24th annual

Dickinson State University

2026 Celebration of Scholars:

Achievement in Research, Humanities, and the Arts

Saturday, April 25, 2026
7:30 a.m. to 2:30 p.m.
Murphy Hall & Student Center Ballroom
Dickinson State University

About the Celebration of Scholars:

Dickinson State University Celebration of Scholars (CoS) is a forum in which students in all disciplines present scholarly work to an audience of peers, faculty, and community members. These scholarly endeavors include scientific research, explorations in humanities and the arts, and summations of scholarly accomplishments such as portfolios. Along with student presentations, the conference features a keynote address by a faculty researcher who has engaged in and published research in collaboration with undergraduate students.

CELEBRATION OF SCHOLARS ORGANIZING COMMITTEE & ACKNOWLEDGEMENTS

Wendy L. Wilson, PhD (Chair)
Professor of Psychology

George Seror III, PhD (Co-Chair)
Associate Professor of Psychology

Chip Poland, PhD
Professor of Agricultural & Technical Studies

Colin Strine, PhD
Associate Professor of Biology

Stefanie Aulner, MA
Assistant Professor of History

TJ Dempsey, PhD
Assistant Professor of Psychology

Cody Ptacek, MS
Assistant Professor of Nursing

CarrieLynn D. Reinhard, PhD
Assistant Professor of Applied Communication

Thomas Schwartz, PhD
Assistant Professor of Kinesiology

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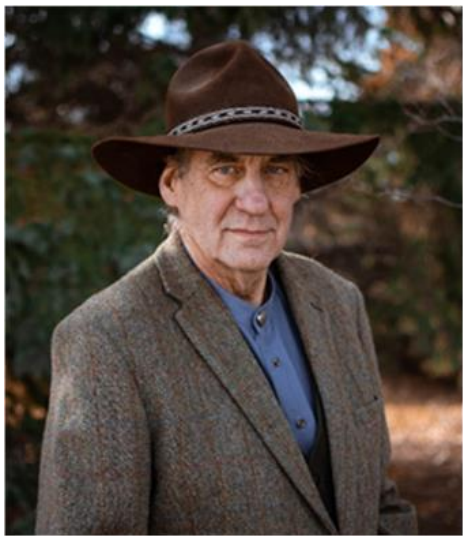
Faculty Sponsors Dr. Shafaq Asif, Ms. Stefanie Aulner, Mr. TJ Dempsey, Dr. Elizabeth Freedman, Dr. Samanthika Hettiarachchi, Dr. Jinasena Hewage, Dr. Sarah Manka, Dr. Talha Naqash, Mrs. Michelle Orton, Mr. Cody Pacek, Dr. Chip Poland, Dr. George Seror III, Dr. Colin Strine

Opening Remarks, Introduction of Keynote and Closing Remarks: Mr. Scott Molander DSU President, Ms. Stefanie Aulner (CoS member), Dr. Wendy L. Wilson (CoS Chair)

Oral Presentation Moderators: Dr. George Seror III, Dr. Colin Strine, Ms. Danielle Harper, Dr. Olalekan Sipasi

In addition to multiple Student Volunteers



Keynote Speaker

Dr. Thomas Isern

Professor of History,
University Distinguished Professor
NDSU

"Let us Inquire: The Meaning of the Great Plains in American Life"

Dr. Tom Isern is Professor of History and University Distinguished Professor at North Dakota State University.

Dr. Isern is in his fifty-second year of teaching college history and still trying to get it right. A specialist in the history of the Great Plains, he has authored or co-authored seven books in the field, such as *Pacing Dakota* (2018) and *Dakota Circle: Excursions on the True Plains* (2000). He also speaks statewide with the people of North Dakota about their history and folklore weekly on Prairie Public Radio's *Plains Folk*. The feature he writes and voices is broadcast for worldwide distribution as a podcast via NPR One. Dr. Isern is a member of the national advisory board for Phi Alpha Theta, the honor society for student professional historians.

2026 Celebration of Scholars Schedule

7:30-7:55 Registration and Welcome Reception (7:50 am)

Murphy Hall, Stroup Auditorium (welcome)

8:00-9:35 Oral Presentations Sessions 1A and 1B

Session 1A Room 117 (Stroup Auditorium)

Session 1B Room 155 (Thompson Auditorium)

9:45-10:35 Keynote Address

Stroup Auditorium

10:40-12:00 Poster Presentations

12:00-1:00 Lunch

Student Center Ballroom

1:00-2:30 Oral Presentations Sessions 2A, 2B, and 2C

Session 2A *Room 117 (Stroup Auditorium)*

Session 2B Room 155 (Thompson Auditorium)

Session 2C Room 160

Session 1: Oral Presentations 8:00am-9:35am

Oral Session 1A and 1B

Session 1A, Stroup Auditorium (Room 117): "Livestock Agricultural"
(Moderator: Ms. Danielle Harper)

- *Jenna Hume (Agricultural Studies).* "How Stage Training Impacts a Horse's Recovery Heart Rate."
- *Kailey Brimmer (Agricultural Studies).* "The Effect of Vitamin A Supplementation on the Weaning Weight and Carcass Traits of Angus Calves."
- *Brae Eneboe (Agricultural Studies).* "The Effects of FerAppease® to Reduce Stress on Weaning Calves."
- *Abby Talkington (Agricultural Studies).* "The Effect of FerAppease® on Pregnancy Rates in Beef Cattle."
- *Dalton Tvedt (Agricultural Studies).* "Bucking Bull Genetics: Do sires effect offspring in terms of buck-off percentage, average score, and power rating?"
- *Wyatt Wilharm (Agricultural Studies).* "Comparative Differences Between the Backfat, Kidey Pelvic Heart (KPH%), and the Quality Grade of Angus and Charolais Cattle."
- *Lorelei Jarrett (Agricultural Studies).* "The Effectiveness of Purchasing an LRP (Livestock Risk Protection) on Any Given Year."

Session 1B, Thompson Auditorium (Room 155): "Healthcare Matters"
(Moderator: Dr. George Seror III)

- *Mikayla Jeppson (Psychology).* "Stigma Surrounding People with Disabilities and the Role of Grafton State School."
- *Jack Simons (Psychology).* "Mentoring as an Intervention to Improve Mentees' Mental Health."

- *Natalie Lile (Natural Science).* "World Health Organization (WHO) Cleans Best: Does soap type matter when following best handwashing practices?"
- *Benjamin Thompson (Computer Science).* "The Dynamic Oversight Blueprint: A dual-track lifecycle for ethical machine learning in medical diagnostics."
- *Afolabi Soetan (Computer Science).* "The TAPE (Transparency, Autonomy, Privacy, Explicability) Ethical Framework for Privacy of Patient Data and Explainability of Treatment in Medical Primary Care."
- *Hawken Farstveet (Computer Science).* "Operationalizing Ethics in Healthcare AI: A framework for bias mitigation and data privacy in medical imaging."
- *Bryce Shelhamer (Computer Science).* "An Ethical Assurance Framework for Radiology AI: Auditing data bias and ensuring equitable predictions."

Session 2: Oral Presentations 1:00pm-2:30pm

Oral Sessions 2A, 2B, and 2C

Session 2A, Stroup Auditorium (Room 117): "Plants, farming and Careers"

(Moderator: Dr. Olalekan Sipasi)

- *Tanner Miller (Agricultural Studies).* "The Effect of Urea Fertilizer on Hard Red Spring Wheat in the Dakotas."
- *Carly Moore (Agricultural Studies).* "Industrialization of China's Swine Production: Evaluating its Influence on Soybean Markets in the Western Hemisphere."
- *Austin Buckman (Agricultural Studies).* "Production of Angus Cattle in the Badlands and Flatlands of Southwestern North Dakota."
- *Wyatt Walker (Agricultural Studies).* "How preservatives can maintain hay quality on high moisture prairie hay."
- *Taylynd Stuhr (Agricultural Studies).* "Vertical Farming Anywhere: Evaluating the Feasibility, Sustainability, and Scalability of Controlled-Environment Agricultural Through the Coldwater Fresh Model."
- *Shaydin Ell (Agricultural Studies).* "Attention and Interest at Career Fairs: Insights into Young Adults' Career Priorities."
- *Garin Opdahl (Agricultural Studies).* "Impact of soil pH on various rhizobium strains and how it affects soybean growth and nodulation"

Session 2B, Thompson Auditorium (Room 155): "Life in North Dakota"

(Moderator: Dr. Colin Strine)

- *Madison Beckler (Natural Science).* "Investigating the Effects of Supplemental Antioxidant Presences in Cells Undergoing Induced Oxidative Stress."
- *Carl Askins (Natural Science).* "Investigation of Phytochemistry and Antimicrobial Activity of Plants Native to North Dakota."

- *Miranda DiBenedetto (Natural Science).* "No Need to Hibernate: Seasonal behavioral shifts in eastern cottontail rabbits (*Sylvilagus floridanus*) at the NDUS Research Extension Unit."
- *Donivan Giangregorio (Natural Science).* "Ring-necked Pheasant (*Phasianus colchicus*) Habitat Usage Around Dickinson, North Dakota, in the Summer."
- *Arley Price (Natural Science).* "Trihalomethane Removal Efficiency of a Newly Developed Aeriation Technique for Drinking Water."
- *Tyson Schwab (Natural Science).* "Effects of Water Level Fluctuations on Breeding Success of Piping Plovers (Charadrius melodus) on Lake Sakakawea in the Summer of 2024."
- *Kimber Thiel* **"**An Evaluation of Sanitation Effectiveness in a Cat Facility Following a Coccidia Outbreak."

<u>Session 2C</u>, Murphy Hall Room 160: "Sports and Psychology"

(Moderator: Dr. George Seror III)

- *Kori Nagel (Natural Science).* "The Association of Leg Anthropometrics and Running Speed in Collegiate Track and Field Athletes."
- *Kyrie Alldredge (Psychology).* "Sports Psychology: Student athletes and mental health."
- *Reece Biel (Psychology).* "Harm Reduction: Assumptions versus evidence-based approaches."
- *Ganessa Ayuyu (Psychology).* "Controversies Within an Identity: Dissociative Identity Disorder."
- *Rosanna Rodriguez (Psychology).* "The Relationship Between Adverse Childhood Experiences and the Development of Substance Use Disorder."

Poster Presentations, 10:40pm to Noon

AGRICULTURE

- *The Effect of Vitamin A Supplementation on the Weaning Weight and Carcass Traits of Angus Calves* **Kailey Brimmer**
- *Production of Angus Cattle in the Badlands and Flatlands of Southwestern North Dakota* **Austin Buckman**
- *Attention and Interest at Career Fairs: Insights into Young Adults' Career Priorities* **Shaydin Ell**
- *The Effects of FerAppease® to Reduce Stress on Weaning Calves* **Brae Eneboe**
- *How Stage of Training Impacts a Horses Recovery Heart Rate* **Jenna Hume**
- *The Effectiveness of Purchasing an LRP (Livestock Risk Protection) on Any Given Year* **Lorelei Jarrett**
- *The Effect of Urea Fertilizer on Hard red Spring Wheat in the Dakotas* **Tanner Miller**
- *Industrialization of China's Swine Production: Evaluating its Influence on Soybean Markets in the Western Hemisphere* **Carly Moore**
- *Impact of soil pH on various rhizobium strains and how it affects soybean growth and nodulation* **Garin Opdahl**
- *Vertical Farming Anywhere: Evaluating the Feasibility, Sustainability, and Scalability of Controlled-Environment Agriculture Through the Coldwater Fresh Model* **Taylynd Stuhr**
- *The Effect of FerAppease® on Pregnancy Rates in Beef Cattle* **Abby Talkington**
- *Bucking Bull Genetics: Do Sires Effect Offspring in Terms of Buck Off Percentage, Average Score, and Power Rating* **Dalton Tvedt**
- *How Preservatives can Maintain Hay Quality on High Moisture Prairie Hay* **Wyatt Walker**
- *Comparative Differences Between the Backfat, Kidney Pelvic Heart (KPH%) and Quality Grade of Angus and Charolais Cattle* **Wyatt Wilharm**

COMPUTER SCIENCE

- *The Dynamic Oversight Blueprint: A Dual-Track Lifecycle for Ethical Machine Learning in Medical Diagnostics* **Benjamin Thompson**
- *The HEAL Framework: Operationalizing Transparency, Algorithmic Fairness, and Explainability in Clinical Artificial Intelligence* **Jacob Littleton**
- *The TAPE (Transparency, Autonomy, Privacy, Explicability) Ethical Framework For Privacy of Patient Data and Explainability of Treatment in Medical Primary Care* **Afolabi Soetan**

EDUCATION/TR HONORS LEADERSHIP

- *Hidden in Plain Sight: Labeling K-5 Standards as Foundational Choice Ready Essential Skills* **Kate Enney**

HISTORY

- *Afghanistan and Central Authority* **Isaac Baker**
- *The Silent Sentinels* **Emma Gillig**
- *The Fall of the Roman Empire; Causes and Consequences* **Joshua Jimenez**
- *Theodore Roosevelts Explorations* **Grant Kees**
- *Visions of Camelot* **Donald Radke**
- *Worth It: The Impact of Charles Worth on Fashion* **Kylie Zeller**

EXERCISE SCIENCE

- *Performance Predictors of National Basketball Association (NBA) Players Based on Collegiate Statistics* **Eniola Soetan**
- *Evaluating the impact of compensatory crosslinkers and Scaffold composition on the tensile strength and elasticity of Anterior Cruciate Ligaments using Recombinant Type I Collagen in Synthetic Compensatory Synthetic Ligaments* **Eniola Soetan**

NATURAL SCIENCE

- *Predicting Earthworm Location by Soil Moisture* **Rebekah Anderson, Jeremiah Jilek, Jacob Scully, Ben Kivela, Angel Pour**
- *Investigation of Phytochemistry and Antimicrobial Activity of Plants Native to North Dakota* **Carl Askins**
- *Effects of Mental Stress and Exercise on Heart Rate Recovery* **Hudson Atkinson**
- *Investigating the effects of supplemental antioxidant presences in cells undergoing induced oxidative stress* **Madison Beckler**
- *Effect of Caffeine on Salivary Function and Enamel integrity: A combined experimental study* **Reannan Butler**
- *No Need to Hibernate: Seasonal behavioral shifts in eastern cottontail rabbits (Sylvilagus floridanus) at the NDUS Research Extension Unit* **Miranda DiBenedetto**
- *Social Media Use and Depressive Symptoms in Adolescents: A Systematic Review (2010–2025)* **Maryam Elsayed**

- *Using Species Distribution Models to Identify High Risk Habitats from invasive Small Indian Mongoose (Urva auropunctata) on three major Hawaiian Islands* **Celicia Enos**
- *The Effect of Food Presence on Surface Behavior in Guppies (Poecilia Reticulata)* **Madilyn Freiter, Maryam Elsayed, Jesse Clawson, Kiaralynn Weidinger**
- *Foraging Behavior and Food Type Preference of Typical American Harvester Ants* **Drew Gabel**
- *Ring-necked pheasant (Phasianus colchicus) habitat usage around Dickinson, North Dakota in the summer* **Donivan Giangregorio**
- *An In-Depth Study on Heart River's Biodiversity & Health* **Kaleb Hamann**
- *Heat, Hunger, and Habitat: Investigating Temperature-Driven Feeding in Blaptica dubia roaches* **Mya Hentsch-Robb, Hanna Hill**
- *Inside the Blaptica Roach Hive* **Parker Knaub, Zachary Woog, Sandie Friday, Isaiah Vargas, Aric Winczewski**
- *Effect of Amino Acid Supplementation of BMMY Medium on Recombinant Protein Production in Pichia pastoris: Implications for Collagen-Related Biomaterials* **Maxx Lee**
- *Temperature VS Vinegar eels* **Davyn Lehfeldt, Jazmine Turner, Jesse Van Baalen, Kirstine Babia**
- *World Health Organization (WHO) Cleans Best: Does Soap Type Matter When Following Best Handwashing Practices?* **Natalie Lile**
- *Harvester Ants Attraction to Different Home Foods* **Sierra McKenzie, Cole Skabo, Kyler Hollinde, Hyrum Price, Gianni Smalls**
- *The Association of Leg Anthropometrics and Running Speed in Collegiate Track and Field Athletes* **Kori Nagel**
- *Color and Temperature Preferences in Lady Beetles (Coccinellidae)* **Lilly Newsom, Jack Taylor**
- *How Temperature Affects Behavior* **Zachary Nodland, April Matkin, Hunter Davis**
- *Effect of Light Exposure on Movement Time in Bess Beetles (Odontotaenius disjunctus)* **Camille Poncin**
- *Dog Breed and Trait Correlation in the Dickinson Area* **Giovanni Powell-Valdez**
- *Trihalomethane Removal Efficiency of a Newly Developed Aeriation Technique for Drinking Water* **Arley Price**
- *How Group Density Influences Foraging Duration in Lady Beetles* **Ava Robinson, Kazen Nelson, Kheyerah Bilger, Trixie Humilde**
- *Red Ants: Observing Preference on Glucose and Carbohydrates* **Rylee Rothleutner, Malachai Medina, Samantha Greff, Daniel Steinbr**

- *Effects of Water Level Fluctuations on Breeding Success of Piping Plovers (Charadrius melodus) on Lake Sakakawea in the Summer of 2024* **Tyson Schwab**
- *How does Acetaminophen affect Daphnia magna mouth movement behavior?* **Sandra Sones, Faith Sullivan-Brennan, Douglas Sheldon**
- *Do Trexo Robotic™ devices enhance bowel movements in children with stage (V) and stage (IV) cerebral palsy?* **Sam Stillings**
- *An Evaluation of Sanitation Effectiveness in a Cat Facility Following a Coccidia Outbreak* **Kimber Thiel**

NURSING

- *In hospitalized adults 65 years and older, does structured hourly nursing rounding, compared to standard nursing care without scheduled rounding, reduce the incidence of patient falls during hospitalization?* **Paola Carney Kahala, Shanna Kay Brian, Christopher Denten**
- *In Infants Under 1 Year of Age, How Does Safe-Sleeping Practices Compared to Unsafe-Sleeping Practices Affect the Incidence of Sudden Infant Death Syndrome During the First Year of Life* **McKensey Echeverria, Parker Lund, Mikayla Jardine**
- *Effects of Maternal Tylenol Use on Fetal Development During Pregnancy* **J'Ell Garfield, Peyton Janeway**
- *Does cognitive behavioral therapy (CBT) have a better effect on adults with depression than antidepressants alone, or when they are used concurrently?* **Rose Kuntz, Taylor Bohlen, McKenzie Haven**
- *In individuals experiencing an ischemic stroke (P), what is the effectiveness of Tenecteplase (I) compared to Alteplase (C), and how is quality of life and life expectancy improved or hindered (O) following medication administration (T)?* **Leah Nauman, Lauren Taylor**
- *In patients in the ED how does scanning medications before medication administration compares to scanning medications after medication administration in reducing medication errors over 6 months?* **Ashley Pinto, Madison Hughes**
- *In adults with chronic kidney disease, how does treatment with SGLT2 inhibitors compared to standard care affect the progression of kidney disease and cardiovascular outcomes over a 6–32-month period* **McKenzie Smith, Mercy Darko, Makaela Unterseher**
- *In preterm babies, how does delayed cord clamping compared to immediate cord clamping affect hematologic outcomes in the first 6 months of their life?* **Brianna Toll, Alicia Engstrom, Laura Maala**

PSYCHOLOGY

- *The Impact of Parenting Styles and Adverse Childhood Experiences on Adult Anxiety: The Role of Resilience and Grit* **Kaylee Bishop**
- *Rewiring Recovery: Brain-Injury Informed Support for Justice-Involved Individuals* **Mychal Reanne Cook**
- *Examining the Effects of Gamma Frequency Binaural Beats on Simon Task Performance* **Ellia Soydara**

Abstracts

Arranged alphabetically,last name of first author

Kyrie Alldredge

Sponsored by Dr. George Seror

Psychology

Sports Psychology: Student Athletes and Mental Health

Sports psychology examines the mental factors that influence performance, including motivation, confidence, focus, and stress management. This presentation explores the field of sports psychology, focusing on its role in enhancing athletic performance and supporting student athletes' overall wellbeing. This project aims to inform the audience about what sports psychology is, its history, how it is used, its benefits to athletes, and how it can be used to improve both individual and team performance in sports. In addition to providing an overview of the field, this project presents results of a survey distributed to student athletes across campus at Dickinson State University. The survey examined athletes' perception of whether mental health challenges affect their performance, how often it affects them, and what they believe are the main causes. The survey also assessed the athletes' interest in having a sports psychologist available to them at the university. This presentation emphasizes the value of integrating psychological support into athletic programs. It will be proposed that a sports psychologist should be hired at the university to enhance performance and improve overall mental health of student athletes on campus.

Rebekah Anderson, Jeremiah Jilek, Jacob Scully, BenKivela, Angel Pour

Sponsored by Dr. Colin Strine

Natural Sciences

Predicting Earthworm Location by Soil Moisture

At the population level, earthworms (Lumbricus terrestris) will favor soil types with more moisture over soil types with less moisture, assisting agricultural professionals to predict locations of greatest benefit. We asked the question, "What soil type do earthworms prefer?" and hypothesized that they would prefer the moist soil over the dry and soaked soils. To test our hypothesis, we put 2000 grams of soil in a 28.5 cm X 18 cm plastic bin and separated the soil into three sections to separate the soil types. The three soil types we created were dry (no added water), moist (100 mL), and soaked (200 mL). After 24 hours, we counted the number of earthworms in each soil type, recorded those numbers, and used R Version 4.5.2 to complete our statistical analysis. We ran a Kruskal-wallace test and a post hoc Dunn test. We ran 5 trials with each bin being its own trial, and each contained 15 earthworms in total, starting with 5 in each soil type, which totaled 75 earthworms. In the dry, moist, and soaked soil types, the averages were 1.4, 6.8, and 6.8 earthworms, respectively, and the standard deviations were 1.34, 1.10, and 0.84 earthworms, respectively. There is significant difference between at least one or more of our soil types (KW score, p-value = 0.01). There is significant difference between the dry and moist soil types and the dry and soaked soil types (Dunn, P.adj = 0.02). There is no significant difference between the moist and soaked soil types (Dunn, P.adj = 0.89). Generally, the earthworms migrated to either moist or soaked soil types but not the dry soil type. The data supports our hypothesis that earthworms prefer moist soil over dry soil, but it refutes our hypothesis that they prefer moist soil over soaked soil.

Carl Askins

Sponsored by Dr. Samanthika Hettiarachchi and Dr. Jinasena Hewage

Natural Sciences

Investigation of Phytochemistry and Antimicrobial Activity of Plants Native to North Dakota

Antimicrobial resistance is one of the most relevant global public health threats, putting many of the gains of modern medicine at risk due to the misuse of antimicrobial medication. As antimicrobial resistance continues to escalate, phytochemical research is emerging as a promising avenue for developing new

strategies to combat resistant pathogens. I hypothesized that sequential Soxhlet extracts from Native North Dakota plants will show solvent dependent phytochemical signals and will inhibit Escherichia coli growth in a diffusion assay more than the control group. Seeds of Lemon Balm, Milkweed, Purple Coneflower, and Golden Rod were greenhouse grown at Dickinson State University; whole plants were air-dried, and Soxhlet extracted sequentially with methanol and distilled water. Extracts were assayed for alkaloids (Dragendorff test) and reducing sugars (Fehling test) and screened against E. coli on EMB agar. Disk diffusion was used by soaking disks in extract and placed in plates, then incubated. Zones of inhibition were determined by measuring the maximum diameter of a clear region surrounding each disk. 80 plates were used, 20 plates per plant (10 with methanol and 10 with water extract). Alkaloids were detected in only water extracts of Milkweed, Purple Cornflower, and Lemon Balm, while reducing sugars were detected mainly in methanol extracts strongest for Lemon Balm. Golden Rod was negative for both alkaloids and reducing sugars. Kruskal-Wallis test found no significant difference in plant type on zone of inhibition ($\chi 2 = 14.702$, df = 11, $p = 0.1965$) but a significant difference in extract type on zone of inhibition ($\chi 2 = 24.16$, df = 11, $p = 0.01208$). Overall, inhibition varied more by extract grouping than by plant identity, but interpretation is limited by sequential extraction carryover and non-standard approach relative to reference disk methods.

Hudson Atkinson

Sponsored by Dr. Colin Strine

Natural Sciences

Effects of Mental Stress and Exercise on Heart Rate Recovery

Heart rate is a commonly used indicator of physiological stress, physical exertion, and cardiovascular recovery. The purpose of this study is to examine differences in heart rate responses under psychological stress without physical activity and during recovery following intense physical exercise. Participants will first remain seated and play a game of Jenga to induce mild cognitive and emotional stress while heart rate is monitored using a finger pulse oximeter. Participants will then complete a high-intensity workout designed to significantly elevate heart rate. Post-exercise heart rate will be recorded immediately and at set intervals during recovery. This study aims to compare peak heart rates and recovery times between the two conditions. It is hypothesized that physical exercise will produce higher peak heart rates and longer recovery times compared to psychological stress alone. Understanding these differences may provide insight into autonomic nervous system responses and cardiovascular fitness.

Ganessa Ayuyu

Sponsored by Dr. George Seror

Psychology

Controversies within an Identity: Dissociative Identity Disorder

Dissociative identity disorder has been highlighted as one of the most common dissociative disorders, but it is heavily misjudged in both medical and public settings. Many of their cases are misdiagnosed due to controversial beliefs and biased interpretations. As with many mental health disorders, dissociative identity disorder took a long and careful process of analysis to be confirmed as a diagnosis; however, people remained skeptical about how its symptoms should be properly seen and treated. Often, the disorder is caused by exposure to abusive and violent behaviors. Although treatment is a slow process, additional research can help raise awareness for the treatment of dissociative identity disorder.

Isaac Baker

Sponsored by Ms. Stefanie Aulner

History

Afghanistan and Central Authority

The 1960's were a turbulent time for the Kingdom of Afghanistan, as the government began a project to reform the nation. Over the next decade, Afghanistan would see a constitution introduced, freedom of the press guaranteed, encouragement of the formation of parties, numerous economic developments made, and a parliament formed through which to debate on and propose bills to the executive branch. Yet by the end, these changes would end abruptly in an early morning coup after which the nation would transition from a

Centuries old monarchy to a one state dictatorship. A failure to control the new modernizing army, a lack of care within the general population and an overall disapproval among the cities, along with a lack of meaningful change to the status quo led to a weak central government, ended in one day. Within this poster, you will learn exactly why Afghanistan's attempt to liberalize and modernize failed, and instead why it drifted into authoritarianism and war.

Madison Beckler

Sponsored by Dr. Sarah Manka

Natural Sciences

Investigating the effects of supplemental antioxidant presences in cells undergoing induced oxidative stress

In the body, an excess of Reactive Oxygen Species can lead to cell and tissue damage, correlating with cancers, cardiovascular disease, some neurodegenerative diseases, immunologic disorders, and the aging process. ROS accounts for the imbalance between pro-oxidants and antioxidants within biological systems known as oxidative stress. Reactive Oxygen Species (ROS) refers to the various oxygen-containing free radicals and reactive non-free radicals; often a product of metabolism. High amounts of ROS are not always terminus; antioxidants may aid in lowering oxidative stress and restoring homeostatic balance through donating electrons or scavenging. Many antioxidants must be consumed through nutrition, because they are not naturally synthesized in the body, for example, vitamins E, C and A must be consumed regularly to avoid deficiency. Vitamin C is heavily researched within health sciences, and this research aims to understand the relationship between induced oxidative stress and vitamin C treatment at the cellular level. I aimed to confirm vitamin C antioxidant properties by inducing oxidative stress with hydrogen peroxide (H2O2). I chose HeLa cells – an immortal cancer cell-line because they are commonly used as an oxidative stress model. Oxidative stress was induced with increasing hydrogen peroxide concentrations ranging from 100 um to 1000 um of variable increments. By exposing cells to several concentrations, I created a viability curve based on hemocytometer cell counting. From this curve, values for hydrogen peroxide and antioxidant co-treatment were selected as 300 um H2O2, and 100 um vitamin C. Differences in mean cell viability percent (H2O2 = 57.0 ± 6.53 %), compared with supplemental antioxidants (H2O2+VitC = 71.4 ± 4.43%) were detected. Overall, this study supports the growing evidence that vitamin C plays a critical role in preserving cellular integrity under oxidative stress conditions.

Reece Biel

Sponsored by Dr. George Seror

Psychology

Harm Reduction: Assumptions Vs Evidence Based Approaches

Millions of people in the United States abuse or misuse alcohol or other drugs each year, and an increasing number of individuals can be described as having a substance use disorder. In the early days of treatment for these disorders, the prevailing thought was that abstinence was the only viable approach; but another approach has gained support in recent decades with notable increases in public and professional backing during the AIDS epidemic in the 1980s and 90s. That approach is harm reduction. Harm reduction recognizes abstinence-only approaches as a potential barrier to treatment. Harm reduction approaches are not as intent on completely eradicating substance use behaviors as much as they are focused on mitigating the negative impacts of those behaviors. These approaches appear to be particularly beneficial for intravenous drug users and those who use opioids. This presentation will examine preliminary evidence from several studies which suggest that syringe service programs (SSPs) provide a pathway for those who inject drugs to obtain services that lower the risks associated with their substance use. These studies also indicate that SSPs get the lifesaving medication naloxone into the hands of those that are most likely to be at the site of an overdose. Lastly, SSPs introduce individuals who may otherwise be resistant to treatment to nonjudgmental treatment providers. While evidence favors the benefits of harm reduction approaches, more research is needed to fully understand their impacts.

Kaylee Bishop

Sponsored by Dr. George Seror

Psychology

The Impact of Parenting Styles and Adverse Childhood Experiences on Adult Anxiety: The Role of Resilience and Grit

Supportive parenting styles and low exposure to adverse childhood experiences (ACEs) are associated with lower levels of anxiety and stronger coping mechanisms in adulthood. Resilience and grit are protective traits that help individuals manage stress. However, it is possible that limited exposure to adversity during childhood may reduce opportunities for developing resilience and grit. This study explores the relationship between childhood environment, resilience, grit, and adult anxiety. It examines whether individuals with highly positive childhood experiences represented by low ACE scores and ideal parenting consistently exhibit high anxiety levels in adulthood due to lack of exposure to stressors may hinder the development of resilience and increase anxiety later in life. Specifically, it is hypothesized that individuals reporting highly positive childhood environments will demonstrate lower levels of resilience and grit, resulting in higher levels of anxiety in adulthood. To test this, a survey measuring perceived parenting styles, ACEs, resilience, grit, and current anxiety levels was conducted. Results of the survey and potential directions for future research will be discussed.

Kailey Brimmer

Sponsored by Dr. Chip Poland

Agricultural Studies

The Effect of Vitamin A Supplementation on the Weaning Weight and Carcass Traits of Angus Calves

Vitamin A has been considered to be the most important vitamin from a practical nutritional standpoint. It was recognized in the 1920's and 1930's that most animal species have a specific dietary requirement for vitamin A. Requirements for beef cattle have been established for feedlot cattle, dry pregnant females, lactating females and bulls. The objective of this project was to determine if vitamin A supplementation at birth has an impact on weaning weight and carcass traits of Angus calves. To investigate this, calves from 31 two-year-old heifers were randomized to treatment within sex at birth. Calves in the treated group (every other calf within sex) was given a supplemental vitamin A injection (500,000 IU) at birth and again at approximately two months of age. Calves in the control group were not given vitamin A injections. At approximately seven months of age, all calves were weighed and ultrasounded to record their carcass measurements. The carcass measurements taken consisted of intramuscular fat, rib fat, rump fat, and ribeye area. Weaning weight and carcass characteristics were not affected by either vitamin A treatment ($P>0.24$) or an interaction between vitamin A treatment and sex ($P>0.61$), with one possible exception. Rib fat ($P=0.12$) tended to be greater in treated heifers and untreated steers. Steer calves had greater weaning weights ($P=0.01$) and ribeye area ($P=0.001$) and lower intramuscular fat ($P=0.008$) compared to heifers. Rib ($P=0.21$) and rump ($P=0.15$) fat was not affected by sex. Overall, supplementation of vitamin A in young Angus calves did not have a direct effect on weaning weight or carcass traits.

Austin Buckman

Sponsored by Dr. Chip Poland

Agricultural Studies

Production of Angus Cattle in the Badlands and Flatlands of Southwestern North Dakota

The beef industry in North Dakota produced $2.5 billion in gross business volume in 2022. Angus, a breed of beef cattle, are known for are known for their meat quality, fertility, and adaptability, but environmental factors such as climate, forage availability, soil conditions, and terrain can influence their performance. In western North Dakota, the Flatlands (Missouri Plateau ecosite) and Badlands (Little Missouri Badlands ecosite) differ greatly in these conditions, which may impact cattle growth and reproduction. Despite these differences, there is limited research comparing how cattle perform across these regions under similar management conditions. This study aimed to evaluate the performance and productivity of Angus cattle raised in the Flatlands and Badlands regions of western North Dakota. Data were collected over a two-year period and included first-calf heifers and three-year-old cows in the Flatlands, and four- and five-year-

old cows in the Badlands. Measurements included calf birth weight, weaning weight, yearling weight, and rebreeding success to assess growth and reproductive efficiency. Results showed that calves in the Flatlands had slightly lower birth weights (P=0.08) compared to those in the Badlands. However, these differences decreased by the weaning (P=0.87) and yearling (P=1.00) stage's, where weights were similar between regions. Rebreeding performance was similar across the two environments. Overall, environmental conditions influenced early growth, but long-term performance was similar between regions. These findings suggest producers should focus on overall productivity rather than early weights when making management decisions. Future research should examine forage quality, soil health, water availability and genetics of similarly aged cows to better understand regional differences. Keywords: Angus cattle, cattle performance, western North Dakota, forage conditions, reproductive efficiency, livestock management.

Reannan Butler

Sponsored by Dr. Elizabeth Freedman

Natural Sciences

Effect of Caffeine on Salivary Function and Enamel integrity: A combined experimental study

Caffeine is a widely consumed stimulant found in a variety of beverages, and its combined effects on oral health remain incompletely understood. This raises many concerns about oral health, including saliva and enamel, among people who drink caffeine. Previous studies have provided important insights into the effects of oral health, focusing mainly on saliva or enamel, but there is a lack of integrated experimental models that examine both simultaneously. This research project at Dickinson State University (DSU) investigates the effects of caffeine on oral health, researcher participation, and extracted rat teeth. The saliva study will be a single-subject design in which the researcher will measure their own flow rate, pH, and buffering capacity after caffeine intake, then compare these results with a control test using water. The enamel study will use rat-derived tooth samples and expose them to a control caffeine solution and to control water, which will be measured for microhardness, mineral density, and surface erosion. It is hypothesized that caffeine will reduce salivary protection function and increase enamel degradation. Results are expected to show that flow rate, buffering capacity, and pH all decrease, whereas enamel damage increases, leading to decreased hardness and increased erosion.

Paola Carney Kahala, Shanna Kay Brian, Christopher Denten

Sponsored by Mr. Cody Ptacek

Nursing

In hospitalized adults 65 years and older, does structured hourly nursing rounding, compared to standard nursing care without scheduled rounding, reduce the incidence of patient falls during hospitalization?

Patient falls among hospitalized adults aged 65 years and older continue to pose a serious threat to patient safety, often resulting in injury, prolonged hospital stays, and increased healthcare costs. This review examines whether structured hourly nursing rounding, compared to standard care, can reduce fall incidence in this high-risk population. Drawing from six peer-reviewed studies, including a randomized controlled trial, the evidence indicates that hourly rounding can significantly reduce falls by improving patient monitoring and proactively addressing needs such as pain, positioning, and toileting. Despite some variability in implementation across studies, the findings consistently support hourly rounding as an effective, evidence-based, and practical intervention. These results highlight a simple, scalable nursing strategy that can significantly improve patient safety and outcomes, supporting broader clinical adoption.

Mychal Reanne Cook

Sponsored by Dr. George Seror

Psychology

Rewiring Recovery: Brain-Injury Informed Support for Justice-Involved Individuals

Brain injury is highly prevalent among individuals involved in the criminal legal system, with research estimating that 60% to 87% of incarcerated individuals report a history of traumatic brain injury (TBI), compared with approximately 12% in the general population. Many of these injuries remain undiagnosed and contribute to challenges in emotional regulation, impulse control, memory, and decision making. These neurological effects are often misinterpreted as behavioral problems rather than consequences of injury, resulting in responses that may not adequately address underlying needs. This misunderstanding can contribute to disciplinary actions, limited access to appropriate services, and barriers to rehabilitation. Because most incarcerated individuals will eventually return to their communities, addressing brain injury in correctional facilities is a critical public health concern. This poster examines the prevalence of brain injury among justice-involved populations in North Dakota and highlights brain-injury-informed peer support as a strategy to increase awareness, improve self-regulation skills, and support successful community reintegration and long-term recovery outcomes.

Miranda DiBenedetto

Sponsored by Dr. Colin Strine

Natural Sciences

No Need to Hibernate: Seasonal behavioral shifts in eastern cottontail rabbits (Sylvilagus floridanus) at the NDUS Research Extension Unit

This project assessed the seasonal differences in the behaviors of eastern cottontail rabbits (*Sylvilagus floridanus*) at the Dickinson Research Center in North Dakota from fall 2025 through winter 2026.The research hypothesis was that behavioral frequency would differ between fall and winter for at least some recorded behaviors. We recorded daily minimum and maximum temperature using local weather networks in addition to precipitation level. Using five motion-activated Stealthcam Wildview TM camera traps in open fields and forests, this study has recorded rabbit activity over the course of four months with equal durations between fall and winter. All cameras were set for 10 second recording intervals. Each video was reviewed by two observers for presence of cottontails on camera. Once confirmed each video with cottontails was reviewed to code foraging, vigilance, alertness, movement, grooming, play, and flight based on a pre-defined ethogram. Throughout the study, 651 videos with cottontails were captured between October 2nd 2025 and January 14th, 2026. Not every camera detected cottontail rabbits. There were 408 videos recorded in the fall and 243 videos recorded in the winter, of these only 2 confirmed play observations were recorded. Average maximum daily temperature recorded was three degrees higher in the fall compared to the winter, while winter had approximately 2-degree cooler average minimum daily temperatures. Average rainfall during the fall season was 0.156 ± 9.77 mm with no rainfall in winter. Cottontails foraged more during the winter despite similar vigilance behavior between seasons. However, cottontails spent less time alert in the winter and moved less on camera during winter than in fall. Despite the fewer detections in the winter, behavioral differences may be explained by cottontails experiencing increased energetic requirements in winter. Cottontails tended to forage more in the winter perhaps to offset these energy demands.

McKensey Echeverria, Parker Lund, Mikayla Jardine

Sponsored by Mr. Cody Ptacek

Nursing

In Infants Under 1 Year of Age, How Does Safe-Sleeping Practices Compared to Unsafe-Sleeping Practices Affect the Incidence of Sudden Infant Death Syndrome During the First Year of Life

Sudden infant death syndrome (SIDS) remains a leading cause of infant mortality in the United States, with sleep environment and practices playing a critical role in risk reduction. Findings consistently demonstrate that adherence to safe sleep recommendations, such as supine positioning, use of a firm sleep surface, room-sharing without bed-sharing, and avoidance of soft bedding, significantly reduces the risk of SIDS and other sleep-related infant deaths. Unsafe sleep practices, including prone positioning, co-sleeping/bed-sharing, and exposure to loose bedding, are strongly associated with increased risk. While breastfeeding has been shown to have a protective effect, its association with bed-sharing introduces complex

risk-benefit considerations. Additionally, parental education, culturally sensitive communication, and consistent modeling of safe sleep practices by healthcare providers are essential in improving adherence to guidelines. Quality improvement initiatives in clinical settings further support that reinforcement of safe sleep behaviors can positively influence caregiver practices.

Shaydin Ell

Sponsored by Dr. Chip Poland

Agricultural Studies

Attention and Interest at Career Fairs: Insights into Young Adults' Career Priorities

College students use career fairs as a crucial resource for career exploration, yet little is known about what draws students to and maintains their interest in these environments. Understanding these engagement patterns is essential for improving the effectiveness of in-person career fairs. This study examines young adults' engagement by analyzing booth selection, self-reported time spent at booths, and the factors that influence their interest. Participation at a university job fair was investigated using anonymous surveys during Dickinson State University's Opportunities in Agriculture career fair. The study focuses on the relationship between young adults' behavior and booth features such as industry type, engagement, and perceived career significance through career fairs. Results showed that Cenex and Harvest States (CHS) Southwest Grain attracted the most initial attention among booths. Young adults spent an average of 3.42 minutes at each booth, indicating short but meaningful interactions. The most influential factors in determining interest were job location, advancement opportunities, company culture, and company reputation. Booth appearances ranked lowest in importance, suggesting that visual design does not strongly impact engagement. Overall, young adult engagement at career fairs is driven more by career-related factors than by booth aesthetics. Hence, the purpose of this study is to provide career services professionals and employers with information on how to increase participation at in-person job fairs, especially in the domains of agriculture and natural resources.

Maryam Elsayed

Sponsored by Dr. Sarah Manka

Natural Sciences

Social Media Use and Depressive Symptoms in Adolescents: A Systematic Review (2010–2025)

The project is a systematic review of the relationship between social media and depression among adolescents aged 10-19 years. Social media use among young people, such as Instagram, Snapchat, and TikTok, is an integral part of modern life. The use of social media and its possible negative effects on young people's mental health is a growing concern. However, existing research indicates conflicting results regarding the relationship between social media and depression among young people.The purpose of this review is to provide a better understanding of the relationship between social media and depression among young people by reviewing existing research published between 2010 and 2025. The review will not only focus on the amount of time spent by young people on social media but also on how they use social media. The review will also examine the patterns of young people's social media use, such as passive use of social media, social comparison on social media, cyberbullying, and the problematic use of social media.

The project will be conducted by following a systematic approach and will critically assess existing research on the use of social media and depression among young people. The project is expected to find a stronger relationship between young people's use of social media and depression than the amount of time spent by young people on social media.

Brae Eneboe

Sponsored by Dr. Chip Poland

Agricultural Studies

The Effects of FerAppease to Reduce Stress on Weaning Calves

Beef cattle face numerous sources of stress from birth to harvest. Routine handling practices, such as weaning, can cause stress in cattle, triggering inflammatory responses that negatively affect their health, productivity, and reproductive performance. FerAppease mimics the naturally secreted pheromones produced by the mammary glands, providing a calming effect to nursing calves. Studies show that FerApease has reduced the number of treatments needed for calves to regain full health from bovine respiratory disease. Many studies have used FerAppease at feedlot arrival, but little research has focused on weaning. This study evaluates FerAppease effectiveness to reduce stress by improved behavioral responses, decreased morbidity and mortality rates, and increased average daily gain. The study was conducted from October 7 to November 19 of 2025, using 48 bull calves ranging from 442 lbs to 620 lbs. At weaning, calves were weighed, band castrated, vaccinated, and assigned to a control or treatment group. Calves were arranged into three replicates containing eight calves. Weights were collected three times: days 0, 14, and 43. Daily observations occurred during days 0-14. Results showed that in the first three days of observations, treated calves tended to find water faster ($p=0.12$) and had reduced tendencies of bawling ($p=0.08$) and pacing ($p=0.15$). Over the entire period, treated calved were observed eating pellets more frequently ($p<0.02$). Initial body weight ($p<0.10$) tended to be greater in the treatment group. Average daily gain was 1.1 lbs per day across both groups. Final body weights ($p<0.25$), body weight gain ($p>0.27$), and average daily gain ($p>0.27$) did not differ between the groups. No calves were treated for sickness or died. Overall, FerApease reduced some stress-related behaviors after weaning but did not improve overall health and overall performance gain was not guaranteed.

Kate Enney

Sponsored by Mrs. Michelle Orton

Education/Theodore Roosevelt Honors Leadership Program

Hidden in Plain Sight: Labeling K-5 Standards as Foundational Choice Ready Essential Skills

While North Dakota's Choice Ready framework is designed as a high school accountability measure, the foundational essential skills of critical thinking, collaboration, and communication must be cultivated early in a student's education. This scholarly review examines the connection between North Dakota Century Code 15.1-21 and early skill development in elementary classrooms. By aligning Choice Ready indicators with K–5 standards, this research highlights how these essential skills are already embedded within existing standards but are not formally labeled or tracked as Choice Ready indicators until high school. This gap limits opportunities to intentionally support and document student growth over time. This presentation proposes labeling K–5 standards that address communication, creativity, critical thinking, and collaboration as foundational essential skills under Choice Ready and creating ways to track student progress in these areas. Attendees will explore strategies to help students recognize these skills as part of their future readiness. Ultimately, this review argues that North Dakota's existing K–5 standards already serve as Choice Ready foundations in learning essential skills, but require intentional labeling and tracking to fully support student readiness.

Celicia Enos

Sponsored by Dr. Colin Strine

Natural Sciences

Using Species Distribution Models to Identify High Risk Habitats from invasive Small Indian Mongoose (Urva auropunctata) on three major Hawaiian Islands

Species distribution models provide a foundation for understanding potential distributions of an invasive mongoose (U. auropunctata) across three islands in Hawaii, Oahu, Maui and Hawaii. To explain U. auropuncatas distribution across these islands, we used Maxent modeling to create habitat suitability maps combining extracted recorded presence data from iNaturalist and 2 bioclimatic predictors from worldclim. We obtained recorded occurrences highest on Oahu (n = 1037) followed by Hawaii island and Maui. Maxent modeling provided a habitat suitability map that visualizes areas of the species occurrences and highly suitable areas. Response curves suggest mongoose preference toward moderate minimum temperatures (peaking between 12 oC - 17 oC) and higher levels of precipitation (varying per island). Additionally, model

performance provided area under the curve (AUC), with moderate predictability for Oahu (AUC = 0.76) and Maui (AUC = 0.75) and good predictability for Hawaii (AUC = .90). This analysis emphasizes the threat mongoose pose to Hawaii's ecosystems and highlights the importance of identifying high-risk areas for future biological control.

Hawken Farstveet

Sponsored by Dr. Talha Naqash & Dr. Shafaq Asif

Computer Science

Operationalizing Ethics in Healthcare AI: A Framework for Bias Mitigation and Data Privacy in Medical Imaging

Machine learning is increasingly integrated into clinical decision support systems (CDSS), particularly in medical imaging and diagnostic applications such as radiology and dermatology. These systems can improve diagnostic speed and accuracy, but they can also introduce serious ethical concerns. Due to the growing reliance on machine learning in healthcare, there is a risk of biased training data and insufficient privacy protections. Demographic bias occurs when machine learning models are trained on unrepresentative or biased datasets, which leads to inconsistent performance across racial or gender groups. In addition, the use of Protected Health Information raises concerns regarding data security, anonymity, and regulatory compliance. These challenges show the need for a structured ethical framework embedded throughout the machine learning lifecycle. This focuses on bridging the gap between AI ethics and clinical engineering by providing a step-by-step guide for auditing medical diagnostics. By integrating ethical checks throughout all stages of development, including data collection, preprocessing, training the machine learning model, validation, deployment, and continuous monitoring. Provides the tools for evaluating the dataset's representativeness, detecting and mitigating demographic bias, and ensuring that patient data is properly anonymized and securely stored. This protects healthcare institutions from legal liability and helps build the trust necessary for doctors to adopt AI in their daily practice. The outcome of this study is a structured, actionable framework that translates ethical principles into practical steps within the machine learning development lifecycle. By applying this framework, the expected outcome is to yield more equitable diagnostic models by getting rid of bias during the data preparation phase rather than after the deployment of the model.

Madilyn Freiter, Maryam Elsayed, JesseClawson, Kiaralynn Weidinger

Sponsored by Dr. Colin Strine

Natural Sciences

The Effect of Food Presence on Surface Behavior in Guppies (Poecilia Reticulata)

Food presence is a factor that affects the behavior of animals, especially in fish, where swimming vertically might be correlated with feeding habits. This experiment was aimed at finding out if there was a connection between the presence of food and increased time guppies spend at the surface of water. It was hypothesized that food presence results in an increase in time guppies spend at the surface. Fifteen guppies were placed in a graduated cylinder filled with 1000 mL of water. Two observations were made: first without adding any food, then after adding food. Each observation lasted for two minutes for 30 trials. Time spent at the surface and guppy color were measured. The data were not normally distributed (Shapiro-Wilk, $p < 0.05$); therefore, non-parametric methods were used. Results showed no significant difference in the number of seconds guppies spent at the surface depending on food presence (Wilcoxon test, $p > 0.05$).

Drew Gabel

Sponsored by Dr. Colin Strine

Natural Sciences

Foraging Behavior and Food Type Preference of Typical American Harvester Ants

This study examined the foraging preferences of Pogonomyrmex occidentalis (typical American harvester ants) when exposed to various macronutrient sources on coverslips—fats (peanut butter), proteins (tuna), and carbohydrates (honey)—compared to a non-food control, all positioned equidistantly (15 cm

apart), to better understand ecosystem dynamics and develop better pest management strategies. Ants were hypothesized to prefer carbohydrate-rich foods when given multiple nutrient options. In this experiment, 10 ants were placed in the center of an arena and given 2 minutes to adjust to their new environment. Their distribution across food zones was recorded at 0, 2, 4, and 6 minutes for each trial. This process was repeated 8 times for a total of n = 80 ants. Statistical analysis was conducted to determine whether recruitment differed by food type over time. Normality tests (Shapiro–Wilk) indicated non-normal data, so Kruskal–Wallis tests were used alongside ANOVA when appropriate. No ants were present at any food site at 0 minutes. At 2 minutes, no significant preference was observed ($p > 0.05$). By 4 minutes, trends emerged ($p = 0.074$) but were not significant. At 6 minutes, ants showed a strong preference (Kruskal–Wallis, $p = 0.001$). Post hoc analysis (Dunn's test with Holm adjustment) showed significantly more ants were attracted to carbohydrates than the control ($p = 0.009$) and fat ($p = 0.001$). These results indicate a time-dependent shift from random exploration to a clear preference for carbohydrate-rich food sources.

J'Ell Garfield, Peyton Janeway
Sponsored by Mr. Cody Ptacek
Nursing

Effects of Maternal Tylenol Use on Fetal Development During Pregnancy

In pregnant women, the safety of Tylenol use during pregnancy remains debated. Tylenol is the most researched pain reliever for pregnant women currently used. Our research aims to determine how Tylenol use during pregnancy affects fetal development. The First Baby Study tracked 2,423 mother-child pairs and assessed self-reported third-trimester use of Tylenol. They recorded the child outcomes using behavioral scales such as the Child Behavior Checklist at age 3 (Sznajder, Teti, & Kjerulff, 2022). The results from this large cohort indicated consistent associations between prenatal Tylenol use and later developing neurodevelopmental concerns. These diagnoses included attention-deficit hyperactivity disorder (ADHD), autism spectrum disorder (ASD), or broader neurodevelopmental disorders. Across all the research reviewed, prenatal acetaminophen exposure showed consistent associations with adverse neurodevelopmental outcomes in children, such as sleep and attention problems (Sznajder, Teti, & Kjerulff, 2022). Other research studies showed that maternal use of acetaminophen during pregnancy lacked accurate knowledge of dosing or potential risks. Some sources acknowledged the role of genetic or outside factors. The results indicate that prenatal exposure to acetaminophen is consistently associated with an increased likelihood of adverse neurodevelopmental outcomes. Although causation cannot be confirmed, there are concerns for fetal brain development. At the same time, maternal use of acetaminophen, combined with limited knowledge about proper dosing and potential risks, plays a large part in affecting public perception and emerging evidence. Overall, the results highlight the importance of cautious, well-informed use of acetaminophen during pregnancy. They suggest that healthcare providers and pregnant women weigh the benefits and potential risks.

Donivan Giangregorio
Sponsored by Dr. Sarah Manka
Natural Sciences

Ring-necked pheasant (Phasianus colchicus) habitat usage around Dickinson, North Dakota in the summer

Understanding habitat selection in wildlife species is important for effective conservation and management, particularly in agricultural landscapes where habitat availability is constantly changing. The ring-necked pheasant (*Phasianus colchicus*) is a widely distributed game bird, yet limited research exists on its summer roosting preferences in North Dakota. This study researched how habitat type influences summer roosting site selection of pheasants around Dickinson, North Dakota. It was hypothesized that pheasants would prefer habitats with greater vegetative cover, such as wetlands, due to increased protection from predators and access to food resources. Field observations and trail camera data were collected across three habitat types (wetland, idle grassland, and strip cover) during July and August 2025. Six trail cameras and weekly in-person counts were used to record pheasant presence, with data analyzed using chi-square tests in R. A total of 74 pheasant detections were recorded, with 44 observations occurring in wetlands, 16 in idle

grasslands, and 4 in strip cover. Statistical analysis showed a significant difference in habitat use ($x^2 = 39.5$, $df = 2$, $p < 0.001$), implying that habitat selection was not due to chance. No significant relationship was found between habitat use and demographic class ($x^2 = 6.17$, $df = 4$, $p = 0.187$). These results demonstrate a strong preference for wetland habitats across all groups. This study suggests that maintaining wetland vegetation may be needed to support pheasant populations during the summer months in North Dakota.

Emma Gillig
Sponsored by Dr. Stefanie Aulner
History/Composite Social Science EDUC Program
The Silent Sentinels

This study examines the findings on the Silent Sentinels and their contribution towards Women's Rights and History. The Silent Sentinels were a militant subgroup of the American Suffragists led by Alice Paul. Research was done on the treatment these women received during and after these protests. The findings were then examined to understand how their treatment and actions affected the Women's suffrage movement as a whole. The research was done through examining primary and secondary sources that included, Jailed for Freedom by Doris Steven and, The Silent Sentinels by Jason Nord. Through these sources it was found that these women had suffered tremendous abuse at the hands of the law, (The Night of Terror) and counter protesters. The news of the women who suffered did help turn the tides towards the view of Women's Suffrage being a right. Their work is still revered today, and can help with those struggling to see their protesting coming to an actual fruition.

Kaleb Hamann
Sponsored by Dr. Colin Strine
Natural Sciences
An In-Depth Study on Heart River's Biodiversity & Health

This paper is an attempt to assess the ecological health of Heart River and by extension Lake Patterson, noted reservoir to Dickinson and surrounded by the Crooked Crane trail. I hypothesize greatest species richness and water quality in sites furthest from both South Heart and the Renewable Deisel Plant East of Patterson Lake. I will use the biodiversity of observed wildlife frequenting the river and sampled aquatic characteristics through various sets of means like the deployment of cameras, examination of water quality, and traps for arthropods. A trio of areas have been designated as points of study in the roughly 5 miles of space between Patterson and South Heart where the Heart River winds through. Each area consists of a pair of points on the far sides where data will be collected, these points will be set up with of cameras (12 in total, 2 cameras for each of the 2 points in all 3 areas) on both sides of the river facing away from it to photograph passing animals, these spots will also have the insect traps and are where water samples will be collected which will determine species richness of each point which can thus be contrasted to other points. These results can be used to assess impacts of development and industry on the local biodiversity using Heart River.

Mya Hentsch-Robb, Hanna Hill
Sponsored by Dr. Colin Strine
Natural Sciences
Heat, Hunger, and Habitat: Investigating Temperature-Driven Feeding in Blaptica dubia roaches

Temperature and eating habits are interconnected through metabolic requirements, though factors like humidity and dehydration also play a role. This study examined how temperature affects the appetite of Blaptica dubia (Dubia roach) across three environments: cold (6.5 °C), room temperature (16 °C), and hot (27.8 °C). Each treatment consisted of two trials with two homes (6x6x10 cm plastic boxes) containing soil, leaves, a hide, and approximately 15.36g of food (5.22g of lettuce and 10.14g of carrots). Each home contained 8 roaches, and data was collected 48 hours after feeding. The average food consumed was 5.60g in the cold environment, 0.31g at room temperature, and 1.36g in the hot environment. Despite these numerical

differences, a Kruskal-Wallis test indicated no statistically significant differences ($p > 0.05$ for all comparisons), likely due to the small sample size ($n = 2$). While the results confirm a numerical impact of temperature on appetite—specifically that the roaches ate more in the heat than at room temperature—the lack of statistical significance suggests that other variables, such as humidity and species preference, likely influenced the findings.

Jenna Hume

Sponsored by Dr. Chip Poland

Agricultural Studies

How Stage of Training Impacts a Horses Recovery Heart Rate

Rodeo is a high-intensity equine sport that requires horses to have an efficient cardiovascular system and rapid recovery to perform at their best. Rodeo horses progress through distinct training stages to help them develop to this high level. The stages (Started, Finished, and Seasoned) play a critical role in determining how effectively a horse responds to and recovers from physical exertion. Understanding how the stages influence recovery heart rate is essential for a successful rodeo horse's career in relation to evaluating cardiovascular fitness and performance readiness. This study seeks to evaluate how the stage of training impacts recovery heart rate in performance horses by looking at recovery heart rate in 15 performance horses across the three stages. Heart rates were recorded before and after an exercise session and form of exercise were written down to keep track of the differences in training for each stage. The horses were trotted monthly using a standard protocol of 5 minutes at 6 mph with heart rate recorded before and after, and in 2 minute intervals until recovery. Data was collected using timed stethoscope measurements to ensure consistency. This provides insight into how conditioning influences cardiovascular recovery in performance horses. Results indicated that only the group or stage of training was statistically significant, with p ranging from 0.0-0.058. This meant that at least one of the groups were different when looking at heart rates before, after, the time it took for heart rate to go back to normal, and the difference between after and recovered heart rate. The trial by itself and the interaction between the group and trial was not statistically significant, with p ranging from 0.277-0.971 and was not analyzed any further. These findings suggest that stage of training significantly influences cardiovascular response and recovery, demonstrating training levels impact performance and recovery efficiency in rodeo horses.

Lorelei Jarrett

Sponsored by Dr. Chip Poland

Agricultural Studies

The Effectiveness of Purchasing an LRP (Livestock Risk Protection) on Any Given Year

Risk is a common factor in the agriculture industry; however, there are many programs and strategies that can be utilized to mitigate it. Livestock Risk Protection (LRP) is an example of coverage offered and subsidized by the USDA for cattle and swine producers of any size to utilize. The effectiveness of purchasing risk protection is of concern for producers' return on investment and bottom line regarding market fluctuation.

This project aims to analyze the effectiveness of purchasing an LRP from 2021 to 2025. Using the LRP coverage price and comparing it to the cash price taken by producers in Montana in the months of March and October over the last 5 years allows for an understanding of the effectiveness of purchasing LRP on any given year. This study assessed both weight classes (0lbs-599lbs), and (600lbs-1,000lbs) for feeder steers as well as feeder heifers. By evaluating whether the LRP coverage price, averaging the LRP indemnity payments, for a 13-week contract length, and 100% coverage level over the last 5 years, creates an overview of how effective an LRP may be in a given year. Purchasing an LRP in March 2021, October 2021, March 2022, and October 2022 led to higher profitability for the producer. The data collected from the 5 year period showed that when LRP coverage was used, average indemnity was $-7.619403 CWT. LRP was utilized in 14 of the 40 sample populations in the experiment. March showed the most fluctuation in price, with an average of $28.57 CWT, an increase from December of the previous year, when the contract would have been purchased. October showed a $23.47 CWT increase from the purchase of the contract in July. The results show that a producer is unlikely to collect a payment from purchasing an LRP on any given year.

Mikayla Jeppson

Sponsored by Dr. George Seror

Psychology

Stigma Surrounding People With Disabilities And The Role Of Grafton State School

This presentation examines the stigma of people with disabilities and the history of institutional maltreatment and neglect at Grafton State School. The practices at the Grafton State School contrast with contemporary person-centered approaches that characterize organizations such as ABLE, Inc., with the core values of dignity, individualized care, and community inclusion. ABLE prioritizes training protocols for employees as well as individualized care and empowerment for clients. ABLE's goals are to fight stigma, promote respect, and improve quality of life for people with disabilities. This presentation focuses on my internship at ABLE Inc., supporting adults with disabilities and providing valuable insights into effective communication and resilience for individuals facing various challenges. This experience fostered a deeper understanding and commitment to advocating for inclusive and empowering care. The presentation concludes by reflecting on how care practices and societal mindsets have evolved and the vital role each of us plays in creating an inclusive society.

Joshua Jimenez

Sponsored by Ms. Stefanie Aulner

History

The Fall of the Roman Empire; Causes and Consequences

This abstract proposal examines the multifaceted decline of the Western Roman Empire, focusing on the pivotal century between 376 CE and 476 CE. The research argues that the collapse was not triggered by a single event, but rather by a systemic failure of administrative authority compounded by unsustainable economic transitions, Invasions, and military overextension. By analyzing the breakdown of frontier defenses and the erosion of central tax collection, the study illustrates how the Roman state became increasingly unable to respond to the mounting pressure of external migrations and internal fragmentation. The consequences of this collapse are explored through the lens of the subsequent socio-political transformation of Europe.

The dissolution of Roman hegemony led to a decentralized landscape where former imperial territories transitioned into early medieval kingdoms, fundamentally altering trade networks and legal structures.

Grant Kees

Sponsored by Ms. Stephanie Aulner

History/Composite social science

Theodore Roosevelts Explorations

I am doing my research on Theodore Roosevelt and his colleagues on his Africa and South America expeditions. Hunting exploration in Africa occurred in 1909 and 1910. The South America expedition started in 1913 and went to 1914. I will be making a board game from my research and applying into an adventurous game. It will be played like this; South America and Africa- start to finish. With setbacks, two stacks of cards to draw from them. The goal is to get to the finish first. Without dying. Multiple cards of diseases, animals, tribes, and physical ware on the body will eliminate players. Not in a square like a monopoly. But in a bigger map with south America and Africa and checkpoints. Roll a dice and an even number goes to card pile 2. Roll a dice and an odd number goes to card pile 1. END GOAL: Able to go back to America and tell all of your stories. The goal is to emphasize the bravery and rarity of TR's life and adventures.

Parker Knaub, Zachary Woog, Sandie Friday, Isaiah Vargas, Aric Winczewski

Sponsored by Dr. Colin Strine

Natural Sciences

Inside the Blaptica Roach Hive

Understanding how organisms respond to environmental conditions is important because it helps explain survival behaviors that apply broadly across ecosystems. This study investigated how light exposure affects the behavior of Blaptica Dubia roaches, specifically measuring activity levels as the number of stops made in a short time period. It was hypothesized that roaches exposed to light would show increased activity (more stops) compared to those in the dark due to stress or avoidance behavior.
Initially, roaches were placed in light and dark environments for one week to measure lettuce consumption (in grams), but insufficient data prevented strong conclusions, leading to a revised behavioral experiment. In the second phase, a repeated measures design was used where 15 roaches were observed individually in a light condition and 15 in a dark condition for 30 seconds each. The main predictor variable was light exposure (light vs. dark), and the response variable was the number of stops recorded per trial. Controlled variables included the number of roaches, observation time (30 seconds), and environmental setup. Data were summarized using averages and standard deviations to compare activity levels between treatments. Results showed a total sample size of N = 30, with n = 15 per group. Roaches in the light condition had an average of 3.13 stops (SD ≈ 1.25), while roaches in the dark condition had a higher average of 3.80 stops (SD ≈ 1.97). Contrary to the hypothesis, roaches in the dark exhibited slightly greater activity overall. Additionally, variability was higher in the dark group, suggesting less consistent behavior. The overall pattern indicates that light did not increase movement as expected and may instead suppress activity in Dubia roaches.

Rose Kuntz, Taylor Bohlen, McKenzie Haven
Sponsored by Mr. Cody Ptacek
Nursing

Does cognitive behavioral therapy (CBT) have a better effect on adults with depression than antidepressants alone, or when they are used concurrently?

Throughout this study, we will be going over the effects of CBT and antidepressants alone and their effect on adults who are diagnosed with depression, as well as the effects when they are used together. Antidepressants are medications that target neurochemical pathways involved in mood regulation. They are commonly used to manage all types of depressive disorders, ranging from mild to severe. Cognitive-Based Therapy (CBT) is a form of therapy that focuses on identifying and acknowledging negative thought patterns and works towards making changes. CBT helps patients develop coping strategies and is targeted towards improving symptoms and reducing depression. According to the CDC, adults aged 20-39 diagnosed with depression have a percentage rate of 16.6% from August 2021 to August 2023. Depression is diagnosed through a comprehensive assessment that includes the evaluation of symptoms and their impact on daily functioning. The National Institute of Mental Health (NIMH) provides guidelines for the diagnosis of major depressive disorder in adults that follow certain criteria. Depression is defined by a score of 10 or greater on the 9-item Patient Health Questionnaire, a validated screening instrument assessing depression symptoms in the past 2 weeks based on a self-report. For each question, the response options, “not at all,” “several days,” “more than half the days,” and “nearly every day,” are given a score of 0-3. PHQ-9 summary scores range from 0 to 27. Depression is treated based on an individual’s score and the severity of their symptoms with CBT and/or antidepressants together.

Maxx Lee
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Natural Sciences

Effect of Amino Acid Supplementation of BMMY Medium on Recombinant Protein Production in Pichia pastoris: Implications for Collagen-Related Biomaterials.

Pichia pastoris (Komagataella phaffii) is a widely utilized methylotrophic yeast expression system for recombinant protein production due to its capacity for high cell density growth and ability to perform post-translational modifications. Despite these advantages, protein yield and quality are highly dependent on intracellular processing and culture conditions, particularly media composition and carbon sources. Additionally, proteins such as collagen present unique challenges due to their high proline and hydroxyproline content, which are critical for structural stability and proper folding.

This study presents a literature review focusing on how media composition directly affects recombinant protein production in P. pastoris, with a focus on amino acid supplementation for collagen and collagen related bioproducts. Previous studies demonstrated that nutrient availability, buffering capacity, and carbon source regulation significantly impacted protein yield, secretion efficiency, and proteolytic stability. However, there is still limited research on how amino acid supplementation, specifically, proline, lysine, and hydroxyproline, influence these factors.A proposed experimental design is presented to evaluate the effects of amino acid supplementation on protein yield and quality. A recombinant P. pastoris strain expressing a collagen-related target will be grown in BMGY and induced into BMMY. Experimental groups will include standard supplementation with proline, lysine, hydroxyproline and a combination of all three amino acids. Cultures will then be sampled over a 96-hour incubation period with measurements of OD600, protein yield, and integrity by SDS-PAGE and densitometry. Data will be analyzed by ANOVA to determine significance. This research aims to bridge the gap in media optimization by looking at the impact amino acid supplementation has on the process of recombinant protein synthesis.

Davyn Lehfeldt, Jazmine Turner, Jesse Van Baalen, Kirstine Babia
Sponsored by Dr. Colin Strine
Natural Sciences

Temperature VS Vinegar eels

Vinegar eels live in vinegar, a product many people already use in cooking and cleaning. This in turn could affect the temperature at which you store your vinegar. Temperature is an important environmental factor because it influences the behavior of organisms such as vinegar eels (Turbatrix aceti) by increasing activity. Examining how temperature affects movement helps explain how organisms respond to changing environmental conditions. Environmental changes can directly impact living things people interact with daily. This study investigated how cold, room, and hot temperature influence vinegar eel activity, measured as thrashes per minute (TPM). We hypothesized that vinegar eel movement would vary with temperature, with the highest activity at both hot and cold temperatures. Vinegar eels were assigned to low, normal, high temperature treatments, and TPM was recorded for individual eels under controlled conditions. A total of N=60 observations were collected (n=20 per group). Mean TPM increased with temperature: low (307 ± 57), normal (626 ± 100), and high (893 ± 62). It indicated a significant effect of temperature on activity ($p < 0.001$), with all pairwise comparisons significant. These results demonstrate that temperature strongly affects vinegar eel movement. Overall, vinegar eels move faster at higher temperatures, supporting the prediction that movement increases both hot and cold temperatures.

Natalie Lile
Sponsored by Dr. Colin Strine
Natural Sciences

World Health Organization (WHO) Cleans Best: Does Soap Type Matter When Following Best Handwashing Practices?

Stronger soap formulations are often assumed to remove more bacteria; however, the correlation between soap formulation and bacterial reduction does not always hold true in practice. This study assessed whether soap type affects bacterial reduction when using a WHO-recommended handwashing technique, and whether swabbing and fingertip imprinting yield comparable results. It was hypothesized that soap type differences would be minimal due to standardized technique, with antibacterial soap showing slightly greater reduction and both sampling methods yielding similar reductions. Pre- and post-wash samples were collected using palm swabs and fingertip imprints, cultured, and counted as colony-forming units (CFUs). CFU reductions were analyzed using log transformation, ANOVA, and nonparametric tests where appropriate. A total of 137 adult participants from Dickinson State University were randomly assigned to no soap (n = 37), regular (n = 33), antibacterial (n = 33), or antimicrobial soap groups (n = 34). Mean CFU log reduction for swabs was highest for antibacterial soap ($\bar{x} = 0.325, \pm 0.828$) followed by no soap ($\bar{x} = 0.143, \pm 0.434$), antimicrobial soap ($\bar{x} = -0.268, \pm 0.910$), and regular soap ($\bar{x} = -0.266, \pm 0.761$); log reduction differed significantly between soap types ($F = 5.35$, $p = 0.0016$), and this difference was confirmed with Kruskal-Wallis ($\chi^2 = 13.06$, $p = 0.0045$). Pairwise comparisons showed antibacterial soap performed significantly

better than antimicrobial and regular soaps, though not significantly better than when no soap was used. Fingertip data showed smaller differences, with mean log reductions ranging from 0.021 to 0.188, and no significant group effect. High variability and other factors may have influenced antimicrobial soap CFU reductions. These results suggest that soap types have limited and inconsistent effects, and proper handwashing technique may be more important than product choice.

Jacob Littleton

Sponsored by Dr. Talha Naqash and Shafaq Asif

Computer Science

The HEAL Framework: Operationalizing Transparency, Algorithmic Fairness, and Explainability in Clinical Artificial Intelligence

This research investigates the need for an ethical framework for Artificial Intelligence in healthcare, specifically for AI systems used to predict illnesses or injuries in patients. As AI becomes more common in the medical field, it is important to ensure that these systems are developed in a way that supports patient safety, accuracy, and ethical decision-making. A major problem in healthcare AI is that many systems operate as "black boxes", meaning their reasoning is difficult for clinicians and patients to understand. This lack of transparency can reduce trust, increase the risk of bias, and create concerns about privacy and patient safety. Without a clear framework to guide development and deployment, AI systems may create more risks than benefits in clinical settings. The methodology used in this research begins with a review of existing literature to identify the main ethical and technical concerns surrounding AI in healthcare. The key issues identified include bias, transparency, autonomy, privacy, and model degradation over time. Based on these findings, a theoretical framework called the HEAL is proposed. This framework includes structured checkpoints for data validation, fairness testing, explainability, safety evaluation, and a continuous feedback and audit loop for ongoing improvement. The expected result of this research is a medical AI system that can clearly explain its reasoning, reduce unnecessary bias, and maintain patient privacy while improving over time. The framework is also expected to create stronger audit trails, support safer clinical use, and reduce the chance of medical errors caused by poorly tested or opaque systems. In addition, the built-in feedback loop is expected to help prevent model degradation and support long-term reliability. Since precision, safety, and trust are essential in the medical field, the HEAL framework provides a structured way to support clinicians and protect patients privacy.

Sierra McKenzie, Cole Skabo, Kyler Hollinde, Hyrum Price, Gianni Smalls

Sponsored by Dr. Colin Strine

Natural Sciences

Harvester Ants Attraction to Different Home Foods

We collected data on ants' food preferences, we chose this due to how many people have problems with ants in their home, so we are seeing if a certain type of food attracts ants more than others. Our hypothesis is that the more sugar in the food, the more it will attract an ant. We equally distributed 180 harvester ants (Pogonomyrmex barbatus) into three 10-gallon tanks with 400g of dirt, we put a small piece of apple in there and let them sit overnight to acclimatize. We then did tests with sugar, salt, and apples and counted how many ants approached them for over two minutes. After the test we took the food out and washed the microscope slides that the food was on. We then left the ants alone for 5 minutes then did the same test but with the food in different spots, we did that 5 times in each tank. We had 15 samples for each of the 3 groups, the averages for apples were 5.1, and standard deviation was 3.1, salt was 3.9 with a standard deviation of 1.7, and sugar was 5.5 with a standard deviation of 2.5. We also observed that the ants stayed longer on the apples than the others. We ran both the Shapiro and Bartlett test to make sure we could run the Anova test and we confirmed that we could run the Anova test. We got a p value of 0.206 for the Anova test so that confirms the null hypothesis which means that there is no difference with the food. This might be because the ants were not hungry or they were stressed and trying to escape so they were not foraging for food.

Tanner Miller

Sponsored by Dr. Chip Poland

Agricultural Studies

The Effect of Urea Fertilizer on Hard red Spring Wheat in the Dakotas

Hard red spring wheat is a major crop in the Dakotas, where nitrogen (N) is typically the most yield-limiting nutrient. It is an important factor for plant growth, chlorophyll production, and protein synthesis. Adequate N availability supports tillering, leaf area development, and photosynthesis, all of which directly influence grain yield and quality. In addition, nitrogen plays a central role in determining grain protein concentration. Therefore, optimizing N rates is essential for both agronomic performance and economic sustainability. Hence, this study evaluates the effects of varying urea (46% N) application rates on wheat performance and profitability under field conditions located east of Lemmon, SD during the 2025 growing season. Six nitrogen treatments ranging from approximately 50 to 92 lb. N/ac were applied across 2.18-acre field plots. Having 89.5 lbs. of N applied as control. Starter fertilizer applied to all treatments was the same across all plots. Grain yield, protein concentration, and economic return were measured to determine the most efficient N rate.The results of this study showed N rates improved yield ($P< 0.001$), increased grain protein ($P<0.002$), and net return ($P=0.002$). The highest N treatment (92 lb. N/ac) produced the greatest yield (72.32 Bu/ac), protein level (15.6%) and net return (366.89 $/Ac), but only marginally outperformed the control treatment. Economic analysis revealed a linear response with net returns increasing with higher N rates. The control treatment produced the highest numerical net return ($370.57/ac). These findings indicate that optimal (N) management should prioritize economic efficiency rather than maximum yield. Under the conditions of this study, decreasing nitrogen application rates did not improve wheat production or economics and approximately 89.5 lb. N/ac provided a reasonable balance of productivity, grain quality, and profitability."

Carly Moore

Sponsored by Dr. Chip Poland

Agricultural Studies

Industrialization of China's Swine Production: Evaluating its Influence on Soybean Markets in the Western Hemisphere

Since 2004, the global soybean trade has undergone reconfiguration driven by China's rapid industrialization of its animal protein sector. As the largest consumer of soybeans, it is vital to know the influence China has on the global supply chain, and how China effects other countries' economies. This study provides a comprehensive analysis of how China transition from traditional ""backyard"" farming to large, commercial livestock operations has impacted the market share and export stability of the three primary Western Hemisphere producers: Brazil, the United States, and Argentina. Utilizing a 21-year dataset (2004–2024) sourced from the United Nations Comtrade database, this research tracks the trade flows of raw soybeans. The methodology prioritizes net weight (kg) to mitigate the distortion of price inflation, while corroborating volume trends through trade value (USD) to address reporting discrepancies. Preliminary findings reveal a three-phase evolution in the market: an initial era of U.S. dominance, a period of diversification of infrastructure from Brazil, and a post-2018 divergence characterized by a plateau in US exports and an accelerated incline in Brazilian market share. This divergence is assessed by comparing China's increasing industrial feed requirements with soybean demand. The results suggest that while geopolitical tensions and disease outbreaks created short-term volatility, the long-term industrialization of the Chinese hog industry has altered the competitive landscape for Western Hemisphere exporters, necessitating year-round supply.

Keywords: Argentina, Brazil, China, Export Stability, Industrialization, Market Share, Soybean, United States

Kori Nagel

Sponsored by Dr. Elizabeth Freedman

Natural Sciences

The Association of Leg Anthropometrics and Running Speed in Collegiate Track and Field Athletes

Sprint performance is important in track and field, and it often depends on both morphological and biomechanical factors. Muscular power and force production are well studied, but the role of specific leg bone anthropometrics in sprint acceleration remains unclear. This specific study done examined whether femur, tibia, and foot length are associated with 0–20-meter sprint performance in a sample of collegiate track and field athletes and whether these relationships differ by sex. 28 athletes completed three 20-meter sprint trials using a FreeLap® timing system. Limb lengths were measured using a tape measure. Linear regression models including sex and event interactions were analyzed in R. Model fit was evaluated using AIC. Femur and tibia length were not significantly associated with sprint performance in either sex ($p > 0.05$). Foot length was not significant in males ($p = 0.27$) but was significantly associated with faster sprint times in females ($p = 0.03$). The femur-to-foot length ratio was also significantly associated in females ($p = 0.03$), while no ratios were significant in males. An exploratory analysis also revealed that the relationship in females was primarily driven by female jumpers. These findings suggest that distal limb anthropometrics may influence sprint acceleration when separated by sex. Proximal limb anthropometrics seem to have little influence. Overall, sprint performance is likely driven more by mechanical and neuromuscular factors than by limb length alone.

Leah Nauman, Lauren Taylor

Sponsored by Mr. Cody Ptacek

Nursing

In individuals experiencing an ischemic stroke (P), what is the effectiveness of Tenecteplase (I) compared to Alteplase (C), and how is quality of life and life expectancy improved or hindered (O) following medication administration (T)?

When every minute counts in an ischemic stroke, selecting the most effective thrombolytic agent becomes life changing. In the critical moments following an ischemic stroke, the choice between Tenecteplase and Alteplase can significantly influence patient outcomes and recovery. An ischemic stroke results from inadequate blood flow to the brain from partial or complete occlusion of an artery and can be classified as thrombotic or embolic. Ischemic stroke (IS) is caused by vessel occlusion, leading to diminished blood flow to the brain tissue, resulting in neurological impairment. Rapid reperfusion with IV fibrinolytics is the main therapeutic goal in patients experiencing an ischemic stroke. Alteplase and Tenecteplase share the pharmacological class of tissue plasminogen activator (tPA) and the therapeutic class of thrombolytic, and can both be used to treat an ischemic stroke. This review aims to compare the efficacy and safety of Tenecteplase in comparison with Alteplase and which has the better long term outcomes post stroke. The focus of this research was to incorporate relevant articles and previously conducted studies to find out if one drug is preferred or more effective than the other. The findings suggest that Tenecteplase is the preferred medication to be given in the event of an ischemic stroke despite the similarities between the two medications. Tenecteplase has a longer half-life and lower plasma clearance, allowing its administration as a bolus dose. The use of Tenecteplase has been rising steadily due to its ease of administration (single bolus), faster onset of action, lesser cost, and emerging evidence regarding the lower risk of bleeding and a better chance of recanalization in large vessel occlusion (LVO). Stroke treatment continues to evolve as clinicians compare the safety and effectiveness of emerging thrombolytic therapies such as Tenecteplase and Alteplase.

Lilly Newsom, Jack Taylor

Sponsored by Dr. Colin Strine

Natural Sciences

Color and Temperature Preferences in Lady Beetles (Coccinellidae)

Understanding how environmental factors influence insect behavior can aid in predicting ecological interactions and improving biological control strategies. Lady beetles (Coccinellidae) are beneficial insects whose movement and habitat selection may be influenced by visual and thermal cues. This study investigated whether lady beetles exhibit preferences for specific colors and temperatures, with the hypothesis that they would favor warmer environments and lighter colors. Lady beetles (n=60) were tested in controlled arenas 6” L×6” W×1.5” H to examine their temperature and color preferences. Temperature

trials included three trials (n = 10 each) with observations at 5- and 10-minute intervals under consistent conditions. Color preference was tested across 10 trials (n = 3 each) using five colors: black, red, green, yellow, and white, and counting the individuals on each color after 10 minutes. Temperature and color served as independent variables, and data were analyzed using a Kruskal-Wallis test and Dunn pairwise comparison, with a Wilcoxon test applied to temperature data. Results showed a significant preference for warmer temperatures, with an average of 7/10 lady beetles on the warm side at 5 minutes and 8.3/10 at 10 minutes. Lady beetles briefly explored the cold side but returned to warmth, indicating a time-dependent thermotactic response. Both 5 and 10 minutes showed significant differences together, but as individual segments, they showed no significant difference. For color preference, yellow was most frequently selected (15), followed by green (6) and red (5), while black (3) and white (1) were rarely chosen. Pairwise comparisons showed that white to yellow and black to yellow had significant differences, compared to other colors that had little significant differences. Lady beetles have clear preferences for warm environments and yellow coloration, indicating that thermal and visual cues strongly influence their behavior and ecological effectiveness.

Zachary Nodland, April Matkin, Hunter Davis
Sponsored by Dr. Colin Strine
Natural Sciences

How Temperature Affects Behavior

Temperature is an environmental factor that influences the behavior and survival of all living organisms. All living organisms have specific temperatures they prefer to live in. This experiment looks into the effects of different temperatures on the Amphipod "Gammarus sp" species. Specifically, how they behave in suboptimal temperatures 3 degrees below and 4 degrees above their ideal temperature. The original hypothesis was that they would become more active above their ideal temperature, and less active below. The experiment had two control groups and 3 treatments, each group containing ten of the "Gammarus sp". The treatments were 15, 18, and 22 degrees Celsius with the control being 18 degrees Celsius. The main variables measured were antenna flicks, tail flicks, and active movement measured in seconds, within a 10 second time frame. Total numbers of samples were 60 with 9 total deaths which were not used in the data. Results indicated that while active movement remained relatively stable across groups (Control: 6.55 ± 3.98 s; Cold: 5.95 ± 3.03 s; Hot: 6.2 ± 3.71 s), tail flick frequency increased significantly in the cold treatment (4.0± 2.96) compared to the control (1.95 ± 2.24). Conversely, antenna flicks decreased in the hot treatment (3.85 ± 2.43) relative to the control (4.45 ± 2.76). Based on data, the "Gammarus sp" had better resistance to colder temperatures as opposed to higher temperatures. This kind of study explores the impact of different temperatures on living organisms and is applicable to all kinds of life.

Garin Opdahl
Sponsored by Dr. Chip Poland
Agricultural Studies

Impact of soil pH on various rhizobium strains and how it affects soybean growth and nodulation

Soybeans is a vital agricultural crop worldwide due to their high protein content, oil production, and ability to support sustainable farming through biological nitrogen fixation, a process that relies on a symbiotic relationship between soybean roots and rhizobia bacteria, which form nodules that convert atmospheric nitrogen into a usable form for plant growth. However, soil acidity has become an increasing concern in modern agriculture, as long-term fertilizer use, intensive cropping practices, and natural soil acidification have lowered soil pH in many production areas. Low soil pH negatively impacts nutrient availability, increases aluminum toxicity, and reduces microbial survival, ultimately limiting soybean growth, nodulation, and yield potential.

This study examined the effects of four soil pH levels (4.7, 5.1, 5.5, and 6.0) on soybean growth and nitrogen fixation using three different inoculant types: peat-based, liquid, and granular, along with an untreated control. Soybeans were grown in a controlled growth chamber to minimize environmental variation. Plant height, stem diameter, nodule number and weight, and total dry biomass were measured to assess early plant development and nodulation efficiency. Soil pH levels were carefully adjusted using lime or calcium

carbonate to represent common acidic field conditions.Results show acidic soil significantly reduces nodulation, root development, and overall plant growth, particularly at pH levels below 5.0. Higher pH levels improved nutrient availability and microbial activity, leading to increased nodulation and biomass production. Among inoculant treatments, peat-based and granular inoculants showed greater effectiveness in low pH soils, likely due to improved rhizobia protection and placement near developing roots. Liquid inoculants provided high initial bacterial populations but were more sensitive to acidic conditions.

Ashley Pinto, Madison Hughes

Sponsored by Mr. Cody Ptacek

Nursing

In patients in the ED how does scanning medications before medication administration compares to scanning medications after medication administration in reducing medication errors over 6 months?

Medication errors are a major safety concern in the emergency department with research showing that about a 30-40% of medication errors are committed during the medication administration stage. With a fast-paced and high-pressure environment, nurses are often making quick clinical decisions which increases the risk of medication errors. Medication errors should be prevented and found before the medication is given rather than after they have already given the medication. These errors can include wrong dose, wrong patient, or even wrong medication. Studies have shown that wrong-dose errors are the most common in the emergency department. Research shows that using barcode medication administration (BCMA) scanner in the emergency department can decrease these medication errors by about 50%. Research also shows that not scanning prior to medication administration is correlated with higher medication error. The BCMA scanners can help ensure that the correct patient, medication, dose, and time are being verified prior to administration rather than after.

Camille Poncin

Sponsored by Dr. Colin Strine

Natural Sciences

Effect of Light Exposure on Movement Time in Bess Beetles (Odontotaenius disjunctus)

Bess Beetles (Odontotaenius disjunctus), are nocturnal detritivores involved in the decomposition of plant matter into nutrient-dense soil. Light pollution has been shown to impact the movement patterns of nocturnal animals like moths, and we wanted to see if bess beetles were impacted by light exposure in a similar way. We compared the movement of bess beetles that were exposed to light and those who were moved directly from their tank to determine whether light exposure affected the speed at which they move. Ten bess beetles were exposed to light and ten were kept in their tank and then placed in a box thirty cm from a shelter. We timed how long it took (in seconds) for the beetle to travel from its original start position to the line defining the shelter. The timer was stopped when the beetle's head crossed the line. The independent variable in our study was light exposure (light or dark), and the control variable was the thirty cm each beetle had to travel. We performed a Shapiro-Wilk normality test and found that the movement time of both groups was not normally distributed. Following that test, we performed a Wilcoxon signed rank test to determine if there was a significant difference between the two groups. The average time it took for the light exposed beetles to travel across the arena was 208.894 with a standard deviation of 262.062 seconds, while the beetles that were pulled straight from their habitat took an average of 343.361 seconds with a standard deviation of 384.185 seconds. Movement speed was non-significantly different between the two treatments ($W = 59$ and a $p = 0.5288$), suggesting beetles took similar times to return to shelter. Due to this, we fail to reject the null hypothesis. These results suggest that background light levels may not significantly influence the movement patterns of bess beetles returning to shelter.

Giovanni Powell-Valdez

Sponsored by Dr. Colin Strine

Natural Sciences

Dog Breed and Trait Correlation in the Dickinson Area

Dogs (Canis lupus familiaris) are a major and important companion animal for humans. Picking a dog revolves around knowing their traits, knowing the breeds and their behaviors. Knowing these preferences can help form an understanding of dog breeds and which one may be best for oneself. My project will assess whether there is a correlation between dog breed and trait preferences in humans within the Dickinson area. I will conduct a survey that will define dog breeds (Retrievers, Bullies, Terriers, etc.) and traits (Shedding, Coat Length, Active vs Lazy, etc.) relating to them and give 1 through 5 questions, Multiple choice questions and Ranking questions based on preference for each trait or breed. To form these questions papers have been looked at to determine specific traits of specific breeds as these will be what are looked at. I hypothesize that there will be a correlation in trait preference and breed preference. If this correlation is found, then it can be used to develop into an understanding of breeds as a whole and allow us to know why and how a breed is selected. This study could help dogs find homes that are properly fit for them.

Arley Price

Sponsored by Dr. Jinasena Hewage

Natural Sciences

Trihalomethane Removal Efficiency of a Newly Developed Aeriation Technique for Drinking Water

The purpose is to analyze THM removal efficiency of an innovative aeration technique for an industrial-level water treatment system used in a municipality's drinking water tanks, long after the water left the treatment plant. Trihalomethanes (THMs), harmful chemical byproducts, are produced when chlorine or other disinfectants react with naturally occurring organic compounds in water. Many techniques exist today to remove THM's to keep municipalities under federally regulated limit of 80 parts/billion (ppb). The problem with other technologies is THMs form post treatment, it must be treated in the distribution system, where the infrastructure/energy costs are great. Can new applications of old technology save money, energy, and footprint? The principle of the treatment system under development is a gradual removal of THMs under constant aeration until THM levels are below 80 parts/billion (ppb). In this technique, chloroform was introduced to drinking water in the plant, aeration following. During aeration, samples were analyzed at regular intervals to account for time effects, air volume measured in cubic feet/minute (CFM), water temperature, and air depth of THMs removal rate. The Hach THM analysis method was used in this study including approximately 29 steps start to finish. In this analysis, spiked chloroform mimics total THMs in drinking water. Collected samples per time interval were subjected to a series of chemical treatments, converting chloroform to a colored species. The Hach spectrophotometer, consisting of THM Plus analytical software, was used to measure THM levels in ppb/sample. Current results could not deliver effect of individual variables on THM removal, although, the aeriation technique showed removal of THM to the recommended level. The development process is not yet concluded, but qualitative insight could be derived that the process of moving air through a hose to bring air bubbles to the surface appears to be most significant in THM removal.

Donal Radke

Sponsored by Ms. Stefanie Aulner

Visions of Camelot

This project will be hand-drawn watercolor paintings of King Arthur and important characters from his mythos. The paintings will be based on the appearance of clothing and equipment, armor, and weapons from the British Isles during 400-550 CE. This time period was chosen due to it being the proposed rule of Arthur. This research study is being done to illustrate through a historical lens the context and details from King Arthur's mythos. Arthur is a prominent legendary figure that has influenced American, British, and Japanese twenty-first century pop culture.

Ava Robinson, Kazen Nelson, Kheyerah Bilger, Trixie Humilde

Sponsored by Dr. Colin Strine

Natural Science

How Group Density Influences Foraging Duration in Lady Beetles

In many predatory species, the density of conspecifics can significantly alter foraging efficiency and patch residency. This study investigated how varying group sizes of lady beetles influence their average foraging time within banana and strawberry habitats. Understanding these behavioral shifts is essential for optimizing biological pest control and predicting predator dispersal. It was hypothesized that as the number of individuals in a patch increases, mutual interference would lead to a quantitative decrease in the average time spent foraging compared to solitary individuals. The experimental design compared a control group of individual beetles against treatment groups of three, six, and eight individuals. To ensure consistency, all beetles were acclimatized in a foodless environment for two minutes prior to testing. Each treatment was replicated five times (N=5) to ensure data reliability. The primary variables measured were the group size and the average time spent foraging in the designated patches before dispersal. The results demonstrated a clear inverse relationship between beetle density and foraging duration. The control group of individual beetles showed the longest average residency times. As group size increased to six and eight, the average foraging time per beetle decreased, showing a big-picture pattern of density-dependent dispersal. Statistical averages from the three replicates confirmed that the largest group (eight beetles) had the shortest foraging duration, likely due to increased encounter rates and interference. In conclusion, lady beetle foraging behavior is highly sensitive to the presence of others. The observed reduction in patch residency as group sizes increase supports the theory of interference competition. These findings suggest that higher predator densities may trigger premature dispersal, a critical factor for managing effective predator-prey ratios in field settings.

Rosanna Rodriguez

Sponsored by Dr. George Seror

Psychology

The Relationship Between Adverse Childhood Experiences and the Development of Substance Use Disorder

Substance use disorders can stem from a multitude of things like genetics, gender, and psychological variables, but one of the biggest factors is also adverse childhood experiences (ACEs). An ACE can be from many different forms of abuse, household dysfunction, neglect, etc. They are also linked to cause health problems across the lifespan. Research started in the early 1990s on ACEs and has shown that they have been linked to individuals developing substance use disorders in their adult lives. When an individual is exposed to four or more, they are then more likely to engage in illicit substance use per experience. The goal of this presentation is to examine the relationship between exposure to ACEs and how it can result in substance use disorders in adulthood. Through reading scholarly articles, I was able to extract the data to clarify that ACE exposure does in fact lead to substance use disorders in adulthood. The data also shows that the severity of the substance use disorder depends on the quantity and severity of the ACEs in childhood. Thus early intervention in childhood can drastically reduce the chances of one developing a substance use disorder later in life.

Rylee Rothleutner, Malachai Medina, Samantha Greff,Daniel Steinbron

Sponsored by Dr. Colin Strine

Natural Sciences

Red Ants: Observing Preference on Glucose and Carbohydrates

This experiment investigated how ants responded to different food types and which foods they preferred when they were given equal access to them. Three food items: skittle, cracker, and apple were placed an equal distance away in a controlled environment, and groups of 20 ants were observed over 5 trials. The number of ants present at each food group was recorded at one-minute intervals up to five minutes. The purpose of this study was to determine whether ants prefer high-sugar foods and observe how they detect and locate food. It was hypothesized that ants would be most attracted to the skittles due to their high sugar content compared to the other items. However, the results showed a different trend: crackers receiving the highest number of visits(63), followed by apples(35), and skittles(9).This suggests that ants

may prefer food other than those with the highest simple sugar content, due to factors like texture, ease of transport, or starch composition. Overall this experiment provides insight on how ants determine what food type is a more sustainable resource for their colony. (Our data analysis was still in process during the time of submission.)

Tyson Schwab

Sponsored by Dr. Sarah Manka

Natural Sciences

Effects of Water Level Fluctuations on Breeding Success of Piping Plovers (Charadrius melodus) on Lake Sakakawea in the Summer of 2024

This project investigates how elevated water levels in Lake Sakakawea during the 2024 breeding summer season affected reproductive success and overall population in the threatened Piping Plover (Charadrius melodus). From late May to early August, weekly monitoring of shoreline sites occurred across the lake. Documentation of the adults census, nests development, eggs success and chicks included counting of eggs adults, chicks, and fledge along with location of each nest, areas of chicks until fledged. Water-level data from the U.S. Army Corps of Engineers showed that rising lake elevations occurred in summer 2024. This resulted in reduced access to nesting habitat and flooded nesting areas such as islands. The findings include the natural predation and weather conditions that cause decline in the populations. Data was analyzed using descriptive statistics of nests location and survival rates and graphical analysis to examine relationships between water levels and reproductive success. Showing a clear decline in piping plover population survival rates in habitats affected by significant water level increases during the course of the water level increase of the summers of North Dakota during the nesting seasons. These findings will help guide and improve water-management strategies and conservation planning to protect critical Piping Plover breeding areas in North Dakota.

Bryce Shelhamer

Sponsored by Dr. Talha Naqash & Dr. Shafaq Asif

Computer Science

An Ethical Assurance Framework for Radiology AI: Auditing Data Bias and Ensuring Equitable Predictions

Artificial intelligence is increasingly being used in radiology. Machine learning models are trained by analyzing medical images such as X-rays, CT scans, and MRIs to support diagnostic decision-making. These systems are trained on large datasets and are then deployed in a clinical environment such as radiology, where accuracy and reliability are important. A major challenge in this field is that the training datasets often lack sufficient demographic and clinical diversity. This can cause AI systems to produce biased predictions, which leads to unequal diagnostic performance across patient groups. In radiology, such disparities can result in misdiagnosis and reduced quality of care. Despite ongoing discussions of fairness and transparency, there is a lack of structured methods to help evaluate whether these systems meet an acceptable ethical standard before deployment. This work proposes an ethical assurance framework for auditing bias in radiology AI systems. This framework defines the clinical tasks and target populations; it evaluates dataset representativeness and measures the model's performance across demographic groups. The fairness thresholds are applied as a decision criterion to help determine the system's readiness. If these thresholds are not met, then bias mitigation techniques such as data rebalancing and model refinement are applied and followed by iterative retesting. Systems that do meet the criteria will be deployed with human oversight and continuous monitoring. This framework is expected to help improve diagnostic fairness and consistency across diverse patient populations. By introducing a measurable evaluation criterion and iterative correction, this will help to reduce bias and enhance the system's reliability in clinical applications.

Jack Simons

Sponsored by Dr. George Seror

Psychology

Mentoring as an intervention to improve mentees mental health

This study examined the impact of mentorship on mental health outcomes over a six-month period. A total of 142 participants were included ranging in age from 16–25, with data collected through self-report measures completed by mentees or, in the case of minors, their parents or guardians. Measures assessed changes in overall psychological well-being and suicide risk. Results indicated improvement in mental health among mentees at 3 months and following the 6-month period of mentorship. Notably, the rate of positive suicide screenings decreased from 42% to 27% over the course of the study. These findings suggest that structured mentorship programs may serve as an effective intervention for improving mental health and reducing suicide risk. Further research is recommended to examine the persistence of these effects beyond the mentorship period, and mechanisms underlying these improvements.

McKenzie Smith, Mercy Darko, Makaela Unterseher

Sponsored by Mr. Cody Ptacek

Nursing

In adults with chronic kidney disease, how does treatment with SGLT2 inhibitors compared to standard care affect the progression of kidney disease and cardiovascular outcomes over a 6–32-month period.

Chronic kidney disease (CKD) is a progressive condition associated with significant morbidity, mortality, and increased cardiovascular risk. CKD without proper care is associated with a high risk of progression to end-stage kidney disease (ESKD) and adverse cardiovascular outcomes, including heart failure, myocardial infarction, and stroke. Sodium-glucose co-transporter-2 (SGLT2) inhibitors have emerged as a promising therapy for cardio-renal protection, demonstrating potential to slow CKD progression and reduce cardiovascular events. However, their efficacy across varying CKD stages and compared to standard care requires further synthesis. Evidence suggests SGLT2 improves glomerular hemodynamics, reduces intraglomerular pressure, and has anti-inflammatory effects, independent of glycemic control. Therefore, SGLT2 inhibitors provide both renal and cardiovascular benefits in adults with CKD, evidently supporting their role as an adjunctive treatment option for improve CKD outcome. Future long-term studies are warranted to confirm these findings, identify optimal patient populations, and refine clinical management strategies for CKD. This research aims to evaluate the impact of SGLT2 inhibitors on kidney disease progression and cardiovascular outcomes in adults with CKD compared to standard care over a 6-32-month period.

Afolabi Soetan

Sponsored by Dr. Talha Naqash & Dr. Shafaq Asif

Computer Science

The TAPE (Transparency, Autonomy, Privacy, Explicability) Ethical Framework For Privacy of Patient Data and Explainability of Treatment in Medical Primary Care

This study explores the development of an AI-based ethical framework in a healthcare context, as this framework focuses on enhancing the privacy of patient data and the explain-ability of AI recommendations to ethically streamline the integration of AI into healthcare. In this era, AI becomes more common in medical settings, and salient ethical concerns arise regarding the privacy of user data as well as the transparency of AI decisions. This is especially relevant in healthcare, where large volumes of sensitive personal information are regularly being stored and analyzed.The research question investigates how an ethical framework designed to maximize privacy and explain-ability can guide the implementation of AI in healthcare settings without compromising patient privacy or the quality of care. The methodology involves a comprehensive review of the current literature on AI ethics in healthcare. This allows the study to identify essential ethical principles, such as transparency and patient autonomy, and important gaps in the current research, such as a step-by-step ethical model that describes how each ethical principle is employed at every step. The expected result for this study is an ethical framework that provides a step-by-step demonstration of how medical centers ought to ethically treat patients using AI. This framework is expected to lead to the maximization of patient privacy and the explain-ability of AI-generated outputs. This ensures that the patient's rights are protected. This research is significant because it provides a guideline for how medical

centers can ethically adopt AI in high-risk treatment plans in ways that preserve privacy and explain ability, which are essential elements of healthcare. This research is also significant because it supports medical centers by providing a model demonstrating how this framework will be applied in practice at each stage of the treatment process.

Eniola Soetan

Sponsored by Mr. TJ Dempsey

Exercise Science

Performance Predictors of National Basketball Association (NBA) Players Based on Collegiate Statistics

One of the more daunting tasks that general managers in the National Basketball Association is identifying, appraising, and ultimately selecting the talent that they want to add to their team. These are incredibly impactful decisions that can have major ramifications on the success of the team or the team's ability to be flexible and pivot later down the line. Before every draft, there are countless mock draft boards that seek to predict where potential players will fall in the draft and how they will pan out on the professional level. However, despite advanced statistics, player comparisons, draft combines, pre-draft workouts, and the like, every year there are always players who did not quite pan out as expected based on their college careers, either for better or for worse. This research project seeks to discover which professional performance metrics can be consistently and significantly predicted by collegiate performance, and which collegiate level and professional level performance metrics typically fall short of correlating to one another. Results from this project can contribute to the fields of sports data and analytics, player development, and even sports performance by providing insight into which collegiate level performance metrics tend to translate over to the professional level and why that might be.

Eniola Soetan

Sponsored by Dr. Samanthika Hettiarachchi and Mr. Trevor Hann

Exercise Science

Evaluating the impact of compensatory crosslinkers and Scaffold composition on the tensile strength and elasticity of Anterior Cruciate Ligaments using Recombinant Type I Collagen in Synthetic Compensatory Synthetic Ligaments

Tears to the anterior cruciate ligament (ACL) are becoming increasingly common, with the predominant treatment method being operative reconstruction surgery requiring a graft from a donor site (autograft) or a cadaver (allograft). Grafts from donor sites can cause donor site morbidities and, in individuals with soft tissue disorders such as osteogenesis imperfecta or Ehlers-Danlos syndrome, are often not practical due to compromised connective tissue. Cadaver grafts have less favorable outcomes, particularly in younger and more active populations, and may lead to immune reactions or rejection.

The ACL is composed of 90% type I collagen, a fibrous triple-helical protein made of glycine, proline, and hydroxyproline in repeating Gly-Pro-Y or Gly-X-Pro sequences that create crosslinking for strength and integrity. In osteogenesis imperfecta and Ehlers-Danlos syndrome, these sequences are destabilized at a genetic level, leading to compromised collagen and soft tissue, which manifests as tissue weakness, fragility, joint hypermobility, and slow wound healing—risk factors for ACL tears and surgical complications.

To investigate compensation methods for compromised collagen, normal type I collagen, osteogenesis imperfecta type I collagen, and Ehlers-Danlos arthrochalasia type I collagen were recombinantly synthesized using Komagataella pastoris. Collagen will be characterized using SDS-Page and fibrillized for characterization with Fourier Transform Infrared Spectroscopy (FTIR). The soluble collagen will then form grafts mimicking the native ACL using crosslinkers genipin and glutaraldehyde and scaffolds gelatin and gelatin methacrylate. Grafts will be tested for tensile strength and elasticity to determine whether crosslinking agents or scaffolds can compensate for compromised collagen and enhance collagen. Results could contribute to bioengineered ligament development and address donor site morbidity, ligament tear risks, and surgical challenges in vulnerable populations.

Sandra Sones, Faith Sullivan-Brennan, Douglas Sheldon
Sponsored by Dr. Colin Strine
Natural Sciences

How does Acetaminophen affect Daphnia magna mouth movement behavior?

Acetaminophen, commonly known as Tylenol, is a common find in aquatic environments, which can end up affecting the whole ecosystem. We exposed a model crustacean organism, the Daphnia magna, to increased acetaminophen concentrations and hypothesized that the rate of mouth movement would decrease as the concentration of acetaminophen increased due to physiological stress. Each Daphnia magna was haphazardly selected from a Carolina Biological Supply container (32 per treatment). All groups acclimatized to an Acetaminophen concentration for 30 minutes. Then each individual was acclimatized to the concavity of well slides on the dissecting microscope for 30 seconds before measuring. We recorded mouth movements in increments of 10 seconds. We did 10 seconds counting, 10 seconds not counting, 3 times each, for a total of 60 seconds. We did this for an average BPTs (Beats Per Ten seconds) and eliminated room for human error. We repeated this process from 0.1ml all the way to our 1.0ml solution. There was a total of 10 Daphnia magna that were dead and were removed from our conclusions. Altogether, the data collected resulted in different outcomes. Our non-exposed individuals showed us a mean BPTs of 9.344, (SD=4.859). The individuals exposed to 0.1ml showed a mean BPTs of 6.036, (SD=4.375); a decrease from the non-exposed individuals of 3.308 BPTs. Meanwhile, the 0.5ml was 8.914 BPTs, (SD=5.852), and the 1.0ml was 9.395 BPTs, (SD=5.037). Both showed non-significant changes compared to the non-exposed group. It was not simply that the higher the concentration, the lower the movement, but based on the data that we collected, we noticed a nonlinear response where the lowest concentration had the most decrease in feeding, while the higher concentrations had little to none.

Ellia Soydara
Sponsored by Dr. George Seror
Psychology

Examining the Effects of Gamma Frequency Binaural Beats on Simon Task Performance

Executive function and attentional control are essential for everyday life. Deficits in these processes are associated with conditions such as attention deficit hyperactivity disorder (ADHD) and substance use disorders (SUDs). Binaural beats in the gamma frequency range have been proposed as a non-invasive method for enhancing executive function and inhibitory control. Previous research in our lab demonstrated that an intervention with 40 Hz binaural beats reduces interference in the Stroop task, a measure of attention and inhibitory control. The current experiment seeks to extend these results by examining whether a 40 Hz binaural beat intervention also affects performance on a Simon task. Participants responded to the words "LEFT" or "RIGHT" presented on a computer screen. Response time and accuracy were measured in a pretest-posttest design. Participants were randomly assigned to either a binaural beat intervention (380 Hz in the left ear and 420 Hz in the right ear) or a control condition (400 Hz presented to both ears). Results showed a typical Simon effect, with slower and less accurate responses on incongruent trials. However, no significant improvements from the pretest to the posttest were observed and no significant differences were found between groups. Potential reasons for the results will be discussed, along with future directions for research."

Sam Stillings
Sponsored by Dr. Sarah Manka
Natural Sciences

Do Trexo Robotic™ devices enhance bowel movements in children with stage (V) and stage (IV) cerebral palsy?

Cerebral palsy (CP) affects over 17 million people worldwide, with 26% to 74% of children with CP experiencing constipation. I hypothesize that using an over-ground robotic gait trainer developed by Trexo Robotics™ will benefit children with CP by improving peristalsis, increasing blood flow, and strengthening abdominal muscles from walking. Therefore, resulting in bowel movement improvement over the course of one year, compared to children who do not use these devices. I will collaborate with Trexo Robotics™ to

connect with families across the United States and Canada with children diagnosed with cerebral palsy stage (V) or stage (IV) who use their products, with a target sample size of 50 families. A pediatrician will contact 25 participants for a control group. Monthly online surveys will be completed for one year to track bowel movements, related variables, therapies, and Trexo™ usage. Data will be analyzed using t-test, ANOVA test, mixed and linear models. If the expected results were achieved, this would show Trexo Robotics™ as a possible alternative to traditional bowel movement treatments for children with cerebral palsy, with the hope that more children will be able to utilize these devices.

Taylynd Stuhr

Sponsored by Dr. Chip Poland

Agricultural Studies

Vertical Farming Anywhere: Evaluating the Feasibility, Sustainability, and Scalability of Controlled-Environment Agriculture Through the Coldwater Fresh Model

Global population growth and increased reliance on traditional agricultural resources have generated concerns regarding the long-term viability of the global food supply. Advanced vertical farming is emerging as a viable solution for providing urban populations with fresh produce while mitigating environmental stressors. This study evaluates vertical farming as a method for improving food security, with a specific focus on the Coldwater Fresh model in Arizona. Through an assessment of recent academic literature and industry data, this research analyzes technological advancements, resource utilization, and production outcomes. Additional evaluation focuses on yield efficiency and sustainable selling prices as key indicators of economic viability. The study also considers operational factors such as energy consumption and air-flow efficiency. Vertical farming enables year-round production and significantly reduces land and water use. However, energy consumption remains a major limitation to scalability. Air-flow efficiency also presents ongoing operational challenges. Economic viability was found to depend more on optimizing yield and pricing strategies than on social pressure or major technological breakthroughs. Ultimately, this study posits that vertical farming, when scientifically designed and monitored at a granular level, is a scalable and complementary component of the modern agricultural landscape. These findings suggest that continued optimization of operational efficiency could position vertical farming as a critical contributor to future global food security.

Abby Talkington

Sponsored by Dr. Chip Poland

Agricultural Studies

The Effect of FerAppease® on Pregnancy Rates in Beef Cattle

Estrous synchronization is widely used in the beef and dairy cattle industries to control estrus and artificial insemination (AI) timing and improve conception rates. This process can be stressful for the animals with multiple handling instances and hormonal treatments. Literature suggests that stress can negatively impact reproductive performance. Thus, reducing stress could lead to improved reproductive outcomes. This research evaluated the effectiveness of FerAppease, a pheromone-based product used to reduce stress in cattle, in improving pregnancy rates in heifers and cows using AI protocols. Angus heifers (177) and cows (273) of different ages were sorted at branding by age (first calf heifer, 2- and 3-year-olds, and mature cows). Within the age groups, the cows were sorted into two pastures, and treatments were assigned to pastures randomly within age group (control or treatment). The cows were artificially inseminated using the 7&7whereas the heifers were artificially inseminated using the 14-day CIDR (Controlled Internal Drug Release, a progesterone-releasing intravaginal insert) protocol. At the time of AI breeding, in the treatment groups FerAppease was applied (10 mL) to the poll and face of each animal. In the fall, all the cattle were ultrasounded to determine pregnancy. The only difference between the treatment groups was the application of FerAppease at breeding. FerAppease did not affect pregnancy rates of first calf heifers ($P>0.60$), cows ($P>0.89$), or when combined ($P>0.84$) across breeding cycles. Furthermore, FerAppease did not specifically increase pregnancy to AI breeding ($P>0.59$, 0.66 and 0.52, respectively). This suggests that applying FerAppease at the time of AI breeding does not improve pregnancy outcomes. Although the literature

suggests using FerAppease reduces stress in cattle and improves performance, its use during AI protocol does not improve pregnancy rates.

Kimber Thiel

Sponsored by Dr. Sarah Manka

Natural Sciences

An Evaluation of Sanitation Effectiveness in a Cat Facility Following a Coccidia Outbreak

Sanitation is an important part of disease prevention in animal housing facilities, especially in environments where there are multiple cats being housed in close proximity. Contamination can be spread easily due to the high population density of cats, shared spaces, and the constant presence of organic material. Coccidia is a highly resistant parasite that can persist in the environment if cleaning procedures are not fully effective. The purpose of this study is to evaluate whether the cleaning procedures and products currently being used in a cat facility are effectively reducing possible parasite-related contamination following a recent coccidia outbreak. It was hypothesized that possible parasite-related material is still present within the facility despite the current cleaning procedures. Environmental samples were collected from high-risk areas over a three-week period using sterile polyester swabs. Sample locations included areas near litter boxes, the mop bucket after mopping, a floor crease near a cat tree, and the mop sink drain. Samples were placed into test tubes and taken to the DSU campus laboratory, where a salt flotation method was used to prepare slides for microscopic examination to check for debris and egg-like structures. Microscopic observations showed that debris and possible parasite-related structures were present in multiple sample areas. The most consistent material was observed near the litter boxes and in the floor crease near the cat tree. Observations varied by week, with some areas showing reduced egg-like structures over time while still containing debris. This confirms contamination was still present across all three weeks but varied by location. Overall, the findings suggest that environmental contamination can still be present in high-risk areas of the facility despite normal routine cleaning procedures. This supports the importance of proper cleaning procedures following a coccidia outbreak.

Benjamin Thompson

Sponsored by Dr. Talha Naqash & Dr. Shafaq Asif

Computer Science

The Dynamic Oversight Blueprint: A Dual-Track Lifecycle for Ethical Machine Learning in Medical Diagnostics

The rise of machine learning algorithmic diagnosis tools in the medical field is often limited by a rushed deployment without a proper fail-safe in place. The tendency to rely on autonomous, non-transparent outputs without a properly tuned architecture puts patient dignity and marginalized patients at risk due to inaccurate and non-diverse training data. The problem is further complicated when the distinction between machine learning development errors and errors in implementation and use in medical settings is not clearly known. To mitigate negligence in the medical setting and algorithmic errors, healthcare institutions require a cyclical, dual-track theoretical framework that separates design and implementation weaknesses. Utilizing a structured design and implementation workflow helps computer scientists, medical professionals, and review committees understand the logical flow of the framework. The results of this study are projected to create a harmonized system where machine learning outputs are transparent and critically examined before use. The theoretical result of the blueprint is expected to establish remedies to reduce diagnostic anomalies and prevent the use of data without informed consent. The model should theoretically produce implementation vigilance using medical oversight committees with clear protocols to rollback or recalibrate software when ethical negligence is detected. This research brings a practical methodology to transition ethics from compliance checks to proactive operational codes. The separation of vulnerabilities into two categories, architectural and deployment flaws, equips medical regulators, software developers, and medical boards with a methodology to address liabilities before they affect patients. This creates a bridge between computer science theory and medical patient care to maximize patient wellness.

Brianna Toll, Alicia Engstrom, Laura Maala
Sponsored by Mr. Cody Ptacek
Nursing

In preterm babies, how does delayed cord clamping compared to immediate cord clamping affect hematologic outcomes in the first 6 months of their life?

Delayed cord clamping (DCC), compared with immediate cord clamping (ICC), has become an increasingly common medical decision in newborn care. Delayed cord clamping (DCC) is recommended as standard care for stable term and preterm neonates. A preterm neonate is defined as one born at 36 weeks of gestation or less. DCC involves postponing umbilical cord clamping for more than 30 seconds or until cord pulsation stops. It stimulates the natural physiological process of placental transfusion at birth, providing the neonate with approximately a 20% to 30% increase in blood volume and a 50% increase in red blood cells. Placental transfusion occurs quickly after birth, with about 80 mL of blood transferred within the first 60 seconds and around 100 mL by about 3 minutes. Current data indicate that DCC at 120 seconds is associated with a significant 2% increase in mean hematocrit, while ICC corresponds to a 20% lower hemoglobin level compared to DCC. The median hemoglobin in the DCC group is 3 g/dL higher than in the ICC group, representing a 2.6% increase. Studies show that, compared to ICC, DCC is linked with higher serum ferritin levels but no change in anemia. This review discusses the hematologic effects of DCC versus ICC in preterm infants during the first six months of life. Overall, current evidence supports DCC as a beneficial intervention for improving early hematologic stability in preterm infants.

DaltonTvedt
Sponsored by Dr. Chip Poland
Agricultural Studies

Bucking Bull Genetics: Do Sires Effect Offspring in Terms of Buck Off Percentage, Average Score, and Power Rating

Bull riding is a sport within rodeo where the objective is for a rider to stay on top of a bull for an eight second duration. Within the last twenty years, bull riding at the professional level has changed from being just one of the events in a rodeo to becoming its own multi-million-dollar sporting event. This has created a lucrative market for high-performing bucking bulls. The reason for this study is to assess desirable sires that produce high quality bucking bulls in terms of buck off percentage, average score, and power rating. Probullstats is a database that keeps track of bucking bull scores, recorded outs, and calculates power ratings. Therefore, sires and grandsires from each bull that is inside the top 100 of the Probullstats top 500 premiere list were gathered. From this, there was an ANOVA test done to determine if sires influenced the average score, buck off percentage, or power rating. There was also a scoring system put in place for this study to find out what bull was the best across all categories, and to see what categories each bull was better in. The system gave each bull a score for its ranking amongst the other bulls in each category of average score, buck off percentage, and power rating, and then summed them to calculate a total score. The result of this study shows sires do not have an influence on their offspring's buck off percentage, average score, or power rating. Bushwacker proves to be the best overall bull from the scoring system by a margin of over 25 points. Interestingly, when plotted on a graph, the score from the study compared to the number of standard deviations from the average for each bull had a positive correlation. Therefore, the bulls with the highest scores from the study are significantly above the average scores in buck off percentage, average score, and power rating. This could prove to be a consistent way to evaluate and compare bulls. However, further research would be needed to determine this.

Wyatt Walker
Sponsored by Dr. Chip Poland
Agricultural Studies

How Preservatives can Maintain Hay Quality on High Moisture Prairie Hay

A quality forage is important for animal welfare and maximizing feed efficiency. For producers in the sandhills of Nebraska, prairie hay is one of the main sources of feed during the winter. To better safeguard hay and maintain quality, producers can rely on hay preservatives. Hay preservatives are primarily used for

forages such as alfalfa or more profitable forages baled at higher moisture contents but can also be used in baling prairie hay. The goal of this study is to determine if a hay preservative (propionic acid) will maintain the quality of prairie hay baled at a higher moisture while being economical for the producer. There are many species of native and introduced grasses that make up this prairie hay. All hay in this study was baled in the 2025 hay season from one subirrigated meadow that is drained by a ditch. Hay was baled at varying stem moistures or dew moistures from the same meadow and preservative added at recommended rates based on current moisture content and moved to storage after baling. Hay samples were taken for quality analysis 120 and 220 days after baling. Crude protein concentration (P>0.24) was not affected by the addition of preservative, while heat damaged protein concentration (P=0.05) was reduced with the addition of preservative at both sampling times. Additionally, feed value (P=0.07) tended to be, and forage quality (P=0.03) was, improved at the later sampling date when using preservative. This improvement was related to reduced losses in feed value and forage quality between sampling dates. No hay in this study was compromised when baled at higher moisture levels and using propionic acid as a hay preservative. Preservative addition reduced heat damage to protein and maintained forage quality in prairie hay. Despite these improvements, applying preservatives is likely not economical in prairie hay like that used in this study.
Keywords: Economical, feed quality, high moisture, prairie hay, preservatives, propionic acid.

Wyatt Wilharm

Sponsored by Dr. Chip Poland

Agricultural Studies

Comparative Differences Between the Backfat, Kidney Pelvic Heart (KPH%) and Quality Grade of Angus and Charolais Cattle

The cattle industry is a major component of the U.S. agricultural sector and plays a significant role in the global economy, contributing billions of dollars annually. Maximizing return on investment (ROI), making both carcass quality and production efficiency critical factors for producers. Carcass characteristics are important in determining beef quality and consumer satisfaction, and comparing common breeds can help producers make better management decisions. Angus and Charolais cattle are widely used in beef production, with Angus typically associated with higher quality grades and Charolais known for heavier carcass weights. However, limited research has compared these breeds under similar conditions with a focus on multiple carcass traits. This study evaluated the differences in carcass characteristics between Angus and Charolais cattle from western North Dakota. A total of 20 carcasses, including 10 Angus and 10 Charolais, were analyzed at 701 Meats in Belfield, North Dakota. Each carcass was measured for carcass weight, backfat thickness, kidney, pelvic, and heart (KPH) fat percentage, and quality grade based on standards from USDA, which classify beef using quality grades such as Prime, Choice, and Select, largely determined by marbling and maturity. Results showed that Charolais cattle had a higher average carcass weight (798.8 lbs) compared to Angus (777.6 lbs), while Angus cattle had greater backfat thickness (0.40 inches vs. 0.35 inches) and slightly higher KPH percentages (2.20% vs. 2.10%). In terms of quality grades, Angus produced 2 Prime, 5 Choice, and 3 Select carcasses, while Charolais produced 0 Prime, 5 Choice, and 5 Select carcasses. While this study supports general industry trends, it suggests that factors such as management, nutrition, and genetics may play a larger role than breed alone in determining carcass performance, and further research with a larger sample size is needed to better define these differences.

Kylie Zeller

Sponsored by Ms. Stefanie Aulner

History

Worth It: The Impact of Charles Worth on Fashion

Charles Frederick Worth's advances in patterning, design, and presentation of dress fundamentally changed the fashion landscape, transforming it into the modern industry we know today. This research project is focused on the changes Worth made during his lifetime in the fashion world and the impact they still have on the modern day. By highlighting the ingenuity and creativity behind historical advancements, one can trace the influences of them into the present day. Before Worth opened his atelier, dress making was solely in the hands of sewists who were commissioned by their clients. The occupation of fashion designer was not in existence, and especially not held by men. Worth aimed to change clothing from just being symbols

of power and displays of wealth into art. Worth made fashion something to be respected. Worth was an artist. The clothing he created was meant to display the beauty of the wearer and his work. Worth was one of the first fashion houses to sell ready-to–wear dresses and sewing patterns. Before Worth's time, it was rare to see off the rack dresses and other garments. Worth introduced size standardization into his designs, making it easier and faster to obtain beautiful garments, and in addition boost the revenue of the fashion house. He may not have created these techniques, but through him they were popularized and brought to the mainstream, much like modern stores today. Worth created based on his own views as well as the needs of his clients. Worth created the bustle, ushering in a trend that would last throughout the rest of his life and increasing movement for women. He also created gowns with rigging systems inside, allowing for the skirt hem to be lowered of lengthened, as well as created the princess seam that is still fashionable today. His drive to improve the functionality of women's dress and simultaneously creating art put women at the forefront of the fashion industry, and his innovations can continue to be seen today.

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Session 1A & 2A Rm 117 (Stroup Auditorium) Ag Sci
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Session 1B & 2B Rm 155 (Thompson Auditorium) Nat Sci
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Session 2C Rm 160 Psychology
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