals identified by the unit, as a follow-up to the review process.</p> <p>Another review process, which combines merit and peer review, is the annual review of more than 100 research and extension proposals by state commodity check-off boards. Proposals selected for funding</p>

	<p>address the current and emerging issues facing our stakeholders and clearly communicate the research's relevance to user needs.</p> <p>Stakeholder input remains key to IANR success throughout the process mentioned above.</p>
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III. Stakeholder Input

The NIFA reviewer will refer to your Plan of Work. Use this space to provide updates as needed or activities that you would like to bring to NIFA's attention.

Stakeholder Input Aspects	Updates
<p>1. Actions taken to seek stakeholder input that encouraged their participation with a brief explanation</p>	<p>Ongoing input from stakeholder groups, e.g. advocacy, advisory, and commodity groups, keeps extension, research and teaching team plans current. Ongoing relationships with stakeholder groups such as the Agriculture Builders of Nebraska (ABN) and Family, Youth and Community Partners (FYCP), Nebraska Association of County Extension Boards (NACEB), along with listening sessions led by IANR personnel and extension board reviews of local and regional programs, ensure that critical needs are addressed. Continuous listening processes ensure that the plan of work is reviewed and updated regularly. The accuracy of the team's plans are verified using the following methods:</p> <ul style="list-style-type: none"> • Extension issue teams meet regularly to assess their goals and progress made toward achieving them. These interdisciplinary teams include both faculty of academic departments who understand long-term trends and faculty located in extension offices who see, on a daily basis, the needs of Nebraska residents. Many of these faculty members of academic departments have joint research and extension appointments and can represent fundamental as well as applied research and extension education plans. <p>Issue teams:</p> <ul style="list-style-type: none"> ○ Use monthly phone and/or video conferencing to stay on track. ○ Consult with subject-matter department administrators annually to ensure that the issue team's goals are congruent with university department research and extension goals. ○ Engage with their stakeholders to garner input to determine future plans. ○ Refine programs to ensure that content goals support needs identified by stakeholders and demographic trends.

	<ul style="list-style-type: none"> ○ Are coached by members of the Extension Leadership Team to enhance sharing and collaboration efforts. ○ Additionally, extension-developed public value statements are used by stakeholders to tell others of the impact/public value of extension and then seek input for programmatic direction. (Go to: https://extension.unl.edu/impact/ to see "Impacting All of Nebraska" impact summaries). Annual impact reports are developed and are available online for each issue team (and related areas); each includes a public value statement, which helps stakeholders understand the value of and differences being made by today's extension/research programs. Impact reports and public value statements are given to decision-makers and extension board members to help guide their advocacy efforts on behalf of IANR at the local, regional, and national levels. <ul style="list-style-type: none"> • Agricultural Research Division faculty currently participating in multistate projects receive research funding through the multi-state research component of the Capacity Funds. These projects are selected and approved by regional director associations because they are high priority needs identified for multistate activity.
<p>2. Methods to identify individuals and groups and brief explanation.</p>	<p>Nebraska is a state in which the public is very engaged with its university. Research and extension's strategic relationships with local, state, and federal decision-makers is valued. Advocacy groups, advisory groups for subject matter, departments, research and extension centers, and extension boards are utilized to gather input. Farm organizations and industries related to agriculture routinely are at the planning table. Below are examples of how research and extension addressed the needs of underserved and underrepresented populations.</p> <ul style="list-style-type: none"> • Agricultural Research Division research programs related to human nutrition and healthy lifestyles were highlighted under the federal goals and key themes. The research results feed science-based information directly into Nebraska Extension programs that target underserved and underrepresented populations. • Nebraska Extension built a strong partnership with Little Priest Tribal College and Nebraska Indian Community College and recently hired an extension educator who has a local office. Through this partnership, Native American teens have become more involved in outside activities and interact with youth and adults outside their schools. The Expanded Food and Nutrition Program (EFNEP) and the Supplemental Nutrition Assistance Program-Education (SNAP-Ed) staff annually teach low income families and youth (many are from the underrepresented populations) how to improve their diets, improve their nutrition practices, stretch their food dollars further, handle food more safely, and

	<p>increase their physical activity level. SNAP-Ed also implements Policy, Systems, and Environmental (PSE) change strategies in schools, communities and childcare settings to modify the environment to make healthy choices practical and available to all community members.</p> <ul style="list-style-type: none"> • The College of Education and Human Sciences, extension and the Nebraska Department of Education have undertaken a programmatic effort with targeted school districts to address needs of first generation families. • An extension educator addressed the needs of Hispanic and Native American youth in Scotts Bluff County. This program engages middle and high school youth in after-school and community-based programs. Coalitions of Hispanic and Native American individuals contributed to the success of this youth program. An extension educator in northeast Nebraska connected Nebraska Extension youth development programs with Hispanic and Native American families in this region. • Ongoing efforts to recruit and retain a more diverse pool of faculty that can serve as a gateway into underserved and underrepresented populations are underway. • In 2013, IANR participated in a Civil Rights Review through USDA NIFA and developed and started several new initiatives to improve connections with underserved audiences. One direct outcome is a \$100,000 extension-funded competitive grant program for proposals that reach new audiences. A summary of our commitment to a diverse faculty and diversity of audiences reached by our education programs is found at: https://ianr.unl.edu/diversity • In 2019, IANR hosted rural community prosperity listening sessions where Nebraskans were invited to share experiences in rural community development and explore how the university can be most effective in strengthening the economic prosperity and vitality of rural communities. • Nebraska Extension is committed to ensuring access and opportunity for all Nebraskans to receive, and benefit from, our programming. We demonstrate excellence in valuing everyone as an important member of the communities that we already serve and those we seek to serve. Nebraska Extension offers "Navigating Difference (ND) Multicultural and Diversity Training and Intercultural Development Inventory (IDI)" professional development to faculty, staff and community members.
<p>3. Methods for collecting stakeholder input and brief explanation.</p>	<p>In 2018, Nebraska Extension launched the Extension 2025 Strategic Priorities Planning Process. Nebraska Extension partnered with the University’s Bureau of Sociological Research to conduct a statewide random survey of 10,000 Nebraskan’s to determine how Nebraska Extension could most effectively meet their needs. This survey data is being used to determine program areas, staffing patterns, and programmatic outcomes. This data was supplemented by statewide stakeholder listening sessions designed to help identify extension programming priorities for the next five years.</p>

	<p>The Nebraska Association of County Extension Boards (NACEB) engaged in a NextGEN NACEB initiative in 2018 designed to strengthen their relationships with extension and to enhance advocacy efforts for both extension and IANR. This effort included 10 face-to-face stakeholder engagement meetings throughout the state and an online engagement opportunity for extension board members. Additionally, there was an ongoing effort by extension boards to talk one-on-one with their neighbors and colleagues about needs within their geographic regions.</p> <p>Extension is a partner with the 1994 land-grant institutions in our state. Extension and the Nebraska Indian Community College (NICC) have had a continuous partnership to support the implementation and management of tribal college extension programs in three different NICC communities. IANR extension faculty who work routinely with the tribal colleges serve as a conduit to move content and planning information between these entities. Research opportunities are being explored with these colleges.</p> <p>The Nebraska Panhandle has both recent and longtime Hispanic residents. An extension educator in the Scottsbluff area works with audiences and local planning groups to ensure a cross-cultural understanding. The program is in three parts: history of Mexican people in the Panhandle, cross-cultural communications, and formal education for audiences working with English language learners. This workshop is presented for public school educators, health professionals, students in education, health and human services employees, community leaders, chambers of commerce members, and companies. This is just one example of extension's engagement as a teacher for other organizations that seek increased understanding and involvement with all of our state's residents. In addition, Nebraska has worked to increase the number of extension educators who can target diverse youth audiences. For example, a Spanish-speaking 4-H educator works specifically with underserved audiences in northeast Nebraska.</p> <p>Nebraska Extension continues to partner with Iowa State University on a joint educator position. This person is working on business development and youth entrepreneurship, focusing on Latino audiences in the Sioux City, Nebraska, area.</p>
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<p>4. A Statement of how the input will be considered and brief explanation of what you learned from your stakeholders.</p>	<p>Input from stakeholders is used to identify emerging issues for both research and extension, and to help set priorities. Stakeholders are invited to provide input during the selection of administrators; for example, stakeholders serve as members of search committees for unit administrators, deans, vice chancellors, etc. Local stakeholders are invited to interview extension educators for positions located in their geographic regions.</p> <p>Stakeholders expect IANR and its divisions of research, extension, and teaching to remain focused on critical issues facing Nebraska. They expect the land-grant institution to do cutting-edge work that is well regarded by the academy, has global impact, and is of value to Nebraska's residents and economy. Stakeholders recognize that programming priorities must be established. During 2015, 18 extension issue teams were developed from the direction of our stakeholders to address the issues and needs of Nebraskans. In addition, 10 interest groups were formed under these issue teams to directly develop research-based programs and information that will positively impact these stakeholders, allowing them to make informed decisions relevant to these issues. New and innovative collaborative team models are in developmental stages within IANR.</p>
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IV. Planned Program Table of Contents

No.	Program Name in order of appearance
1.	Food Production/Security and Landscapes
2.	People and Their Well-being
3.	
4.	
5.	
6.	
7.	

V. Planned Program Activities and Accomplishments

Please provide information for activities that represent the best work of your institution(s). See Section V of the Guidance for information on what to include in the qualitative outcomes or impact statements. Add additional rows to convey additional accomplishments. You may expand each row as needed.

No.	Title or Activity Description	Outcome/Impact Statement	Planned Program Name/No.
1.	Food Production/Security and Landscapes	<p>Programming delivered in 2019 generated that allowed Nebraska farmers, ranchers and clientele with landscapes to increase productivity, profitability, and sustainability of food, feed, fuel, or fiber production systems through adoption of cutting edge research and extension information provided by IANR programs.</p> <p><u>What is the issue? Who cares and Why?</u></p> <ul style="list-style-type: none"> • Agri-business is vital to the state's economy and having a ready and willing workforce has helped those businesses thrive. <ol style="list-style-type: none"> i. Nebraska's beef industry generates approximately \$7.2 billion in annual cash receipts. The multiplied impact of the \$6.5 billion in cattle sales each year is \$12.1 billion. ii. Nebraska ranks number 3 nationally in corn production, producing 31.6 billion bushels annually. iii. Nebraska ranks #4 nationally in soybean production, producing 305 million bushel annually iv. Nebraska ranks No. 1 in Great Northern beans, No. 2 in pinto beans and No. 5 for all dry edible beans. Nebraska produces 83.4 percent of the nation's Great Northern bean supply. v. Pork is the most consumed meat worldwide. Nebraska's pork industry generates more than \$1 billion annually in cash receipts. In addition, the state has the sixth largest swine herd in the nation. 	Food Production/Security and Landscapes/ No. 1

		<p><u>Target audience</u> Nebraska has 1.9 million people, 530 towns, 25,000 row crop producers, 20,000 cow/calf producers, and 4,500 feedlot operators. Agriculture drives the economy of Nebraska. Survival of communities in Nebraska is underpinned by a profitable, sustainable, and responsible agriculture sector.</p> <p><u>What has been done</u> We create best learning environments by offering year-round programming with direct interaction with you through field and demonstration days, farm tours, hands-on workshops and on-farm research in your field and cab. Equally important, we offer 24/7 information through technology-focused websites and social media. The desired outcomes is to enhance production efficiency that is responsible and sustainable to provide a nutritious and safe product for all people and keep communities in Nebraska vibrant and viable.</p> <p><u>Results</u></p> <ul style="list-style-type: none"> • Precision Agriculture Training program trained 172 NRCS employees in crop development and precision ag. <ul style="list-style-type: none"> i. Attendees of the Nebraska On-Farm Research Network Annual Results Updates valued the knowledge gain from the program at \$14.2 million. ii. Previous cooperators with Project SENSE or the Data Intensive Farm Management (DIFM) project have reported reducing crop input rates in following seasons, improving on-farm profitability ranging from \$10 to \$40 per acre. iii. The Goshen/Gering Fort Laramie Canal break resulted in a water disruption impacting over 100,000 acres of crops for six weeks. Time lapse video was used to monitor and provide information on crop condition in beans, beets, and corn and was used to monitor canal repairs. 	
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		<p><u>External Factors</u> During the second week of March, Nebraskans experienced a major “bomb cyclone”. We had flooding in the eastern part of the state and at the same time had a blizzard in western Nebraska. We had flooding again in the north-central part of the state again in June and July. Extension redirected programming to meet the demands of clientele as a result of conditions caused by the weather.</p> <p><u>Other information</u> Few things are accomplished alone. Our team has strategically partnered with numerous colleagues, organizations and funding partners such as the Nebraska Corn Board, Nebraska Corn Growers Association, Nebraska Soybean Checkoff, United Soybean Board, Dry Bean Commission, Nebraska Agriculture Technology Association, American Angus Association, American Hereford Association, International Genetics Solution, Nebraska Natural Resource Districts, and Natural Resource Conservation Service to offer programming that impacts Nebraska crop and livestock producers.</p>	
<p>2.</p>	<p>Crop Management Diagnostic Clinics</p>	<p>The increased dollar value of the program on a per acre basis is \$9.04 bringing the total value impact to \$28.7 million. 100% of the participants attending the Crop Scouting Training Sessions said the program was ABOVE average or one of the BEST! 88% attending the soil, soybean, and corn clinics said they would be very likely or definitely recommend the workshops to a friend or colleague.</p>	<p>Food Production/Security and Landscapes/ No. 1</p>
<p>3.</p>	<p>Project SENSE</p>	<p>Project SENSE demonstrated the potential for producers to reduce nitrogen applications up to 30 lb-N/ac with no significant loss in corn yield from 2015-2018. The project has continued in 2019 and expanded to include dryland nitrogen application for eastern NE corn production and nitrogen application via fertigation for corn grown under center pivots. In total, 14 field sites with cooperating producers have been implemented in 2019 demonstrating the potential for sensor-based nitrogen management.</p>	<p>Food Production/Security and Landscapes/ No. 1</p>

2019 Annual Report of Accomplishments and Results (AREERA)

4.	Nebraska On-Farm Research Network	The Nebraska On-Farm Research Network conducted over 60 on-farm research studies and held 5 meetings to share research results across the state, impacting over 2 million acres. The research and meetings impacted attendees from 43 counties and 3 states. The total value placed on the knowledge gained \$14.2 million. 93% plan to use statistical significance when making decisions; 97% noted the relevancy of topics was good to excellent; 97% rated it on of the best or above average educational program.	Food Production/Security and Landscapes/ No. 1
5.	Nebraska Ag Technology Association (NeATA) Conference	The NeATA conference was held February 22, 2019 and was attended by ag retail representatives, crop consultants, and farmers. 23.8% of attendees noted significant improvement in their knowledge of current and emerging ag technologies and 47.67% are very likely to adopt or take steps towards using additional ag technology to improve or enhance the farm, business, or job.	Food Production/Security and Landscapes/ No. 1
6.	Forages after the Flood	Blizzards and storms impacted crop and grazing lands indiscriminately this year. In response, presentations on the topics of Growing Annual Forages after a Flood and Managing Sand Deposits after the Flood reached 225 participants. A Crop Watch article, "Reclaiming flood-damaged pastures and forage production," was viewed by 617 individuals online. Production of interviews, articles and a collaborated series of articles with Iowa State University for Flood Recovery of Pastures was created.	Food Production/Security and Landscapes/ No. 1
7.	People and Their Well-being	<p>Programming in 2019 focused on rural and urban family life and lifestyles; human nutrition, with particular emphasis on how foods, our molecular and macro-environments, and food systems interact to impact our well-being; food sciences, including food processing safety, food production waste reduction, and processing technologies to ensure human well-being and nutritious food choices.</p> <p>Program activities included a cascaded approach to creating long-term behavior change. Each program area included mass-media educational efforts (websites, news articles, general contacts) to reach the general public; 1-2 hour workshops that focus on increasing knowledge; longer-</p>	People and Their Well-being/ No. 2

		<p>term (4-6 hour) learning experiences that begin to change attitudes and practices; and in-depth training designed to create behavior change that involved multiple contact opportunities over an extended period. By using this approach, a variety of learners were engaged in programming that best fits their needs.</p> <p>We focused on the following three state defined outcomes:</p> <ol style="list-style-type: none"> 1. New knowledge will be generated that will allow increased adoption of preharvest methods for food quality and safety. 2. Nebraska will have access to a more highly educated workforce to meet the needs of the 21st century workplace. 3. Youth will increase behaviors that result in healthier lifestyles. <p><u>Target Audience</u></p> <ul style="list-style-type: none"> • High-risk families • Children and youth • Families of young children (young children defined as those 0-8) • Producers • Good processing and retail establishment owners/workers • Consumers • Business and community leaders <p><u>External Factors</u></p> <p>Research and extension have been able to successfully meet goals as planned in the area of people and their well-being. Nebraska Extension continues to be cognizant of over-arching issues such as feeding 9 billion people, global water supplies, and how those will impact our work related to educating Nebraskans on healthier lifestyles and creating a well-educated workforce.</p> <p>Research and extension faculty continue to be watchful for emerging issues and world conditions that could change food systems and the global trust that consumers have of U.S. agriculture. In addition, Nebraska faculty</p>	
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		<p>are at the forefront of basic research in food allergies, food safety through the food chain, and microbiome profiling.</p>	
<p>8.</p>	<p>Preharvest methods for food quality and safety.</p>	<p>Outcome: New knowledge will be generated that will allow increased adoption of preharvest methods for food quality and safety.</p> <p>What is the issue? Who cares and Why? Antimicrobial resistance is a major global health threat. The animal production environment may be an important component for the emergence and spread of resistant bacteria and genes that confer resistance to antibiotics.</p> <p>Each year in the U.S., at least 2 million people are sickened from bacteria resistant to antibiotics, and 23,000 people die from those infections. Many more die from other conditions complicated by an antibiotic-resistant infection, according to the Centers for Disease Control and Prevention. Infections from drug-resistant “superbugs” result in an estimated \$20 billion a year in direct health care costs and up to \$35 billion in lost productivity from hospitalizations and sick days. Antibiotic resistance and virulence genes on mobile genetic elements facilitates transfer among pathogenic microbes, making many of these organisms refractory to treatment or possessing enhanced pathogenicity in humans and animals. Understanding pathogen dynamics enables prudent treatment and antimicrobial usage and provides insight into transmission of virulence factors and antibiotic resistance through next generation testing methods in livestock populations.</p> <p>Nebraska Extension improves access to affordable, nutritious and safe foods. We work with communities, consumers, producers and partners to reduce barriers to help Nebraskans grow, find, afford, choose and use healthful foods, increase consumer confidence, and make informed science-based decisions about their practices and choices. These practices</p>	<p>People and Their Well-being/ No. 2</p>

		<p>enhance rural communities, increase food security, strengthen local agriculture markets, and benefits their health and the economic vitality of the state and future generations.</p> <p><u>What has been done</u></p> <p>University of Nebraska–Lincoln is co-leading a new national institute addressing antimicrobial resistance “National institute for Antimicrobial Resistance Research and Education (NIAMRRE)”. This new institute is engaged in research to accelerate discoveries and engage producers in new and impactful ways that will enhance the stewardship and prolong the shelf life of these disease-prevention tools.</p> <p>Eleven basic and applied projects addressing antimicrobial resistance were established, these use state of the art technologies and techniques to understand the genomic diversity and ecology of microbes, microbial interaction with its environment, and microbes in cattle guts, establishments of manure amendments to reduce the spread of antibiotic-resistant bacteria through livestock wastes, and producers and consumers perception of antimicrobial resistance.</p> <p>A strong network consisting of 5 state level and 47 local partnerships, work with the Food Access Team to reduce barriers to help Nebraskans grow, find, afford, choose and use healthful foods.</p> <ul style="list-style-type: none"> • \$112,000 Provided by SNAP-Ed, Children’s Hospital and Medical Center, CHI Health, The Silk Purse Foundation, the Lincoln Community Health Endowment, and Farm Credit Services of America. • Evidence-based evaluations with help from the University of Nebraska Department of Nutrition and Health Sciences. • Partnerships with Extension and Universities in Missouri, and Kansas, Wisconsin, Illinois, Indiana, and Iowa. 	
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		<p>Extension staff from across the state have teamed together in programs to connect youth to Nebraska agriculture. Over 1,300 youth engaged in the Youth for Quality Care of Animals training for a total of 98 hours of education. As the poultry industry grows in Nebraska, the Embryology program which connects youth to the development of chickens and poultry industry had over 14,160 youth participate with 1,312 hours of instruction.</p> <p>Results</p> <p>Neither antimicrobial resistant bacteria nor antimicrobial resistant genes in the environment were observed at significantly different levels across different antibiotic treatments from pen surfaces in the feedlot through aged manure during stockpiling and amended soil after manure application. Thus, antibiotic use during beef cattle production might not be associated with the risk of contamination of antimicrobial resistant bacteria or antimicrobial resistant genes in animal waste or in manure applied to soil. Furthermore, restricted use of antibiotics in beef production may not be a direct solution to lowering the risk of antibiotic resistance in the environment. However, stockpiling manure before land application can be an effective strategy to limit the potential of antimicrobial resistance to the environment or transmission to crops for human consumption.</p> <p>Antimicrobial resistance islands were identified and characterized in 22 <i>M. bovoculi</i> genomes. These included up to 10 individual antimicrobial resistant genes co-located on a genetic island and having varying combinations. The new test for macrolide resistant genes provides relative quantification of the macrolide resistance determinant genes <i>msrE</i>, <i>mphE</i>, and <i>erm(42)</i>. Translation to diagnostic tests will enhance the understanding of the composition of circulating pathogens and the presence or absence of resistance determinants in pathogenic and non-pathogenic organisms.</p>	
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		<p>Over 176,000 Nebraskans (9% of the state’s population) rely on federal food assistance. Incentive programs, like Nebraska Double Up Food Bucks, make it easier for low-income families to eat fresh fruits and vegetables while supporting local farmers and growing Nebraska’s economy.</p> <ul style="list-style-type: none"> • Over 700 low-income families purchased fresh, local produce using Nebraska Double Up Food Bucks. In 3 years, this program has increased from 4 to 9 sites • Food pantry participants brought home over 35,000 pounds of fresh produce grown by Extension Master Gardeners and volunteers through Growing Together Nebraska. The estimated value is \$52,000. This provides over 106,000 servings of fruits and vegetables to families. <p>Field-to-plate educational activities build youth’s understanding of where our food comes from while teaching life skills and laying the groundwork for career opportunities in nutrition and agriculture. In Lincoln County, youth removed from their homes participated in Growing Together Nebraska, growing their own vegetables. According to one Extension Educator, “Throughout the summer the youth took ownership of the garden. They valued what they had done and wanted to make sure others did not mess it up. Produce was brought to the Youth Center for the cooks to prepare. It was amazing how the youth responded to eating the various foods.” One youth reported, “Cabbage is good.” “They talked about what they had for supper or dinner numerous times. As the 12-week program progressed, youth were sharing their own stories with us. Without this positive and trusting relationship being fostered over several weeks, I do not think the youth would have shared to the extent they did.”</p> <p>In 2019, 12.8% of Nebraskans reported food insecurity, where they lacked the money to buy food they needed. The Food Access Team increases healthful foods accessible to families through evidence-based interventions in horticulture and gardening, app marketing, and local store, market and food pantry policy changes.</p>	
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		<ul style="list-style-type: none"> • Providing fresh, locally grown produce to over 12,200 adults whose food pantry services. • Engaging 33,073 low-income Nebraskans with experiences and opportunities to increase fresh produce intake at grocery stores, farmers markets, and food pantries. • Teaching 580 youth to grow their own food in school and community gardens. <p>In 2019, 2,813 youth engaged with animal science through the Animals Inside and Out 3rd – 5th grade field day program. Those youth who completed the survey (n = 1,021) reported the following:</p> <ul style="list-style-type: none"> • 95% know farmers make good choices to keep our food safe. • 87% better understand where their food comes from due to this program. • 88% did something they have never done before in this program. <p>Additional programs focused on food and ag literacy are currently in the peer review process. These include: Animals Inside and Out – Middle School, AgCiting Science Lessons, Embryology 101: Lessons and Resources for Extension Staff.</p> <p>The Nebraska Beef Quality Assurance (BQA) program has reached 6185 individuals from 2013-2019 through in-person BQA Certifications across Nebraska 5,282 remain current with an additional 900 doing online certification. Participants reported 93% gained moderate to significant knowledge in BQA guidelines, animal handling and antimicrobial stewardship/animal health plans, with 88% planning to change practice on their operations. It is also self-reported that BQA certification adds on average \$8.00 per head value to the operation.</p> <p>In 2018-2019, BQA Transportation was a priority to training cattle transportation professionals with 1,607 Nebraskans completing the</p>	
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		<p>certification through both in-person and online training opportunities. Participants self-reported 88% plan to implement BQA cattle handling principles during transportation.</p>	
<p>9.</p>	<p>Highly educated workforce</p>	<p><u>Outcome:</u> Nebraska will have access to a more highly educated workforce to meet the needs of the 21st century workplace.</p> <p><u>What is the issue? Who cares and Why?</u> Equipping Nebraska youth with the skills needed to succeed after high school and empowering them to make decisions about their future is the primary focus of all College and Career Success programs. Programming was offered to youth in grades 4 through 12, with the greatest reach being high school youth. In 2019 more than 12,500 youth from across Nebraska were impacted through a variety of College and Career Success programming efforts.</p> <p><u>What has been done</u> Many methods were used by the College and Career Success Team to engage youth. The College and Career Success team utilizes multiple methods to engage youth, teachers, and counselors in interactive, quality programming designed to help young people link their skills and passion to future career choices. Youth programs were delivered in schools, communities, and through on-campus experiences and retreat style events. The incorporation of Canvas, the on-line platform used by UNL to teach classes, has also allowed the team to reach new audiences through a virtual setting. Through a train-the-trainer model, teachers and counselors were taught to deliver Mapping Your Success through Canvas and youth were able to engage with Canvas through participation in Next Chapter.</p> <p>Through the delivery of the Connecting the Dots program, the College and Career Success Team was well positioned to provide a unique and strategic method to engage its learners. In this program, students experience a “real life” simulation through hands on activities to learn how their high school</p>	<p>People and Their Well-being/ No. 2</p>

		<p>choices impact their postsecondary and workplace experiences. This simulation involves multiple rounds of face to face interaction with employers from their local communities as well as representatives from universities, colleges, and military.</p> <p>In its third year, Next Chapter, a college readiness program and a UNL pre-admittance program, is offered to 8th grade students enrolled in 4-H. Throughout high school, pre-admitted students engage in events, activities, and curriculum during which they will learn how to successfully transition from high school to college. This unique program meshes college and career readiness programming with traditional 4-H programs and activities. Next Chapter is co-branding and building partnerships in Tennessee, New Mexico, and Illinois.</p> <p>Developed in 2018, Mapping Your Success is designed for high school juniors and seniors, the 10-session curriculum which is connected to the Nebraska Career and College Readiness educational standards is focused on students' taking ownership of their own career paths. In 2019, 35 teachers and counselors were trained with an estimated reach of 875 youth from 18 schools across Nebraska.</p> <p><u>Results</u> As a result of Next Chapter at Nebraska:</p> <ul style="list-style-type: none"> • 2,086 youth from across the state (58 counties) gained college and career readiness skills through school enrichment programs, after-school, clubs, and retreats. • Tennessee 4-H'ers now have the opportunity to participate in the Next Chapter Program. • 61% of Chapter 2 participants have a better idea of what they might actually do after high school and although only 19% have led a community service project, 71% have participated in one. 	
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	<p>Connecting the Dots (CTD)</p> <p>In 2019, this interactive career exploration simulation program engaged over 3,500 9th and 10th grade students in opportunities to learn about careers of interest as well as how to “connect the dots” from ninth grade, through postsecondary, to the workplace. As a result of the program, youth increased their ability to demonstrate professional communication and can make informed decisions about their college and career aspirations. Connecting the Dots hosted 30 separate programs throughout Nebraska engaging 81 school districts, an increase of 15 new school districts from 2018. In addition, more than 780 community partners participated in the simulation, an increase of 230 partners from 2018.</p> <p>As a result of the Connecting the Dots program:</p> <ul style="list-style-type: none"> • 90% say this program has helped them explore future career options • 88% of participants have a better idea of what they might do after high school. <p>Partnerships continue to impact the success of the CTD program. Partnerships with the Educational Service Units (ESU) and Omaha Public Power District (OPPD) are most notable. Partnerships with ESUs increased by 50% with the addition of ESU 4 based in Auburn and ESU 5 based in Beatrice</p> <p>Mapping Your Success, designed for high school juniors and seniors, is a 10-session curriculum connected to the Nebraska Career and College Readiness educational standards. The focus is empowering students to take ownership of their own career paths.</p> <p>Skills taught include:</p> <ul style="list-style-type: none"> * critical thinking, * initiative and enterprise, * prioritization, * self image, * relationships and culture, 	
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		<ul style="list-style-type: none"> * skill seeking, * personal and financial well-being, and * a capstone experience <p>A train-the-trainer model, in which extension staff train teachers and school counselors to facilitate the curriculum, was used in the delivery of this program. The team also spent time in 2019, building partnerships with ESU professional development staff and Nebraska Department of Education career specialists to start promoting the program and began establishing a 2019 training schedule.</p> <p>Growing a Brighter Future at Husker Harvest Days Innovation was the theme of the 4-H booth at the 2019 Husker Harvest Days event. Over 14 months, the team worked with the Energy Educators from the Nebraska Public Power District to provide a unique experience for attendees of all ages. The goal of the program partnership was to innovatively engage booth attendees in discovering future career possibilities through the use of four virtual reality experiences related to careers in energy and production agriculture. Additional career exploration information and a photo booth sponsored by 4-H and NPPD were present. Over 1,000 youth and adults were actively engaged in learning over the three-day event.</p>	
10.	Healthier lifestyles	<p><u>Outcome:</u> Youth will increase behaviors that result in healthier lifestyles.</p> <p><u>What is the issue? Who cares and Why?</u> Nebraska ranked 17th in the United Health Foundation America's Health Ranking for 2019. Since 2012, obesity increased 20% from 28.4% to 34.1% of adults. Thus 2 in 3 people in Nebraska are overweight or obese. The state ranks 23rd for senior health and 28th for the health of women and children leading to 1 in 2 people having a chronic health condition. This has a negative impact on Nebraska's economy because of missed work and</p>	People and Their Well-being/ No. 2

		<p>higher health care costs. In addition, because parents are often the food providers in the home, negative food behavior of adults leads to negative behavior in children and a more serious obesity spiral. Although data indicates 1 in 8 people in Nebraska are struggle with hunger, including 1 in 6 children.</p> <p>Despite these sobering statistics, changes are occurring.</p> <ul style="list-style-type: none"> - in the past year, drug deaths continue to decrease to 7.2 deaths per 100,000 population - in the last year, children (age 0 to 17) in poverty decreased 1.2% from 14.1% to 12.9% - in the past years, high immunizations (HPV female & male, Meningococcal, and Tdap) among adolescents ages 13 to 17 has increased. - in the last five years, high school graduation increased 4% from 86.0% to 89.1% of students - in the last five years, low birthweight increased 42% from 5.3% to 7.5% of live births - in the past three years, primary care physicians increased 7% from 148.0 to 158.2 per 100,000 population - in the past year, violent crime decreased 7% from 306 to 285 offenses per 100,000 population <p><u>What has been done</u></p> <p>Nebraska Extension helps children and youth improve eating and physical activity patterns with direct education and healthier home, school, and community environments. By supporting healthy behaviors and environments, we help reduce food and health care costs by helping prevent chronic health conditions.</p> <p>Extension implemented nutrition education and physical activity programs, as well as environmental strategies. Programs impacted individuals and families where they eat, live, work, learn, shop and play through group education classes, field days, summer/day camps, health fairs, workshops,</p>	
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		<p>and demonstrations. Learners received information via website, social media, newsletters and radio. To learn more about how our issue team engages learners, view our video: https://go.unl.edu/hhhu.</p> <p>To strengthen programs, collaborations with partners from the education, government, community, media, faith-based, public health, healthcare and public safety sectors are needed. More than \$1,000,000 were garnered by team members to support programming and included funds from USDA (including SNAP-Ed and EFNEP), Department of Health and Human Services, National 4-H Council, CHI Health, Children’s Center for the Child & Community and other non-profit organizations. The following partners provided/assisted with space, human resources, recruitment, program implementation, planning, materials, and advertising:</p> <ul style="list-style-type: none"> - 98 Schools (Preschools, K-12, Colleges and Universities) - 35 Organizations (Human Service, Healthcare, and Public Health) - 21 Facilities (Child Care Centers, Daycare Homes, and Head Start) - 16 Agencies (Federal, State, and Local Government) <p>Expanded Food and Nutrition Education Program (EFNEP) classes can involve the whole family where the parents and youth learn healthy cooking together. One EFNEP class in Douglas County led three generations of family members to practice healthier cooking and eating together. Another class in Lancaster County allowed for parents learning English through Lincoln Public Schools to cook healthy, youth-approved food together. In a partnership with Family Consumer Science classes, students who are pregnant or parents in high school receive education from EFNEP about how to feed their infants and toddlers. Teen parents learn to establish healthy habits early in their new families.</p> <p>EFNEP concepts are being taught to low-income high school youth in career readiness programs. Through partnerships with Grand Island Public Schools (GIPS) Workforce Prep Academy in Hall County and Avenue Scholars Foundation in Douglas County high school youth are learning the</p>	
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		<p>importance of health and how to plan, budget and cook meals on their own. EFNEP is highly valued by the directors of the workforce prep programs as a method of increasing the health and productivity of the future workforce.</p> <p><u>Results</u> Nebraska Extension directly taught healthy lifestyles programming to 30,869 children and youth and 6,206 adults (i.e. teachers, caregivers, parents) for a total of 37,075 Nebraskans. More than 459,000 individuals were reached through indirect activities.</p> <p>Forty-one Extension professionals across 41 counties delivered nutrition and physical activity programming to 9,300 children and youth using Kids in the Kitchen, Teen Cuisine, CATCH Kids Club and Choose Health: Food, Fun, and Fitness. In-school and out-of-school programs were delivered at schools, community and recreation centers, faith-based centers, libraries, and youth organizations. Youth survey respondents (n=4,010) showed significant, positive intentions, knowledge and behavior changes in the following areas:</p> <ul style="list-style-type: none"> • More aware of daily fruit, vegetable and water consumption, daily activity and screen time • Eating less fast food and giving their family ideas for healthy meals and snacks more often • Follow and make changes to a recipe to make something to eat, use measuring cups and spoons, use knives safely and keep cooking areas clean for food safety <p>Examples of core programs include:</p> <ul style="list-style-type: none"> • Choose Health: Food, Fun, and Fitness • CATCH Kids Club • School Enrichment Kits • Learn, Grow, Eat & Go 	
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		<ul style="list-style-type: none"> • Kids in the Kitchen • 4-H Cooking 101-401 • Teen Cuisine • School Wellness • Go NAP SACC • Eating Smart, Moving More <p>2019 marked the 50th Anniversary of the Expanded Food and Nutrition Education Program (EFNEP), which began in 1969 through extension programs in 1862 and 1890 Institutions. EFNEP uses a peer educator model and influences the nutrition and physical activity behaviors of limited-resource families, particularly those with young children, through community-based, relationship-driven, hands-on education. In 2019, extension EFNEP across seven counties taught over 3,600 K-12th grade youth and 632 limited-resource families. Improvements in healthy living occurred after receiving a minimum of six hours of education through EFNEP:</p> <ul style="list-style-type: none"> • 89% of adults improved diet practices (i.e., eating fruits and vegetables and less sugary beverages) • 75% of adults improved food resource management practices (i.e., cook at home, compare food prices, plan meals) • 73% of adults improved physical activity practices (i.e., exercising for 30 minutes or increasing activity with small changes) • 78% of youth improved their abilities to choose foods according to Federal Dietary Recommendations or gained knowledge • 52% of youth used safe food handling practices more often or gained knowledge • 45% of youth improved their physical activity practices or gained knowledge <p>Food Safety programming in Nebraska provides a huge economic impact as Nebraska has over 4,100 eating and drinking establishments that</p>	
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		<p>employs over 96,000 people (9% of Nebraskans). Additionally, every dollar spent in a Nebraska restaurant contributes \$1.79 to the state's economy and Nebraskans spend 51% of their food dollar away from home.</p> <p>In a NASIS survey and other related research, it was found that consumers in Nebraska want safe, inexpensive, and if possible, local food. Extension has responded to this request by offering:</p> <ul style="list-style-type: none"> • Food.unl.edu, a web page that includes content on food safety during an emergency, (power outages, floods, etc.) for restaurants, grocery stores, and volunteers. • Flood.unl.edu web page created with food safety, sanitary cleanup, and information on safe gardening after a flood. • Flood food safety tip sheets created in English and Spanish and distributed throughout the state. <p>In 2019, the following National Certification Trainings related to Food Safety were offered across the state:</p> <ul style="list-style-type: none"> • ServSafe Managers Certification: 1,403 participants • Food Handlers Certification: 879 participants • Other Food Safety Programming: 1,075 participant <p>The impact:</p> <ul style="list-style-type: none"> • 93% indicated that this experience reinforced something they were already doing. • 75% indicated they have an increased understanding of food safety risks and ways to reduce these risks. • 74% indicated they have a better understanding about ways to communicate food safety practices with staff. <p>The Ecological Approach to Family Style Dining (EAT Family Style) program was developed to train childcare providers how to implement responsive feeding practices at meal times to improve children's healthy</p>	
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		<p>eating. The program combines web-based interactive lessons, goal setting and coaching by Extension Educators. The trajectory of EAT Family Style follows:</p> <ul style="list-style-type: none"> • 2018: EAT Family Style reached 760 preschool children attending 11 child care centers in urban and rural Nebraska. • 2019: Based on participant and Extension professional feedback, revisions were made: updating online lessons, workbooks and coaching processes used by Extension professionals. • 2020: Extension professionals will implement the updated program with newly recruited childcare centers across Nebraska. <p>Partnering with School Teachers to Improve Children’s Health - The School Enrichment Kit (SEK) Program is a unique, standards-based approach to reaching Nebraska youth. Utilizing teaching support of local teachers, Nebraska Extension professionals improve the nutrition and physical activity knowledge and behavior of youth. The SEK program is in its 20th year.</p> <ul style="list-style-type: none"> • The SEK program has the largest in-school student reach of any Extension nutrition education program. During the 2018-2019 school year, the statewide program reached 15,321 students from 627 K-5th grade classrooms. • On average, students received 10 hours of nutrition and physical activity education. • In 2019, 83 Lincoln Public School (LPS) teachers received professional development on the SEK program. 94% of teachers reported the training was very useful. The training opportunity helped improve teacher nutrition and physical activity competencies, as well as increased their confidence in utilizing the kits in their classroom. • A multi-level evaluation process is utilized with the SEK program. Evaluations are captured from teachers, students and guardians. 93% 	
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		(n=535) of teachers who completed the evaluation indicated that using the SEK program increased their confidence when teaching nutrition.	
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