18TH ANNUAL
K-STATE RESEARCH FORUM

WEDNESDAY, MARCH 27, 2013
K-STATE STUDENT UNION

Sponsored by:

Graduate Student Council
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Table of Contents

PROGRAM SCHEDULE

Morning Oral Presentations

9:00 – 11:30	Graduate Engineering/Math/Physical Sciences-Session 1	Flint Hills Room
9:00 – 11:45	Graduate Agricultural Sciences	Big XII Room
9:30 – 12:00	Undergraduate Research	Sunflower Room
10:00 – 12:00	Graduate Biological Sciences-Session 1	Cottonwood Room

Afternoon Oral Presentations

12:30 – 3:15	Graduate Interdisciplinary Research	Big XII Room
1:45 – 3:15	Graduate Biological Sciences-Session 2	Cottonwood Room
1:45 – 3:15	Graduate Social Sciences/Humanities/Education	Room 227
1:45 – 3:15	Graduate Engineering/Math/Physical Sciences-Session 2	Sunflower Room

Poster Sessions

9:00 – 5:00	Posters on display	KS Ballroom
9:00 – 11:00	Graduate Student Poster Judging	
1:30 – 3:30	Undergraduate Poster Judging	
1:30 – 3:30	10th Annual Capital Graduate Research Summit Poster Judging	

Awards Ceremony

4:00 – 5:00	Big XII Room

*The awards ceremony will include a keynote address by Dr. April Mason, Provost and Senior Vice President of Kansas State University.

Oral Session Schedules

Graduate Engineering/Math/Physical Sciences-Session 1
Flint Hills Room
9:00AM – 11:30AM

9:00 **WIRELESS BODY AREA NETWORKS FOR ASTRONAUTS**
Mohammed Taj-Eldin

9:15 **MODELING OF NON-SELECTIVE CATALYTIC REDUCTION OF EXHAUST MIXTURES FROM NATURAL GAS-FUELED ENGINES**
Fan Zeng

9:30 **INVESTIGATING THE MOVING TARGET DEFENSE FOR NETWORK SECURITY**
Rui Zhuang

9:45 **ESTIMATION AND CONTROL OF SPATIALLY DISTRIBUTED CYBER PHYSICAL SYSTEM OVER A NETWORK**
Siddharth Deshmukh

10:00 **INFLUENCE OF INDENTED WIRE GEOMETRY AND CONCRETE PARAMETERS ON THE TRANSFER LENGTH IN PRESTRESSED CONCRETE COSSTIES**
Naga Narendra B. Bodapati

BREAK

10:30 **INVESTIGATION OF THE CONCURRENT EFFECTS OF SIZE DISTRIBUTIONS AND TYPES OF GLASS PARTICLES, AND CURING TEMPERATURES ON REACTION RATE OF GLASS POWDER AS A NEW**
Mohammadreza Mirzahosseini

10:45 **COMBINED NSM STEEL BARS AND EXTERNALLY BONDED GFRP IN STRENGTHENING T BEAMS**
Abdelbaset Mahmoud Traplsi

11:00 **SINGLE MOLECULE STUDIES OF HETEROGENEOUS CATALYSTS**
Xiaojiao Sun

11:15 **GULLY EROSION ASSESSMENT AND WATERSHED REHABILITATION ON MILITARY TRAINING LANDS**
Chelsea Corkins

Graduate Agricultural Sciences
Big XII Room
9:00AM – 11:45PM

9:00 **IMPACT OF HIGH DAY AND/OR NIGHT TEMPERATURE STRESS ON WHEAT**
Sruthi Narayanan

9:15 **THE IMPACT OF ALS MUTATION ON AGRONOMIC POTENTIAL OF DIFFERENT ALS RESISTANT SORGHUM BACKGROUND GENOTYPES**
Dilooshi Weerasooriya

9:30 **SELECTING WHEAT VARIETIES FOR TORTILLA PRODUCTION**
Orelia E. Dann

9:45 **DEVELOPING SORGHUM FLOURS WITH INCREASED RESISTANT STARCH CONTENT FOR HEALTH BENEFITS**
Thanh-Hien Vu

10:00 **CHARACTERIZATION OF SOYBEAN SEE YIELD THROUGH PRECISION PHENOTYPING TECHNIQUES**
Brent Christenson

BREAK

10:30 **ADAPTATION OF GRAIN SORGHUM TO VARYING TEMPERATURE, PRECIPITATION AND CO_2 IN KANSAS: A SIMULATION STUDY**
Abhishes Lamsal

10:45 **EFFECT OF CANOPY HEIGHT AND PREY LOCATION ON LADY BEETLE (COLEOPTERA: COCCINELLIDAE) CAPTURES IN SOYBEAN**
Ximena Cibils Stewart

11:00 **INHERITANCE OF GLYPHOSATE RESISTANCE IN KOCHIA (KOCHIA SCOPARIA)**
Kindsey Myers

11:15 **ORGANIC CARBON CHEMISTRY AND MINERALOGY OF SOIL AGGREGATES IN SOILS FROM A TEMPERATE CONTINUOUS CORN SYSTEM – EFFECTS OF DIFFERENT MANAGEMENT PRACTICES**
Pavithra S. Pitumpe Arachchige

11:30 **ISOLATION AND CHARACTERIZATION OF CAMELINA PROTEINS FROM CAMELINA MEAL**
Ningbo Li

Undergraduate Research
Sunflower Room
9:30AM – 12:00PM

9:30 **EFFECTS OF FEED DELIVERY METHODS FOR GRAZING STOCKER CALVES ON GROWTH PERFORMANCE, BEHAVIOR AND LABOR INPUTS**
Emily M. Mashie

9:45 **CO-TREATMENT WITH A PKC MODULATOR PEPTIDE AND A LOW DOSE OF GEMCITABINE CAUSED A STRONG SYNERGISTIC INHIBITION OF PERITONEAL DESSEMINATION OF PANCREATIC CANCER IN MICE**
Terrahn Wall

10:00 **A LONGITUDINAL STUDY OF UNIVERSITY STUDENT MESSAGE BOARD WRITING COMETENCY**
Denise Durham

10:15 **THE EFFECT OF MIXED HYDROPHOBIC AND HYDROPHILIC SURFACES ON FROST NUCLEATION AND GROWTH**
Alexander Van Dyke

BREAK

10:45 **COMPARISON OF ALUMINUM MORDANTED AND NONMORDANTED WOOL AND COTTON DYED WITH WALNUT**
Kelsie Doty

11:00 **THE GROWING AMERICAN DREAM: AN ANALYSIS OF HISTORIC TRENDS IN HOUSING**
Erin Cammel

11:15 **"FLOW"- A DESIGN RESEARCH AND DEVELOPMENT PROJECT TO CREATE A CONCEPTUAL DISTANCE LEARNER STUDIO WORK STATION IN CONJUNCTION WITH THE HERMAN MILLER COMPANY**
Aaron Bisch

11:30 **"CITY"- A DESIGN RESEARCH AND DEVELOPMENT PROJECT TO CREATE A CONCEPTUAL DISTANCE LEARNER STUDIO WORK STATION IN CONJUNCTION WITH THE HERMAN MILLER COMPANY**
Josef Lang

11:45 **DROUGHT FREQUENCIES IN KANSAS USING STANDARDIZED PRECIPITATION INDEX (SPI)**
Michael P. Baker

Graduate Biological Sciences-Session 1
Cottonwood Room
10:00AM – 12:00PM

10:00 **APPROACHES TO EVALUATE THE EFFECTS OF INTERVENTIONS STRATEGIES ON ANTIBIOTIC RESISTANCE IN CATTLE**
Neena Kanwar

10:15 **EFFECTS OF INFLAMMATORY CYTOKINE ADMINISTRATION ON PRODUCTION, METABOLISM, AND HEALTH IN EARLY LACTATION DAIRY COWS**
Kai Yuan

10:30 **H9E PEPTIDE HYDROGEL: A NOVEL ADJUVANT FOR PORCINE REPRODUCTIVE AND RESPIRATORY SYNDROME VIRUS (PRRSV) MODIFIED LIVE VACCCINE**
Xiangdong Li

10:45 **HOST SPECIES-SPECIFIC INHIBITION OF THE ANTIVIRAL PROTEIN KINASE PKR BY POXVIRUSES**
Chen Peng

BREAK

11:15 **PHOSPHOLIPID SCRAMBLASE 1 ACTIVITY MEDIATES HYPOXIA-INDUCED PHOSPHOLIPID ALTERATIONS LEADING TO AN INFLAMMATORY RESPONSE IN ENDOTHELIAL CELLS**
Emily Archer Slone

11:30 **THE PREVENTIVE AND THERAPEUTIC EFFICACY OF FINASTERIDE AND DUTASTERIDE IN TRAMP MICE**
Alexander Opoku-Acheampong

11:45 **FATTY ACID AND PHYTOSTEROL PROFILES OF COMMERCIALLY AVAILABLE SAW PALMETTO SUPPLEMENTS**
Kavitha Penugonda

Graduate Interdisciplinary Research
Big XII Room
12:30PM – 3:15PM

12:30 **A NANOPLATFORM-BASED APPROACH FOR DETECTING THE TUMOR BOUNDARY**
Dinusha N. Udukala

12:45 **PERCEIVING ARCHITECTURE THROUGH CENTRAL AND PERIPHERAL VISION**
Kevin Rooney

1:00 **OPTIMIZATION OF A BI-PHASIC FED-BATCH FERMENTATION FOR MAXIMIZING SINGLE CELL OIL PRODUCTION**
Kyle V. Probst

1:15 **ANTITUMOR ACTIVITIY BY COMBINATION OF IRON CHELATORS WITH PEPTIDE SEQUENCES**
Gayani S. Abayaweera

1:30 **ASSOCIATION MAPPING OF QUANTITATIVE TRAIT LOCI FOR GRAIN COLOR IN U.S. WINTER WHEAT**
Meng Lin

BREAK

2:00 **RISK ANALYSIS OF THE WATER CONTROL STRUCTURES IN AGRICULTURAL FIELDS IN KANSAS**
Vahid Rahmani

2:15 **ARSENIC MITIGATION BY DEVELOPING A TOOL BASED ON GRAY AND BROWN SEDIMENT SOLID PHASE CHARACTERIZATION**
MD Golam Kibria

2:30 **PEROXIDE AND MEDIATOR: IMPORTANT FACTORS FOR RAPID DECOLORIZATION OF SYNTHETIC DYES USING *ARABIDOPSIS THALIANA***
Rohit B. Kamat

2:45 **CELL PENETRATING CATIONIC PEPTIDE NANOPARTICLE-BASED GENE THERAPY FOR THE TREATMENT OF LUNG METASTASIZED CANCER**
Deepthi Uppalapati

3:00 **HYDROCHEMISTRY AND ORGANIC MATTER CHARACTERIZATION OF AS POLLUTED REGIONS, MURSHIDABAD, WEST BENGAL, INDIA**
Sankar Manalilkada Sasidharan

Graduate Biological Sciences-Session 2
Cottonwood Room
1:45PM – 3:15PM

1:45 **REGULATORY ROLE OF THE START LIPID/STEROL BINDING DOMAIN IN PLANT HOMEODOMAIN TRANSCRIPTION FACTORS**
Aashima Khosla

2:00 **MOLECULAR MECHANISMS OF HOST-RANGE GENES IN VACCINIA VIRUS**
Sherry Haller

2:15 **GENETIC PARAMETERS FOR UDDER QUALITY IN HEREFORD CATTLE**
Heather Bradford

2:30 **EEP CONFERS LYSOZYME RESISTANCE TO ENTEROCOCCUS FAECALIS VIA THE ACTIVATION OF THE EXTRA CYTOPLASMIC FUNCTIONING (ECF) SIGMA FACTOR, SIGV**
Sriram Varahan

2:45 **DEFINING THE DNA RECOGNITION SITE FOR A FUNGAL TRANSCRIPTION FACTOR**
Damien Downes

3:00 **ANALYSIS OF MUTATIONS WITHIN VARIABLE REGIONS OF THE PRRSV GENOME DURING INFECTION**
Nanhua Chen

Graduate Social Sciences, Humanities and Education
Room 227
1:45PM – 3:15PM

1:45 **CHILDREN'S ANTICIPATED RESPONSES TO TWO STORYBOOK CHARACTERS: EVIDENCE FOR (DE) STIGMATIZATION BY ASSOCIATION**
Taylor W. Wadian

2:00 **CONTRIBUTING FACTORS LEADING TO STUDENT-ATHLETE SUBSTANCE USE: A COMMUNICATION PERSPECTIVE**
Joseph Rodgers

2:15 **SUICIDE: THE UNDOCUMENTED, UNREPORTED KILLER OF AMERICAN YOUTH**
David V. Chartrand

2:30 **'LEGITIMATE RAPE' AND THE MEDIA'S RESPONSE: A NARRATIVE CRITICISM**
Mandy Frank

2:45 **DEVELOPMENT OF A CONCEPTUAL MODEL AND EMPIRICAL DEFINITION OF SOCIALLY RESPONSIBLE APPAREL CONSUMER BEHAVIOR**
Erin M. Monfort-Nelson

3:00 **AN ACOUSTIC EDUCATION: TESTING THE EFFECTIVENESS OF SOUNDWALKS AND LISTENING EXERCISES IN LANDSCAPE ARCHITECTURE TO PROMOTE CRITICAL LISTENING IN THE FIELD**
Samantha Jarquio

Graduate Engineering, Math and Physical Sciences-Session 2
Sunflower Room
1:45PM – 3:15PM

1:45 **HUBBLE PARAMETER MEASUREMENT CONSTRAINTS ON DARK ENERGY**
Omer Farooq

2:00 **DOUBLE CHOOZ NEUTRON DETECTION EFFICIENCY WITH CALIBRATION SYSTEM**
Pi-Jung Chang

2:15 **TESTING MODELS OF LOW-DELTA18O SILICIC MAGMATISM IN THE MID-MIOCENE SANTA ROSA-CALICO VOLCANIC FIELD, NV**
Kate Amrhein

2:30 **RARE EARTH ELEMENTS (REE) IN ORGANIC MATTER AS MATURATION INDICATORS; CASE STUDY OF THE WOODFORD SHALE, NORTH CENTRAL OKLAHOMA**
Daniel Ramirez-Caro

2:45 ~~**GEOCHEMICAL INVESTIGATION OF AN OXYANIONS MOBILITY: THE EMERGING CONTAMINANT TUNGSTEN**~~
~~*Chad Hobson*~~ ***WITHDREW****

3:00 ~~**CONSTRUCTING A PROBABILISTIC RISK MAP OF ARSENIC-CONTAMINATED SEDIMENTARY AQUIFERS OF WEST BENGAL, INDIA**~~
~~*Matt Rankin*~~ ***WITHDREW****

Poster Titles and Presenters

Graduate Student Posters
KS Ballroom
On display 9:00AM – 5:00PM
Judging: 9:00AM – 11:00AM

Agricultural Sciences

0. **EFFECT OF SOYBEAN RESISTANCE ON SOYBEAN APHID (APHIS GLYCINES MATSUMURA) BIOTYPES**
   Predeesh Chandran

1. **FACTORS IN WHEAT AFFECTING WATER ABSORPTION TOLERANCE**
   Elyse N. Buckley

2. **CHROMOSOME ENGINEERING FOR FUSARIUM HEAD BLIGHT RESISTANCE FROM ELYMUS TSUKUSHIENSIS IN HARD RED WINTER WHEAT**
   Joey C. Cainong

3. **NUTRITIONAL COMPOSITION AND COLOR COMPARISON OF HERITAGE BRED CHICKENS (120 DAY GROWTH) VS. COMMERCIAL (50 DAY GROWTH) BROILERS**
   Alexandra R. Christiansen

4. **CROP CANOPY EFFECTS ON *KOCHIA SCOPARIA* IN KANSAS**
   Andrew Esser

5. **REDUCED INSECTICIDE USE IN SOYBEAN: A LOOK INTO THE DEVELOPMENT OF SITE SPECIFIC STRATEGIES TO MANAGE *DECTES TEXANUS***
   Alice L. Harris

6. **SOYBEAN INOCULANT AND SEED TREATMENT INTERACTIONS**
   Kim Larson

7. **WHEAT MILL STREAM PROPERTIES FOR DISCRETE ELEMENT METHOD MODELING**
   Abhay Patwa

8. **PALMER AMARANTH CONTROL IN ESTABLISHED ALFALFA UNDER DRYLAND AND IRRIGATED CONDITIONS**
   Josh Putman

9. **EFFECT OF REWORK INCLUSION ON THE PROCESSING AND FINAL PRODUCT CHARACTERISTICS OF A PET FOOD**
   Ryan Roberts

10. **DEEP SOIL STORAGE OF CARBON AS AFFECTED BY TILLAGE AND NUTRIENT SOURCE**
    Stuart Watts

Biological Sciences

11. EFFECT OF GAP JUNCTION ENHANCER IN COLON CANCER CELLS
Kristina Bigelow

12. MIDGUT MICROBIAL COMMUNITY PLAYS A SIGNIFICANT ROLE IN THE VECTOR COMPETENCE OF PHLEBOTOMUS DUBOSCQUI FOR LEISHMANI MAJOR
Dinesh Erram

13. REDUNDANT NUCLEAR LOCALIZATION SIGNALS MEDIATE NUCLEAR IMPORT OF THE ASPERGILLUS NIDULANS TRANSCRIPTION ACTIVATOR OF NITROGEN METABOLIC GENES AREA
Cameron C. Hunter

~~**14. SELECT AMINO ACIDS INDUCED EXPRESSION OF HUMAN BETA-DEFENSIN IN CACO-2 CELLS**~~
~~*Kate Osei-Boadi*~~ ***WITHDREW****

15. BIOCHEMISTRY AND IMMUNOLOGY OF GRAM-POSITIVE BACTERIAL HEME ACQUISITION SYSTEMS
Yan Shipelskiy

16. ELUCIDATING THE STRUCTURAL FEATURES THAT DEFINE SUBSTRATE SPECIFICITY AND ACTIVITY OF *EUONYMUS ALATUS* DIACYLGLYCEROL ACETYLTRANSFERASE (EADACT)
Tam Tran-Nguyen

17. CHOLERA TOXIN ENHANCES SODIUM ABSORPTION VIA ENAC ACROSS CULTURED HUMAN MAMMARY GLAND EPITHELIA
Qian Wang

18. SEROPREVALENCE OF PORCINE REPRODUCTIVE AND RESPIRATORY SYNDROME VIRUS (PRRSV), SWINE INFLUENZA (SIV), AND PORCINE CIRCOVIRUS 2 (PCV2) IN FERAL HAWAIIAN SWINE
Yu Wang

19. CHAPERONE MEDIATED ASSEMBLY OF THE PROTEASOME: CONSTRUCTING THE DESTRUCTION
Prashant Wani

20. HUMAN UMBILICAL CORD MATRIC DERIVED STEM CELLS CONTROL TUMOR GROWTH BY TUMOR SUPPRESSOR GENE EXPRESSION
Naomi Ohta

Engineering, Math, and Physical Sciences

21. ABIOTIC AND BIOTIC PROCESSES ON THE MOBILIZATION OF ARSENIC IN GROUNDWATER OF THE OKAVANGO DELTA, BOTSWANA
Hersy Enriquez

22. MACHINE LEARNING METHODS FOR ESTIMATION OF WEATHER-RELATED OUTAGES ON OVERHEAD DISTRIBUTION FEEDERS
Padmavathy Kankanala

23. TRACKING THE CONTRIBUTION OF AIRBORNE BACTERIA TO THE DISSOLVED ORGANIC CARBON LOAD IN ALPINE ENVIRONMENTS
Kaley M. Oldani

24. PRODUCTION OF DIMETHYLFURAN FROM HYDROXYMETHYLFURFURAL, A BIOMASS DERIVED PRODUCT, USING A RUTHENIUM CATALYST COATED POLYMERIC MEMBRANE REACTOR
John Stanford

25. THE INTERACTIONS OF THE CORN PROTEIN ZEIN AND IONIC LIQUIDS
Sean R. Tomlinson

26. PRODUCTION OF HYDROGEN FROM HIGHER HYDROCARBONS THROUGH AUTOTHERMAL REFORMING PROCESS
Jingyi Xie

27. ONE-STEP CONVERSION OF 2,3-BUTANEDIOL TO BUTENE OVE BIFUNCTIOHNAL CATALYSTS
Quanxing Zheng

Social Sciences, Humanities, & Education

~~28. THE POSSIBILITY OF CONTRACTING OR CAUSING A FOODBORNE ILLNESS: THE IMPACT ON PERCEPTIONS AND BELIEFS OF HANDWASHING AMONG THE DIVERSE WORKFORCE REPRESENTED IN A COLLEGE DINING SERVICE FACILITY~~
~~Becky Bolte~~ ***WITHDREW****

29. A 21ST CENTURY CAMPUS AESTHETIC: PHOTOGRAPHY. MEMORY. PERFORMANCE.
Sarah Flynn

30. ALEXANDER GRETCHANINOFF: FORGOTTEN COMPOSER FROM RUSSIA'S ROMANTIC AGE
Shane Galentine

31. ASSESSING THE USE OF FRESH FRUITS, VEGETABLES AND OTHER NATIVE FOODS ON INDIAN RESERVATIONS IN KANSAS
Pabodha Galgamuwa G. A.

32. DO NOT WASTE MY TIME: KANSAS STATE UNVERSITY STUDENTS' VIEW ON POLITCAL MESSAGING
Travis Hasler

~~33. AN ECONOMIC ANALYSIS OF TE UNTILIZATION OF CRP LAND FOR GROWING CELLULOSIC ETHANOL FEEDSTOCKS~~
~~Michael B. Lindbloom~~ ***WITHDREW****

34. VIDEO LECTURE OR FACE-TO-FACE: SOCIAL PRESENCE THEORY AT PLAY IN THE CLASSROOM
Christopher Mueller

35. A SURVEY OF THE CURRENT CONDITIONS IN HORTICULTURAL THERAPY IN THE UNITED STATES
Anna Shinjo

36. PHYSICAL ACTIVITY IN PRESCHOOL-AGED CHILDREN IN A CHILD CARE SETTING
Jill Stimec

37. *"IT IS SIX WOMEN, BUT IT IS THEIR LIVES, IT IS THEIR LIVES":* BLACK WOMEN'S VOICES ABOUT THE EXPERIENCE OF SINGLEHOOD
Patricia Barros-Gomes

Undergraduate Student Posters
KS Ballroom
On display 9:00AM – 5:00PM
Judging: 1:30PM – 3:30PM

38. EFFECTS OF VIRGINIAMYCIN AND MEGASPHAERA ELSDENII ON CECAL FERMENTATION
Katelyn Salmans

39. PORCINE ENDOGENOUS RETROVIRUS EXPRESSION IS ASSOCIATED WITH MACROPHAGE ACTIVATION STATUS
Wyatt Brichalli

40. GENETIC ANALYSIS OF THE INTERACTION BETWEEN THE NUCLEAR EXPORT SEQUENCE OF A GATA TRANSCRIPTION FACTOR AND A NUCLEAR EXPORTIN
Brandon T. Pfannenstiel

41. PHENOLOGY AND FITNESS IN BIG BLUESTEM (ANDROPOGON GERARDII) ECOTYPES IN GREAT PLAINS RECIPROCAL GARDENS: THE ROLE OF SITE AND ECOTYPE
Sofia Sabates

42. EMPOWERING LOCAL VILLAGERS FROM WEST BENGAL TO UNDERSTAND ARSENIC CONTAMINATION IN DRINKING WATER AND LOCATE ALTERNATIVE SOURCES
Sophia Ford

43. SOLAR POWERED CHARGING STATIONS FOR ELECTRIC VEHICLES
Richard Kim

44. EVALUATING COMPLEX FORMATION BETWEEN IRON, ARSENIC, AND DISSOLVED ORGANIC MATTER USING FLUORESCENCE SPECTROSCOPY
Dustin Phommanivong

45. MAKING MOUNTAINS OF MOLEHILLS: OPPORTUNITIES FOR JUSTIFICATION IN AN EMERGENCY INTERRACIAL HELPING SITUATION S
Donte L. Bernard

46. GRADUATE RECRUITMENT IN SPECIALIZED AGRICULTURAL PROGRAMS
Kevin Cook

10th Annual Capitol Graduate Research Summit Posters
KS Ballroom
On display 9:00AM – 5:00PM
Judging: 1:30PM – 3:30PM

47. UTILIZATION OF HIGH LIGNIN RESIDUE ASH (HLRA) IN CONCRETE MATERIALS
Feraidon F. Ataie

48. MEASURING GULLY EROSION IN TWO DISTURBED KANSAS LANDSCAPES
Katie Burke

49. BOVINE VIRAL DIARRHEA VIRUS TRANSMISSION FROM PERSISTENTLY INFECTED CATTLE TO NON-PERSISTENTLY INFECTED CATTLE WHEN COMMINGLED: AN EVALUATION OF SERUM
Kelly A. Foster

50. PHYSICAL AND PROCESSING DIFFERENCES BETWEEN BAKED AND EXTRUDED PET FOODS
Michael Gibson

51. NOVEL DELIVERY MECHANISM FOR NUTRITION USING SORGHUM BASED PRE-COOKED"BEANS"
Michael Joseph

52. ASSESSING THE ADOLESCENT EXPERIENCE OF MINDFULNESS
Marcie M. Lechtenberg

53. COMPARISON OF GAMITHROMYCIN, TILMICOSIN AND TULATHROMYCIN: METAPHYLACTIC TREATMENTS IN HIGH RISK CALVES FOR BRD
Tanner J. Miller

54. ABRUPT RAINFALL CHANGE DETECTION IN KANSAS
Vahid Rahmani

55. IMPLEMENTATION OF INDUSTRY-ORIENTED ANIMAL WELFARE AND QUALITY ASSURANCE ASSESSMENT TOOLS IN COMMERCIAL CATTLE FEEDING OPERATIONS
Tera J. Rooney Barnhard

Oral Presentation Abstracts

Graduate Engineering, Math and Physical Science-Session 1

WIRELESS BODY AREA NETWORKS FOR ASTRONAUTS

Mohammed Taj-Eldin, Amelia Hodges, William B. Kuhn, and Balasubramaniam Natarajan
Department of Electrical and Computer Engineering, College of Engineering

BACKGROUND AND PURPOSE: Monitoring astronaut vital body signs in real time is currently done via a limited number of wired sensors. The benefits of employing wireless body area networks (WBANs) including wireless bio-sensors within future extra-vehicular activity (EVA) suits are manifold. Astronauts carry a significant load while training and on mission. Thus, replacing conventional wired monitoring systems with wireless technology can reduce weight and protect against any mechanical wear associated with wiring. As a first step towards a WBAN design, we aim to quantify the propagation characteristics within a space suit. **METHOD**: 3D electromagnetic (EM) simulations for the human body within a space suit were performed. A custom antenna that operates in the Medical Device Radio Communication Service (MedRadio) band was designed. Path loss measurements using this antenna are made for different transmit-receive locations within the space suit. **RESULTS**: We first observe that the experimental path loss measurements closely align with 3D EM simulations. Secondly, the observed path loss values demonstrate the viability of using low power wireless links within a space suit. **CONCLUSION**: Our findings advance the potential for a WBAN within the new NASA constellation spacesuit system that will be used for the long-term missions.

MODELING OF NON-SELECTIVE CATALYTIC REDUCTION OF EXHAUST MIXTURES FROM NATURAL GAS-FUELED ENGINES

Fan Zeng and Keith Hohn
Department of Chemical Engineering, College of Engineering

BACKGROUND AND PURPOSE: With increasingly stringent engine emission standards, researchers have focused on exhaust gas after treatment in order to fulfill the ultra-low exhaust emission standards. Commercial systems produced to treat exhaust employ non-selective catalytic reduction (NSCR), in which NO_x, CO and unburned hydrocarbon are simultaneously destroyed over a catalyst. Research activities to develop and model NSCR have mostly focused on gasoline-fueled engines. However, natural gas-powered engines are widely used, particularly in natural gas pipelines. Studies on NSCR for treatment of exhaust from gasoline engines are not applicable for understanding natural gas fueled-engines without a detailed understanding of the chemistry of natural gas exhaust on NSCR catalysts. **METHOD:** This research seeks to build a reliable model to describe the performance of NSCR in natural gas fueled-engines by mathematically describing the performance of the catalytic converter and the oxygen sensor used to maintain the exhaust at a composition that the converter can handle. The impact of exhaust composition on the performance of the catalytic converter has been modeled by applying published micro-kinetics models. **RESULTS AND CONCLUSION:** By successfully simulate of published experimental results, we have confidence the model is applicable to this research. The results shows that CO conversion is high at fuel lean, but low at fuel rich due to the incomplete combustion and also NO_x conversion is high at fuel rich, but low at fuel lean due to excess of air, which is consistent with the theory published.

INVESTIGATING THE MOVING TARGET DEFENSE FOR NETWORK SECURITY

Rui Zhuang[1], Su Zhang[1], Alex Bardas[1], Scott DeLoach[1], Xinming Ou[1], and Anoop Singhal[2]
[1]Department of Computing and Information Science, College of Engineering; [2]National Institute of Standards and Technology, Gaithersburg, Maryland

BACKGROUND AND PURPOSE: In cyber space, time is on the attackers side; they have time to study our networks to determine potential vulnerabilities and choose the time of attack to cause maximal impact. To combat this advantage, a new promising approach called moving target defense(MTD) has been suggested and hypothesized as a potential game changer. MTD can be broadly interpreted as proactively changing the network configuration to reduce/shift the attack surface area available for exploitation by attackers and thus to reduce the success likelihood of intrusion. Currently there is little work to study how much proactively changing a network's configuration can increase the difficulty for attackers and thus improve the resilience of the system under attack. **METHOD:** We propse a preliminary design for a moving target defense system. Based on this design, we implement a simulation system to investigate how several different aspects of changing can impact the success likelihood of intrusion. We also propose a mathmetical model which can be used to estimate the success likelihood of instruion given these parameters. **RESULTS/FINDINGS:** Results show, as expected, increased frequency of change can reduce attacker's success likelihood. Also, even with less than perfect intrusion detectors, significant improvements in network security can be made. **CONCLUSION:** The results clearly shows the potential of MTD for network security and are very important preliminary steps toward building a comprehensive evaluation and analysis framework for MTD systems.

ESTIMATION AND CONTROL OF SPATIALLY DISTRIBUTED CYBER PHYSICAL SYSTEM OVER A NETWORK

Siddharth Deshmukh, Balasubramaniam Natarajan, and Anil Pahwa
Department of Electrical and Computer Engineering, College of Engineering

INTRODUCTION AND FINDINGS: In this research work, we analyze stochastic stability of estimation and control process for spatially distributed cyber physical systems over a communication network. We study a practical scenario where sensors and actuators are arbitrarily deployed over an area to jointly sense and control the underlying cyber physical system. The sensors directly communicate their observations to a central estimation and control unit which on computing the control action communicates to individual actuators. Since, communication links are susceptible to random failures, the overall estimation and control process is subjected to: (1) partial observation updates in estimation process; and (2) partial actuator actions in control process. We analyze the stability of estimation and control process in this scenario, by establishing the conditions under which estimation accuracy and deviation from target state trajectory is bounded. The applicability of this research includes, but not limited to systems like, power distribtion system, irrigation networks, city traffic networks, etc. **CONCLUSION:** The overall analysis illustrates that there is tradeoff betweeen accuracy in estimation process and effectiveness of control process, and the quality of underlying communication network. Our key contribution is the derivation of a new fundamental result on bounds for critical probabilities of inidvidual communication link failure to maintain stability of overall system. Our study further exploits other cyber physical system characterstics like, spatial correlation and correlated communication link failures to broaden the impact of our analysis.

INFLUENCE OF INDENTED WIRE GEOMETRY AND CONCRETE PARAMETERS ON THE TRANSFER LENGTH IN PRESTRESSED CONCRETE CROSSTIES

Naga Narendra B. Bodapati and Robert J. Peterman
Department of Civil Engineering, College of Engineering

BACKGROUND AND PURPOSE: The use of pre-stressed concrete railroad ties over wooden ties is increasing in the United States due to increase in rail road loads and high speed rail. In order for these prestressed concrete ties to function adequately over their expected service life, the prestressing force must be fully introduced before the rail load is applied. The length required to transfer the prestress force into the concrete member is referred to as the "Transfer Length." Thus, lower transfer lengths would ensure the full capacity of pretensioned concrete ties. Present study was conducted to determine the variation in the transfer length with different parameters (Indentation of the reinforcement wires, release strength and consistency of the concrete). **METHOD:** In order to replicate the wire-to-concrete proportions commonly used in prestressed concrete railroad ties, small (3 ½" x 3 ½") prestressed concrete prisms were fabricated and each contained four 5.32-mm-diameter indented wires. A special jacking arrangement was used to ensure that each of the wires was tensioned to the same jacking force of 7000 pounds. Concrete surface strains were measured to calculate average transfer lengths of the prisms. **RESULTS/FINDINGS:** Results showed that the use of indented reinforcement wires in concrete prisms and/or prestress transfer at high release strengths would help in reducing the transfer length. **CONCLUSION:** The performance of the concrete ties can be significantly increased by lowering the transfer lengths, with the usage of indented reinforcement in the high release strength concrete. In order to generalize this, further research should be done with different concrete mix proportions.

INVESTIGATION OF THE CONCURRENT EFFECTS OF SIZE DISTRIBUTIONS AND TYPES OF GLASS PARTICLES, AND CURING TEMPERATURES ON REACTION RATE OF GLASS POWDER AS A NEW SUPPLEMENTARY CEMENTITIOUS MATERIAL (SCM)

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BACKGROUND AND PURPOSE: Glass cullet has the potential of reacting with the alkaline pore solution in concrete, potentially making it an effective supplementary cementitious material (SCM). There is a lack of accurate and comprehensive knowledge about the behavior of glass as an SCM, which limits its use in concrete. Because the glass homogenous nature of cullet particles, they can serve as a model system for investigating the effects of particle size distribution, type, and curing temperature on the glassy material reactivity in concrete. This could allow for better and more use of SCMs containing large quantities of glassy material in concrete, providing a beneficial use for this landfilled material. **METHOD:** This study investigates the simultaneous influences of three size ranges of glass cullet, two types of glass, and three different temperatures. In order to accomplish the aforementioned objective, chemical shrinkage, isothermal calorimeter, and thermogravimetric analysis have been used to quantify reaction degree with time. Additionally, mortar compressive strength and water absorption of samples containing glass powder at different curing temperatures and ages have been used to relate reaction degree to performance. **RESULTS/FINDINGS:** The results reveal that the very fine glass powder (0 to 25 μm) has some reactivity at all curing temperatures and even at early ages. However, its reactivity is significantly higher at elevated temperatures. Moreover, green glass shows higher reactivity than clear glass. **CONCLUSION:** Finely ground glass particles (less than 25 μm) as a partial cement replacement in concrete can have pozzolanic reactivity. This reactivity can be considerable should elevated curing temperatures are employed.

COMBINED NSM STEEL BARS AND EXTERNALLY BONDED GFRP IN STRENGTHENING T BEAMS

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BACKGROUND AND PURPOSE: In this study, external bonding of GFRP and near surface mounting of regular steel bars are combined to improve the behavior, delay the failure, and reduce the cost. E-Glass FRP is selected due to its inexpensive cost and non-conductive properties to shield the NSM steel bars from corrosion due to the redundancy against vandalism of GFRP. **METHOD**: An experimental program was conducted to test in which four full scale T beams were designed and built. All beams were tested by monotonic loading until failure. The first specimen is tested as a control beam. The second specimen is strengthened using two #5 steel NSM bars and one layer of GFRP, both extending to the support. The third and fourth specimens were strengthened with the same system used for the second beam. However, the NSM steel bars were cut short covering only 30% of the shear-span while the GFRP was extended to the support. The fourth specimen was loaded beyond its cracking load then exposed to severe attack of deicing salt by submerging into deicing salt solution for three continuous months. Then, the beam was tested to failure indicating that some deterioration might have taken place. However, it was observed after failure that the NSM bars were very well protected by the surrounding epoxy. **RESULTS:** The beams failed at 15kips, 38.4kips, 25.9kips and 23.2kips by sequence. **CONCLUSION**: All strengthened beams showed significant improve as compared to the Control Beam. However, using the full length NSM bars was more efficient than using short NSM bars.

*****WITHDREW*****

REACTIVE POWER AND VOLTAGE CONTROL IN DISTRIBUTION SYSTEMS WITH PHOTOVOLTAIC GENERATION

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BACKGROUND AND PURPOSE: This paper presents the interaction of traditional centralized voltage regulators such as load-tap-changing (LTC) transformers with the new emerging inverter-based distributed photovoltaic (PV) generators in reactive power and voltage control of distribution systems. **METHOD:** Two local reactive power control injection methods namely fixed PF and fixed PF-fixed Q methods, for inverter-based PVs are considered and their interaction with LTC transformers is analyzed. The investigated objective function is the total electric losses for the 24 hours while satisfying the system operational constraints. Discrete Particle swarm optimization (DPSO) is used to determine the LTC operation scheme as an integer nonlinear optimization problem. **RESULTS/FINDINGS:** The performance is validated by applying the proposed method to the standard IEEE 33 bus test system. **CONCLUSION:** The result show that the fixed PF-fixed Q method outperforms the other methods in power losses reduction and LTC tap-changing operation.

SINGLE MOLECULE STUDIES OF HETEROGENEOUS CATALYSTS

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BACKGROUND AND PURPOSE: With the development of space and time resolution, it is now possible to study individual sites on heterogeneous catalysts. For example, fluorophores can be chosen that emit at different wavelengths depending on the properties of the local environment. By doping these fluorophores into a solid matrix at nanomolar concentrations, individual probe molecules can be imaged; this technique is known as single molecule spectroscopy (SMS). **METHOD:** In this work, we used SMS to probe the acid sites present in mesoporous Silica-Alumina thin films synthesized by the sol-gel method. Compared with other solid catalysts, this material can be modified with a wide variety of functional groups and the pore structure can be strictly ordered, providing a simple and well-defined system to study. A wide-field fluorescence microscope was used to locate and characterize the fluorescent behaviors of C-SNARF-1, a pH sensitive probe with a resolution of 20nm. The fluorescence intensity ratio at two wavelengths provided a way to study the acidity of the interacting medium. Histograms of the intensity ratio collected from at least 150 dye molecules for each sample were interpreted to the distribution of Brønsted acidic microenvironment with varying pH values. **RESULTS AND CONCLUSION:** The results showed that with the increasing of Al doping, there were more microenvironments with strong acidity. This study demonstrated the potential of applying single molecule spectroscopic method for the characterization of heterogeneous catalysts.

GULLY EROSION ASSESSMENT AND WATERSHED REHABILITATION ON MILITARY TRAINING LANDS

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BACKGROUND AND PURPOSE: Military maneuvers result in significant physical and environmental impacts to the landscape. These impacts generally result in a loss of vegetative cover and increased watershed runoff and rate depending on vehicle speed, turning radius, and soil moisture content. Unless adequately monitored or mitigated, this increased runoff can lead to excessive soil erosion and gully formation. Past studies have revealed that these gullies can impact water quality from excessive erosion and create concerns regarding soldier safety. In order to better understand how gullies form and evolve overtime on military instillations, a study is being conducted at Fort Riley, KS. **METHOD:** In 2010, approximately 40 gullies were identified, assessed, and measured using common erosion monitoring and surveying techniques. These gully locations, and any newly formed gullies, were remeasured in 2012 to determine the rate of growth for each site with respect to width, depth, and head cut. **RESULTS/FINDINGS:** For a detailed analysis, these gullies have been visually split into three categories: roadside ditches, anthropogenic gullies, and natural erosion. Roadside ditches have shown the largest increase in head cut migration while anthropogenic gullies have seen a greater degree of change with respect to both width and depth. Other variables will be isolated for further analysis such as soil type, topography, and vegetative cover. These are considered so to determine what locations are most vulnerable to gully formation and migration. **CONCLUSION:** Certain locations on military instilations should be more closely monitored regarding gully erosion potential. This research will support what areas are most suseptiable and why.

IMPACT OF HIGH DAY AND/OR NIGHT TEMPERATURE STRESS ON WHEAT

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BACKGROUND AND PURPOSE: High temperature stress is one of the major environmental factors limiting productivity of wheat (*Triticum aestivum* L.). Climate models predict that, in the future, there will be a greater increase in night temperature compared to day temperature. However, no studies have compared the effects of high day and/or night temperatures on wheat. The objective of this study was to quantify the effects of high day and/or night temperature on physiological, biochemical, growth and yield traits of wheat genotypes. **METHOD:** Two winter wheat genotypes (Ventnor and Karl 92) were grown at optimum temperatures (25/15°C, maximum/minimum) until the onset of flowering. Thereafter, plants were exposed to high day (35/15°C), high night (25/24°C), high day and night (35/24°C), or optimum (25/15°C) temperatures for 7 days. Physiological (chlorophyll content, thylakoid membrane stability, leaf level photosynthesis, and relative water content) and biochemical (amount of reactive oxygen species, activity of antioxidant enzymes, and membrane damage in leaves) traits were measured on day 0, 1, 4, and 7 during the stress period and day 2 and 4 during the recovery period (after the stress was relieved). Growth (plant height, tiller number/plant, and biomass production), and yield traits were measured at maturity. **RESULTS:** Preliminary results showed that both high day and night temperatures significantly influenced most of the physiological and biochemical traits and decreased growth and yield traits. **CONCLUSION:** This study quantifies the effects of high day/or night temperatures on wheat and emphasizes the need for development of genotypes that are tolerant to high temperature stress.

THE IMPACT OF ALS MUTATION ON AGRONOMIC POTENTIAL OF DIFFERENT ALS RESISTANT SORGHUM BACKGROUND GENOTYPES

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BACKGROUND AND PURPOSE: Weed control has been the greatest challenge to sorghum production in the United States. Although herbicides are an important component in grain sorghum weed management, post-emerge management of weeds continues to be a problem. Sustained efforts to this end led to identification of a genetic source, a sorghum genotype referred to as Tailwind (TW) which confers resistant to Acetolactate Synthase (ALS) inhibitor herbicides and was used as the resistant gene donor in the breeding program. However, introgression of this resistance gene in to adapted backgrounds has challenges related to adaptation and agronomic potential in that many of the resistant segregates tend to have reduced early season seedling vigor and variable degree of inter-venial chlorosis. This study was conducted to quantify the effects of the ALS mutation on seedling vigor, extent of chlorosis and associated physiological functions; and to examine the interaction between the mutation and background genotype in affecting these traits. **METHOD:** Large set herbicide resistant families comprising diverse genetic backgrounds were evaluated for early season seedling vigor, leaf chlorophyll content (SPAD), both before and after treatments with herbicides. **RESULTS/FINDINGS:** Early season seedling vigor and the extent of chlorosis were significantly different between backgrounds and the variation disappeared as plant growth was advanced. Such variation did not have visible impact on day to flowering and maturity. **CONCLUSION:** Careful selection of recurrent parent background can minimize these undesirable effects of the mutation. The actual cause for the observed reduced agronomic potential of some backgrounds will be the concern of future research.

SELECTING WHEAT VARIETIES FOR TORTILLA PRODUCTION

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BACKGROUND AND PURPOSE: Wheat flour tortillas are the second most consumed bread product behind white pan bread. Manufactured tortillas are formulated with highly viscoelastic hard red wheat flours selected and grown for bread making. However, the inherent properties of the bread making flours require costly reducing agents to enhance extensibility that is necessary during the pressing stage of tortilla production. Previous research on wheat tortillas focused on ingredients and formulation, but little is known about the optimum tortilla flour chemistry. The objective of this study was to identify the biochemical and physical factors in wheat affecting wheat tortilla quality. **METHODS:** Seven popular hard winter wheat cultivars that vary in bread making quality were grown in 4 locations in Kansas. Wheat and flour properties were characterized using approved AACCI methods. Protein composition was determined using high performance liquid chromatography (HPLC). Flour particle and starch size was measured with laser diffraction. Tortillas were made with a laboratory hot press method and ranked by end-product quality. Wheat and flour quality parameters were correlated with tortilla scores. Variety and environment and their interaction were evaluated. **RESULTS:** Samples varied widely in protein content, kernel size, dough mixing, and bread quality. The starch and protein fractions are currently being analyzed. It is anticipated that flours with a protein composition with a higher proportion of low-molecular weight glutenin subunit (LMW-GS) and gliadin will result in larger diameter tortillas. **CONCLUSION:** Improving the understanding of biochemical properties of flour will enable identification of wheat varieties optimal for tortilla production.

DEVELOPING SORGHUM FLOURS WITH INCREASED RESISTANT STARCH CONTENT FOR HEALTH BENEFITS

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BACKGROUND AND PURPOSE: Sorghum flour is free of wheat gluten and can be used to prepare foods for celiac patients. In addition, sorghum flour is a good source fiber in the form of resistant starch. The objectives of this research are to develop an effective processing technique to increase resistant starch content of sorghum flour and investigate the effects of sorghum protein matrix on starch digestibility. **METHOD:** Samples of white sorghum flour were treated at different temperatures (100, 120, and 140^{o}C) for different times (1, 2, and 4 hours) with different moisture contents (0%, 12.5%, 20%, and 30%). Samples after heat treatments were tested for starch digestibility, protein digestibility, differential scanning calorimetry (DSC), and size-exclusion high-performance liquid chromatography (SEC-HPLC). **RESULTS/FINDINGS:** Sample with 20% moisture after heat treatment at 100^{o}C for 4hr had a high resistant starch content (22.1% compared to 5.6% of control sample) and low protein digestibility (8.37% compared to 68.3% of control sample). Results of thermal analysis using DSC showed a very low degree of gelatinization for samples treated at moisture content less than 20%. Low amount of sorghum protein extracts after heat treatments was observed by SEC-HPLC. **CONCLUSION:** Heat-moisture treatments were successful in increasing resistant starch content by altering sorghum protein without gelatinizing the starch.

CHARACTERIZATION OF SOYBEAN SEED YIELD THROUGH PRECSION PHENOTYPING TECHNIQUES

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BACKGROUND AND PURPOSE: One of the major challenges of crop scientists is to increase crop yield with fewer inputs. To accomplish genetic gains needed to sustain food demands, genotyping and phenotyping technologies that increase genetic material in the breeding program while increasing the efficiency of varietal development is necessary. Precision phenotyping techniques using canopy reflectance measurements (CFM) can be used in this manner. **METHODS:** CFMs were used to characterize seed yield of twenty Maturity Group III and twenty Maturity Group IV soybean varieties released from 1923 to 2010. Measurements were conducted on six irrigated and water stressed environments in 2011 and 2012. Spectral band regions significantly contributing to seed yield and canopy temperature were selected through partial least squares regression and yield estimation models were created using selected band regions through multiple linear regression. **RESULTS AND CONCLUSIONS:** Significant differences were detected between genotypes, environments, and genotype by environment interaction for yield, canopy temperature, and band regions. Yield prediction models created, explained a large portion of the variation in seed yield within genotypes. Yield prediction models also estimated seed yield for the top 25% yielding genotypes accurately. Later plant growth stages were also more reliable in seed yield estimation. Yield estimation models using CFMs can estimate seed yield and may be utilized as a precision phenotyping technique in breeding programs to increase genotype selection efficiency.

ADAPTATION OF GRAIN SORGHUM TO VARYING TEMPERATURE, PRECIPITATION AND CO_2 IN KANSAS: A SIMULATION STUDY

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BACKGROUND AND PURPOSE: Kansas is a major area of agricultural production for both the US and worldwide and stands first in grain sorghum production in the country. However, numerous challenges such as low precipitation in the west, wet to dry condition from east to west, increasing temperature gradient across north to south, reducing water aquifers levels, and intense thunderstorms exacerbated by climate change are the major constraint prevails in Kansas hindering sorghum production. Two fundamental problems are to understand how plants may respond to the expected changes in the environment and how producers might adapt their farming practices to alleviate negative impacts and maximize the potential benefits. **METHODS:** In this study, the impact of variation of climate variables (temperature, precipitation and CO_2 level) on Sorghum yield is evaluated at four stations in Kansas under rainfed conditions. Crop-simulation model (DSSAT, CERES-Sorghum) was used to describe crop growth and development over time, allowing for influences of weather, soils and management. Thus, in addition to yield effects, simulations can provide valuable insights into how alternative management strategies adapt to new production situations emerging from varying climate variables. **RESULTS:** Preliminary results show changes in yield, vary with combinations of climate variables. **CONCLUSIONS:** These results will be useful recommendation of adaptation strategies that are relevant, robust, and easily operated by all stakeholders, practitioners, policymakers, and scientists.

EFFECT OF CANOPY HEIGHT AND PREY LOCATION ON LADY BEETLE (COLEOPTERA: COCCINELLIDAE) CAPTURES IN SOYBEAN

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BACKGROUND AND PURPOSE: In the absence of aphid migration events, lady beetles are capable of suppressing soybean aphid populations below economic injury levels in much of the North Central US. Several factors may influence their ability to locate suitable prey patches, including abiotic factors like wind direction or speed, or biotic factors like prey availability, location, or even quality. For soybean aphid, within-plant distributions change throughout the season but the reasons for these shifts are unclear. The goal of this research was to evaluate how coccinellid communities respond to differing aphid populations within a changing soybean canopy. **METHOD:** In a early-planted and double-cropped soybean field, 40 randomly selected plants were enclosed using a 1-2 m tall wire cylinder covered with mesh and coated in tangle foot (sticky cylinders). This cylinder design allowed us to passively record height and direction for all lady beetle captures in response to four aphid treatments. These included two controls (a plant with no aphids and a cylinder with no plant) and plants with aphids restricted to upper or lower canopy using leaf exclusion cages. Although aphid location within the canopy varied, aphid density was kept consistent between treatments. Changes in coccinellid communities were calculated using the Shannon-Weaver index and rank-proportion between fields and treatments. **RESULTS/CONCLUSIONS:** In general, we found that early-planted soybeans had the same species richness, but lower evenness when compared to double-cropped soybeans. Furthermore, using logistic regression, lady beetle captures were positively correlated with changes in canopy height but did not display any patterns of directionality.

INHERITANCE OF GLYPHOSATE RESISTANCE IN KOCHIA (KOCHIA SCOPARIA)

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BACKGROUND AND PURPOSE: Glyphosate is a non-selective, broad-spectrum herbicide used extensively in agriculture. Prolonged use of glyphosate in glyphosate resistant (GR) crops has created selection pressure; therefore several weeds have evolved resistance to glyphosate, including kochia. Kochia (*Kochia scoparia*) is an annual broadleaf weed that infests crops in Kansas. Previous research suggests that glyphosate resistance in kochia is determined by increased copy number of the gene coding for EPSPS (5-enolpyruvyl shikimate 3-phosphate synthase), the target site of glyphosate. However, the inheritance of glyphosate resistance is unknown. **METHOD:** Using homozygous GR and susceptible (GS) lines, F_1 progeny are being produced by reciprocal crosses. F_1 progeny will be screened for glyphosate resistance and self-pollinated to generate F_2 progeny. The response to glyphosate, shikimic acid levels and EPSPS gene copy number will be determined in the F_2 progeny. **RESULTS/FINDINGS:** Homozygous GR and GS parental lines were identified and upon estimating shikimate levels in these lines, it was found the GS plants accumulated higher amounts of shikimate than GR plants. **CONCLUSION:** Determining segregation of GR and GS in the F_2 progeny will help assess the number of genes that control glyphosate resistance in kochia, which is important to understand the spread of resistance in the kochia population.

ORGANIC CARBON CHEMISTRY AND MINERALOGY OF SOIL AGGREGATES IN SOILS FROM A TEMPERATE CONTINUOUS CORN SYSTEM - EFFECTS OF DIFFERENT MANAGEMENT PRACTICES

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BACKGROUND AND PURPOSE: Agriculture could contribute around 10-12% of the total global anthropogenic greenhouse gas emissions and soil carbon (C) sequestration is the mechanism which is responsible for most of the mitigation potential which is influenced by climatic factors and agricultural management practices. This study was intended to understand the potential of C sequestration based on management practices and aggregate size fractions by determining the chemistry of humic substances, and mineralogy of soil aggregates. **METHOD:** Soils were collected from North Agronomy farm, Manhattan, Kansas which has been under continuous corn for 22 years and had two tillage treatments (tilled/no tilled), two fertilizer treatments (compost/urea) and a control. Four aggregate size fractions were separated by wet sieving. Humic acid was extracted from each aggregate size fractions and was analyzed by FTIR and ^{13}C NMR. Iron (Fe) mineralogy, total organic C (TOC) and amorphous and total Fe/Al oxides were determined. In-situ C chemistry and other elemental chemistry as well as elemental mapping of aggregate thin sections were determined by synchrotron based x-ray spectromicroscopy. **RESULTS/FINDINGS:** ^{13}C NMR spectra showed differences in macromolecular C chemisrty of humic acid in aggregates in high manure added plots. Positive correlation was observed between amorphous Fe/Al and TOC in some aggregate size fractions. X-ray spectromicroscopy indicated physical protection of soil aggregates by Fe. Micro-scale heterogenous nature of organic C was visible in intact thin sections of soil aggregates. **CONCLUSION:** Results suggested the influence of management practices on both the chemistry of SOC and the mineralogy of soil aggregates.

ISOLATION AND CHARACTERIZATION OF CAMELINA PROTEINS FROM CAMELINA MEAL

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BACKGROUND AND PURPOSE: Camelina, an important and ancient oil plant that is originated in Germany, is a new oil crop in North America. Camelina seed contains 29.9-38.3% oil, 23-30% protein, 10% carbohydrates, and 6.6% ash, depending on the variety and variations of soil composition and environment. Camelina oil contains up to 90% unsaturated fatty acid, of which around 33.6% is α-linolenic acid (18:3, omega-3), which is lower than flaxseed (45.1%) but far exceeds canola (6.6%), soybean (7.2%), and sunflower (0%). Camelina meal is a by-product of the oil extraction process from the camelina seed. It typically contains 10-15% residual oil, 40% crude protein, 5% minerals, 10-12% crude fiber, and a small portion of vitamins. As camelina oil demand increase, utilization of camelina protein for value-added products is critical to the food and biotechnology industries; however, little research has been conducted to isolate camelina proteins from camelina meal and characterize the proteins. **METHOD:** In this study, camelina proteins were isolated with Osborne fractionation scheme (S2) and alternation Osborne fractionation scheme (S1). The physicochemical properties of camelina proteins were characterized by transmission electron microscopy (TEM), thermal gravimetric analysis (TGA), and size exclusion chromatography (SEC), etc. **RESULTS AND CONCLUSION:** S1 (88.20%) harvested more protein than S2 (76.52%). Three protein fractions, glutelin, globulin, and albumin, were isolated from camelina meal. Glutelin was the major fraction (64.64%), followed by globulin (17.67%), and albumin (10.54%). The essential amino acids accounted for about 40% of the total amino acids in camelina protein. Glutelin showed higher molecular weight than globulin and albumin.

EFFECTS OF FEED DELIVERY METHODS (AUTOMATED FEEDING, SALT LIMITING, OR HAND-FEEDING) FOR STOCKER CALVES GRAZING BERMUDAGRASS ON GROWTH PERFORMANCE, BEHAVIOR, AND LABOR INPUTS

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BACKGROUND AND PURPOSE: The successes of new technology, such as automated feeders (Solar Feeders, Inc., Fort Smith, AR), have not been explored as a potential resource for supplementing grazing calves. **METHOD:** Crossbred heifers (n = 78, initial BW = 246 ± 3.5 kg) were used to evaluate the effects of delivery methods on behavior, BW gain, pasture and corn gluten (CG) supplement utilization, and labor inputs. Calves were stratified by BW and assigned randomly to 1 of 6-2.4 ha bermudagrass pastures and 1 of 3 delivery treatments: 1) hand feeding CG once daily (HF); 2) automated feeder dispersing CG 3x/d (AF); or 3) CG mixed with 7.5% salt offered ad-libitum (SL). **RESULTS/FINDINGS:** For the 85-d trial, each treatment had similar final BW (P = 0.22). However, AF and SL calves had lower ADG at d 28 than HF (P = 0.05), and total ADG tended to be lower in SL calves compared to HF (P = 0.08). Visual observations of behavior (11 h/d every 14 d) did not detect any differences (P > 0.14). AF calves tended to be more mobile than HF and SL (P = 0.15), but tended to not lay in the shade as often as SL (P = 0.16). The AF required less (P < 0.01) labor (38.2 min/wk) than HF (43.4 min/wk) or SL (50.3 min/wk). **CONCLUSION:** Results indicated that using AF in place of HF or SL had minimal effects on growth performance or behavior while saving the producer labor.

CO-TREATMENT WITH A PKC MODULATOR PEPTIDE AND A LOW DOSE OF GEMCITABINE CAUSED A STRONG SYNERGISTIC INHIBITION OF PERITONEAL DISSEMINATION OF PANCREATIC CANCER IN MICE

Terrahn Wall, Susumu Ishiguro, Atsushi Kawabata, Deepthi Uppalapati, Naomi Ohta, and Masaaki Tamura

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Due to patent restrictions, the abstract for this presentation may not be made public.

A LONGITUDINAL STUDY OF UNIVERSITY STUDENT MESSAGE BOARD WRITING COMPETENCY

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BACKGROUND AND PURPOSE: The prevalence of the internet and how much it may be helping us or hurting us is a highly debated subject. In this project, Dr. McHaney and I look at a compilation of the University's student message boards for a time period lasting approximately ten years. We are trying to discover whether or not writing levels appear to be declining. If so, is this related to technology, specifically New Digital Media use? **METHOD:** The experiment began by extracting messages from the university's message board for the class MANGT 366. We are currently retrieving messages from the message boards of the Spring semester of 1998 until the Spring semester of 2012. The information that is being gathered is being placed into Excel spreadsheets according to semester, question title, question and responses. Next, we will test the responses found in a readability test called the Readability Calculator, which calculates the level of education needed for a person to easily read the passages. We are paying specific attention to the *Flesch-Kincaid Grade Level* component, the *SMOG* component and *Flesch Reading Ease* component of the test. By doing so, we will discover if students' abilities to write has declined over time. **RESULTS:** As we are still in the process of collecting the messages from the message boards, our results are currently inconclusive. **CONCLUSION:** While we do not have any outcomes at this time, we want to find out if new digital media use has affected students' abilities to write at an adequate level.

THE EFFECT OF MIXED HYDROPHILIC AND HYDROPHOBIC SURFACE ON FROST NUCLEATION AND GROWTH

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BACKGROUND AND PURPOSE: The purpose of this research is to test mixed hydrophobic and hydrophilic surfaces to see if they mitigate frost and ice formation. Frost forms when humid air comes into contact with a surface that is below the dew point and freezing temperature of water. Many engineering systems are hindered by frost, such as aeronautics, refrigeration, and electrical transmission wires. These materials are highly dependent on operating conditions and surface roughness, which fluctuate easily. Our hypothesis is that a mixed hydrophobic and hydrophilic surface will slow the frost formation process as well as create a thinner frost layer. The water in the air will want to condense on the hydrophilic areas, thus controlling where nucleation will first occur. This can control the size, shape, and location of frost nucleation. METHOD: To fabricate these mixed surfaces, we coated a hydrophobic material (OTS) on a glass slide/silicon wafer, and then removed circles of OTS using photolithography and oxygen plasma to reveal the hydrophilic glass/silicon underneath. The circles were patterned at different pitches and diameters. The tests were done at room temperature and humidity (23°C and 50%) and at an elevated humidity (80%). RESULTS/FINDINGS: All of the patterns so far show a decrease in thickness when compared to a plain hydrophilic slide and a plain hydrophobic slide. CONCLUSION: Preliminary results show that our hypothesis was correct and further testing is warranted to see how they operate on the engineering systems listed above.

COMPARISON OF ALUMINUM MORDANTED AND NONMORDANTED WOOL AND COTTON DYED WITH WALNUT

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BACKGROUND AND PURPOSE: The purpose of this research was to compare mordanted and nonmordanted cotton and wool fabrics, dyed with black walnut (*Juglans nigra*) leaves, hulls, and bark, for colorfastness properties. **METHOD:** Half of the cotton fabrics were mordanted with aluminum acetate and half of the wool fabrics were mordanted with potassium aluminum sulfate. Dye was extracted from dried walnut leaves, hulls and bark at a ratio of 2.5 times dye matter to total weight of fiber. Dyed mordanted and nonmordanted specimens were evaluated for lightfastness, washfastness, staining, and visual color change. **RESULTS/FINDINGS:** Colorfastness to laundry and light for both cotton and wool were improved with the use of an aluminum mordant. However, the use of a mordant changed the color from a cool (blue) and dull brown to a warmer (yellow) and brighter brown. **CONCLUSION:** Overall, walnut bark dyed wool had the highest ratings for both fastness to laundry and light.

THE GROWING AMERICAN DREAM: AN ANALYSIS OF HISTORIC TRENDS IN HOUSING

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BACKGROUND AND PURPOSE: Throughout the 20th century, house size has increased substantially while family size has declined. Although the average square footage of houses in the U.S. is well below 3,000 square feet, there are many cases in which houses are built as much as 10 times that size. This research seeks to answer the question what increased in home size, simply square footage, number of bedrooms, number of bathrooms, and how the increase in size correlated to number of household occupants and household income. **METHOD:** In an attempt to explain the expansion of the American household, data was analyzed in regard to the effect of economic and cultural trends on average square footage, number of bedrooms and bathrooms, number of household occupants, and household income. Data was collected and analyzed from *Small Homes of Architectural Distinction* by the Architects' Small House Service Bureau published in 1929 and the U.S. Census Bureau for data concerning 1930 and 1980 through 2010. **FINDINGS/CONCLUSION:** There is a general trend of an increasing house size in the United States. Not only are houses becoming larger, but there is a growing divide between small and large homes. This has been impacted by the fluctuation of the economy and cultural influences. The major recessions of the 1980s and the late 2000s, greatly affected the American housing market. While there has been fluctuation, there is a general cultural trend toward increased home size.

‘FLOW’- A DESIGN RESEARCH AND DEVELOPMENT PROJECT TO CREATE A CONCEPTUAL DISTANCE LEARNER STUDIO WORK STATION IN CONJUNCTION WITH THE HERMAN MILLER COMPANY.

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BACKGROUND AND PURPOSE: Building from a central theme of the ‘Flow’ of information, creativity, inspiration, and design- IAPD Design Studio III Section B students researched and developed a remote-site, graduate level, distance learner studio workstation to be used in a variety of off-campus spaces and settings, but connected virtually to an active, on-campus studio learning environment. **METHOD:** Students researched: home-site institutional design needs; distance-learner remote student profiles and design needs; and remote-site facility design needs. They then synthesized these findings into a system design solution that considered: surfaces and spaces; storage and technology; and seating and, atmospherics. Students began their research by analyzing the research resources of the project sponsor company, Herman Miller. Building on this, students gathered data on current enrollments in graduate distance learning programs nationally, and interpolated user needs based on these generational cohort attitudes and expectancies. Students turned those findings into tangible design solutions that addressed the needs of an interactive design studio: instructor to class lectures and group activities; student to student group project and communications needs; remote student to class and instructor interaction needs. **RESULTS/FINDINGS:** The ‘Flow’ work space is a collection of architectural, atmospheric, anthropomorphic and technological objects, elements and spaces created around remotely working design students. **CONCLUSION:** Herman Miller representatives were able to view the results of the research project at mid and final critique points and had favorable reactions to the student’s research and results. Project results are being bound, published and presented to Herman Miller in early 2013.

‘CITY’- A DESIGN RESEARCH AND DEVELOPMENT PROJECT TO CREATE A CONCEPTUAL DISTANCE LEARNER STUDIO WORK STATION IN CONJUNCTION WITH THE HERMAN MILLER COMPANY.

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BACKGROUND AND PURPOSE: Building off the metaphor of a ‘City’ center- with interconnected activities, services, and users- IAPD Design Studio III Section A students researched and developed a remote-site, graduate level, distance learner studio workstation to be used in a variety of off-campus spaces and settings, but connected virtually to an active, on-campus studio learning environment. **METHOD:** Students researched: home-site institutional design needs; distance-learner remote student profiles and design needs; and remote-site facility design needs. They then synthesized these findings into a system design solution that considered: surfaces and spaces; storage and technology; and seating and, atmospherics. Students began their research by analyzing the research resources of the project sponsor company, Herman Miller. Building on this, students gathered data on current enrollments in graduate distance learning programs nationally, and interpolated user needs based on these generational cohort attitudes and expectancies. Students turned those findings into tangible design solutions that addressed the needs of an interactive design studio: instructor to class lectures and group activities; student to student group project and communications needs; remote student to class and instructor interaction needs. **RESULTS/FINDINGS:** The ‘City’ work space is a collection of architectural, atmospheric, anthropomorphic and technological objects, elements and spaces created around remotely working design students. **CONCLUSION:** Herman Miller representatives were able to view the results of the research project at mid and final critique points and had favorable reactions to the student’s research and results. Project results are being bound, published and presented to Herman Miller in early 2013.

DROUGHT FREQUENCIES IN KANSAS USING STANDARDIZED PRECIPITATION INDEX (SPI)

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BACKGROUND AND PURPOSE: As undergraduate students introduced to research, we struggle with how to learn the most important concepts without being overwhelmed in the process. The learning technique "Eliminating the drinking from the fire hose effect" helps students to research complex topics. This technique is elaborated through the research project on drought. Droughts are a global phenomenon estimated using a number of indices. **METHOD:** The process begins with students gathering all of the scholarly articles they can find on an assigned topic. The teacher will need to introduce the student to the concept of scholarly articles and show them how to find them within the university system. Next, the teacher asks the students to spend no more than five minutes reading each article. This is a "skim" reading for the most important points. As the student skims these articles, they put information about the articles into a research chart. **RESULTS/FINDINGS:** The technique is demonstrated using a drought index: standardized precipitation index (SPI). The technique helped students in review literature and synthesize the results. **CONCLUSION:** The learning technique is simple and effective across disciplines and topics of research.

APPROACHES TO EVALUATE THE EFFECTS OF INTERVENTIONS STRATEGIES ON ANTIBIOTIC RESISTANCE IN CATTLE

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PURPOSE: To determine the effects of 2 intervention strategies (i.e., feeding chlortetracycline (CTC) following ceftiofur (Excede®) treatment and mixing of ceftiofur-treated with untreated animals) on ceftiofur and tetracycline resistances, both at phenotypic and genotypic levels. **METHODS:** A controlled field trial was conducted on 176 steers. Steers were randomly allocated to 16 pens of 11 steers each. The 2 intervention strategies were assigned randomly to the pens in a 2-way full-factorial manner. Fecal samples were collected every other day to 26 days. The *bla*$_{\text{CMY-2}}$, *bla*$_{\text{CTX-M}}$, *tet*A, *tet*B, and 16srRNA gene copies/gm wet feces were determined using qRT-PCR from fecal community DNA. Antimicrobial susceptibility testing was performed on 1050 *E. coli* isolates. PCR assay was used to qualitatively detect the 4 resistance genes in *E. coli*. *E. coli* c. f. u enumeration was performed on both non-selective as well as selective media. GEE and multivariate models were used to evaluate the effect of intervention strategies on resistances measured at phenotypic and genotypic levels. **RESULTS:** CTC had a strong increasing effect on all 4 resistance gene copies ($P<0.05$). However, CTC differentially favored prevalence of *bla*$_{\text{CMY-2}}$ gene in *E. coli* over the *bla*$_{\text{CTX-M}}$ gene. Similarly, excede treatment had an increasing effect on both *tet* gene copies but the opposite was observed in the *E. coli* isolates. Administration of both CTC and ceftiofur selected for isolates with better survivorship at higher *in vitro* ceftiofur concentrations. **CONCLUSIONS:** Paradoxical observations were made from microbiological and metagenomic approaches. Details of which will be discussed during the presentation.

EFFECTS OF INFLAMMATORY CYTOKINE ADMINISTRATION ON PRODUCTION, METABOLISM, AND HEALTH IN EARLY LACTATION DAIRY COWS

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BACKGROUND AND PURPOSE: In dairy cows, the first week of lactation is characterized by substantial metabolic stress and increased health disorders. We hypothesized that inflammation may contribute to these problems. Therefore, we tested whether administrating a proinflammatory cytokine, tumor necrosis factor-α (TNFα), affects milk production, metabolism, and health in these cows. **METHOD:** Thirty-three Holstein cows were randomly assigned to 1 of 3 treatments at calving. Treatments were once daily subcutaneous injection of 0, 1.5, or 3.0 μg TNFα/kg body weight for the first 7 days of lactation. Feed intake, milk production, and health disorders were monitored daily; plasma samples were collected daily for metabolite and hormone analyses; liver samples were collected on day 7 for triglyceride and relative gene expression analyses. Glucose turnover rate was determined on day 7 by a stable isotope dilution technique. **RESULTS:** TNFα treatments significantly decreased feed intake, milk and component yields, and increased health disorders. TNFα administration increased plasma concentrations of inflammation markers (TNFα and haptoglobin), but did not affect glucose, insulin, 3-methylhistidine (a marker for muscle protein mobilization), or metabolites in lipid metabolism (β-hydroxybutyrate, non-esterified fatty acids, and triglycerides). Liver triglycerides and relative mRNA abundance of genes in metabolic pathways (*ApoB*, *AGPAT1*, *PCK1*, *AGPAT1*, and *PC*) were unaffected. Glucose turnover rate, a measure of liver gluconeogenesis, tended to be decreased by treatments. **CONCLUSION:** Exogenous TNFα administration in periparturient period promoted inflammation, impaired milk production and health status, decreased gluconeogenesis, but did not affect lipid metabolism. This study suggests that inflammation may contribute to impaired production and health in periparturient cows.

H9E PEPTIDE HYDROGEL: A NOVEL ADJUVANT FOR PORCINE REPRODUCTIVE AND RESPIRATORY SYNDROME VIRUS (PRRSV) MODIFIED LIVE VACCCINE

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BACKGROUND AND PURPOSE: Porcine reproductive and respiratory syndrome virus (PRRSV) is well known for its rapid genetic variation and ability to avoid host defense to establish a long-term infection in swine. These properties of PRRSV make it difficult to develop effective vaccines that confer cross-protection against a broad range of PRRSV strains. Since a novel peptide nanofiber hydrogel (H9e) has been shown to act as an adjuvant for killed subunit vaccines, the objective of this study was to determine whether H9e can be used as an adjuvant for PRRS MLV vaccine to increase protection against PRRSV infection in swine. **METHOD:** Pigs were first vaccinated (Placebo, MLV, or MLV+H9e) then challenged with the VR2332 or MN184A strain of PRRSV. **RESULTS AND CONCLUSIONS:** During the vaccine phase of the study, pigs vaccinated with H9e adjuvanted MLV had a higher and more persistent vaccine-induced viremia than MLV vaccinated pigs and developed earlier PRRSV-specific antibodies and higher titers of neutralizing antibodies. More importantly, pigs vaccinated with MLV+H9e had improved protection against the challenge of two PRRSV strains, shown by reduced viremia and less lung pathology, than pigs vaccinated with MLV alone. Mechanistically, pigs vaccinated with MLV+H9e had lower frequency of T-regulatory cells and IL-10 but higher frequency of Th/memory cells and IFN-γ. Taken together, our studies suggest that the peptide nanofiber hydrogel H9e, when combined with MLV vaccine, can enhance vaccine efficacy across different PRRSV strains by modulating host humoral and cellular immune responses.

HOST SPECIES-SPECIFIC INHIBITION OF THE ANTIVIRAL PROTEIN KINASE PKR BY POXVIRUSES

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BACKGROUND AND PURPOSE: PKR is an important antiviral kinase in vertebrates, which evolves rapidly due to positive selective pressure exerted by viral antagonists. Positively selected sites in the PKR kinase domain influence PKR sensitivity to vaccinia virus K3L. Since the natural host for vaccinia virus is unknown, we studied the PKR-pseudosubstrate inhibitor interactions between myxoma virus and rabbits, a well-defined host-virus system, using the myxoma virus K3L ortholog M156R and PKRs from their rabbit hosts. **METHOD:** The sensitivity of PKR was analyzed by luciferase reporter assay conducted in PKR depleted HeLa cells. Site-directed mutagenesis was used to identify residues in rabbit PKRs that confer differential sensitivity to poxvirus inhibitors. **RESULTS AND CONCLUSION:** Our results indicate that M156R had no effect on human, mouse and hamster PKR but effectively inhibited PKRs from European and brush rabbits. PKR from the brush rabbit, which is the natural host for myxoma virus, was inhibited more effectively than European rabbit PKR. Interestingly, rabbit fibroma virus R156R, which displays 70% amino acid identity with M156R, only inhibited brush rabbit PKR but not European rabbit PKR. We also demonstrate that the Helix αG region in rabbit PKRs is responsible for their differential sensitivity to inhibitors. In conclusion, PKR pseudosubstrate inhibitors evolved to inhibit the PKRs of their natural hosts with highest specificity and that insensitivity of PKR to inhibition might serve as an effective barrier to prevent virus transmission to more distantly related species.

PHOSPHOLIPID SCRAMBLASE 1 ACTIVITY MEDIATES HYPOXIA-INDUCED PHOSPHOLIPID ALTERATIONS LEADING TO AN INFLAMMATORY RESPONSE IN ENDOTHELIAL CELLS

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BACKGROUND AND HYPOTHESIS: Ischemia, lack of blood flow, and reperfusion, return of blood flow, is a phenomenon affecting millions of Americans. The leading causes of death, heart attacks and strokes, are ischemia-reperfusion (IR) incidents. Intestinal IR strikes approximately 30,000 Americans each year with a 70-80% mortality rate. Previous studies of the intestine have established a role for innate immune cells and naturally occurring antibodies (Ab) in IR-induced pathology. Furthermore, administration of two monoclonal Ab recognizing phospholipids or the phospholipid binding protein β_2-glycoprotein I (β_2-GPI) restores tissue damage to wildtype levels in IR-resistant, Ab-deficient *Rag-1*$^{-/-}$ mice. These data indicate involvement of a lipid or lipid-like moiety in mediating IR-induced damage. We hypothesized that phospholipid scramblase 1 (PLSCR1), a protein that regulates bilayer asymmetry, alters the phospholipids of endothelial cells during hypoxia leading to β_2-GPI binding and subsequent inflammatory responses. **METHODS:** We tested our hypothesis using an in vitro cell culture model. Endothelial cells were subjected to hypoxia (1% O_2) followed by reoxygenation to simulate IR. PLSCR1 transcription, protein expression and activity were assessed. Phospholipid alterations were detected by mass spectrometry and β_2-GPI binding determined by immunohistochemistry. The production of prostaglandin E_2 (PGE_2), an inflammatory marker was also examined. **RESULTS:** Our data demonstrate involvement of PLSCR1 in phospholipid scrambling of endothelial cells in response to hypoxia and reoxygenation. The altered phospholipid arrangement promotes β_2-GPI binding, starting a cascade that leads to PGE_2 production, a hallmark of intestinal IR. **CONCLUSION:** Our work suggests that PLSCR1 may be a novel target for the prevention and treatment of IR-induced injury.

THE PREVENTIVE AND THERAPEUTIC EFFICACY OF FINASTERIDE AND DUTASTERIDE IN TRANSGENIC ADENOCARCINOMA OF THE MOUSE PROSTATE (TRAMP) MICE

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BACKGROUND AND PURPOSE: The Prostate Cancer Prevention Trial (PCPT) and Reduction by Dutasteride of Prostate Cancer Events (REDUCE) trial found that the 5α-reductase (5αR) inhibitors finasteride (5αR1 inhibitor) and dutasteride (5αR1 and 5αR2 inhibitor), respectively, decreased prostate cancer prevalence but also increased the incidence of high-grade tumors. 5αR2 is the main isoenzyme in the prostate; however prostate tumors have high 5αR1 and low 5αR2 expression. We hypothesized that finasteride would not be as efficacious as dutasteride in inhibiting prostate intraepithelial neoplasia (PIN) and prostate cancer progression in C57xFVB TRAMP mice. **METHOD:** Six-week old mice were randomized to control AIN93G or pre- and post- finasteride and dutasteride diet (83.3 mg drug/kg diet) groups (n =30-33) that began at 6 and 12 weeks of age, respectively, and were terminated at 20 weeks of age. The pre- and post-groups were designed to test the preventive and therapeutic efficacy of the drugs, respectively. **RESULTS:** Final body weights were decreased in the pre-dutasteride group and genitourinary tract weights were decreased in the pre-finasteride, pre- and post-dutasteride groups. The incidence of low-grade and high-grade PIN as the most severe lesions in the anterior and dorsal lobes of the dutasteride groups increased and decreased, respectively. There was also increased incidence of poorly differentiated cancer as the most severe lesion in the dorsal lobe of pre-dutasteride and both finasteride groups. **CONCLUSION:** There are some commonalities between our findings and trial results reported previously as evidenced by a decrease in high-grade PIN coupled with an increase in poorly differentiated tumors in the treatment groups.

FATTY ACID AND PHYTOSTEROL PROFILES OF COMMERCIALLY AVAILABLE SAW PALMETTO SUPPLEMENTS

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BACKGROUND AND PURPOSE: Saw palmetto is an oil rich berry used in American traditional medicine. Saw palmetto extracts are one of the most commonly consumed herbal supplements by men diagnosed with prostate cancer and benign prostatic hyperplasia (BPH). 5α-reductase enzymes convert testosterone to the more potent androgen dihydrotestosterone (DHT), which promotes cell proliferation in most prostate cancers. Saw palmetto extracts contain fatty acids and phytosterols that may be mild 5α-reductase inhibitors. Some studies have found significant improvement in BPH and lower urinary tract symptoms (LUTS) with saw palmetto supplementation, while others found no benefit. The variation in the effectiveness of saw palmetto supplements may be the result of their different nutrient profiles. **METHOD:** We collected 22 commercially available saw palmetto supplements and quantified their major fatty acids (lauric, myristic,palmitic, stearic, oleic, linoleic acids) and phytosterols (campesterol, stigmasterol, β-sitosterol) using GC/FID &GC/MS, respectively. Samples were classified into liquids, powders, dried berries, and tinctures. **RESULTS AND CONCLUSION:** Liquid saw palmetto supplements contained significantly higher levels of individual fatty acids, total fatty acids, individual phytosterols, and total phytosterols than the other supplement classes. Powders contained significantly higher levels of individual fatty acids, total fatty acids, individual phytosterols, and total phytosterols than tinctures, which contain negligible amounts of these nutrients. Liquids are 24- and 20-times higher in total fatty acids and total phytosterols, respectively, than tinctures. Our findings suggest that certain classes of saw palmetto supplements, and some individual products within the classes, may be better supplement choices if fatty acid and phytosterol levels are important to their efficacy.

A NANOPLATFORM-BASED APPROACH FOR DETECTING THE TUMOR BOUNDARY

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BACKGROUND AND PURPOSE: Developing cancer diagnostics for recognizing breast cancer at the localized stage would be very advantageous, because breast cancer mortality occurs after the cancer has metastasized. Numerous proteases that can be found in the blood of breast cancer patients are of proven diagnostic value. **METHOD:** Fluorescent nanoplatforms consisting of a central Fe/Fe_3O_4-nanoparticle bearing tethered dyes that can be cleaved off by proteases were used to determine the protease concentrations of a series of cancer-related proteases. Then we designed a nanoplatform that can be injected intravenously. It can travel to breast tumors and enriches in the tumor tissue. Then the dye that is attached to the nanoplatforms via a cleavage sequence get activated within the tumor tissue. **RESULTS:** We selected matrix metalloproteinase 2 as the enzyme to successfully image 4T1 tumors in 30 mice at different stages of development. Then we tested 36 human samples which were taken from the tumor core, boundary and adjacent tissue of 12 human donors undergoing a mastectomy. We could identify three general types of disease progression: The protease concentration is highest in the 1) tumor (congruent with a favorable prognosis), 2) boundary region (typical for more aggressive breast cancers), and 3) adjacent tissue (impossible to discern a tumor boundary, this is the worst possible case). **CONCLUSION:** We tested our nanoplatform technology in 30 mice bearing breast tumors and 12 human mastectomy patients. Our nanoplatforms were capable of imaging the location of the tumors and the boundary.

PERCEIVING ARCHITECTURE THROUGH CENTRAL AND PERIPHERAL VISION

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PURPOSE AND BACKGROUND: The purpose of this study is to provide basic vision and aesthetic research in the area of architectural perception. The goal is to examine the ways that 1) central and peripheral vision carry differing aesthetic information about architecture into the mind of an observer, and 2) specific scene categories, such as architecture, can impact the responses for central and peripheral vision. Evidence suggests that the visual processing system breaks down environmental stimuli into separate analytical components before providing a holistic conscious account of the environment. A first order distinction of visual decomposition is central and peripheral vision. In short, central vision (4-5° at the center of vision) is efficient at identifying what an object is, while peripheral vision (all degrees of vision outside central vision) is efficient at determining global scene information. This pilot study will test which visual stream is more efficient at identifying exterior and interior building conditions. **METHOD:** The experiment examines the absence of central vision or peripheral vision to test the effect of accuracy when identifying same versus different building image types; architectural interior spaces and exterior facades. **ANTICPATED RESULTS AND CONCLUSION:** If this experiment supports these hypotheses, it would suggest that specific categories of scene gist, namely architecture, utilize differing visual streams between central and peripheral vision to make correct identification of a building's interior versus exterior. In conclusion, this would provide evidence that there exists a threshold between architecture seen as an *object* and architecture seen as a *space* when experiencing architecture.

OPTIMIZATION OF A BI-PHASIC FED-BATCH FERMENTATION FOR MAXIMIZING SINGLE CELL OIL PRODUCTION

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BACKGROUND AND PURPOSE: Various biobased products including high-grade biofuels can be produced from oleaginous yeast single cell oils (SCOs). Oleaginous yeast are species capable of producing high yields of SCOs, up to 70% (wt/wt), from low-valued, renewable feedstocks such as lignocellulosic biomass. For the oleaginous yeast *Lipomyces starkeyi* the SCO fatty acid profile consists of 62% (wt/wt) C18:1, 18% C16:0, 8% C16:1, 5% C18:2, 4% C18:3n3 and 3% C16:1. Opportunities exist to further understand the effect of different growth conditions on fatty acid composition to develop strains capable of producing more valuable SCOs for biobased products. To induce SCO accumulation, a two-stage fermentation technique is often employed. First, growth and cellular biomass are maximized; then, during the second stage, a nitrogen limited stress-response is induced causing metabolism to shift to SCO production. Based on calculated stoichiometric values, it is evident that nitrogen deficiency in production phase is beneficial, and the oxygen demand for the SCO production stage is over four times greater than the biomass growth stage. **METHODS:** Experiments to optimize SCO yields from *L. starkeyi* were performed using Response Surface Methodology (RSM) to test important fermentation factors: carbon:nitrogen (C:N) ratio, pH, and temperature. The optimized conditions are being scaled up to a 5L bi-phasic fed-batch fermentation to establish proof-of-concept of this exciting green technology. **RESULTS/FINDINGS:** The substrate uptake rate, biomass growth, SCO production, and fatty acid profiles will be quantified and discussed at the presentation. **CONCLUSION:** The knowledge gained from this study has future implications for developing fermentation techniques to produce higher valued SCOs.

ANTITUMOR ACTIVITY BY COMBINATION OF IRON CHELATORS WITH PEPTIDE SEQUENCES

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BACKGROUND AND PURPOSE: In spite of all public and private efforts to develop working treatment approaches, cancer mortality is essentially still the same as in the 1950's. Furthermore, it is one of the reasons for the increasing health care costs. Conventional chemotherapeutic drugs such as Paclitaxel (Taxol) are expensive since they are hard to synthesize due to their complex structures. Recent studies have shown that the iron chelator Di-2-pyridylketone-4,4-dimethyl-3-thiosemicarbazone (Dp44mT) shows antitumor activity in the nanomolecular range. Dp44mT does not contain a stereocenter and can be synthesized in high yields. Peptide sequences capable of targeting mitochondria and destabilizing mitochondrial membranes show synergy with Dp44mT in causing apoptosis in cancer cells. **METHOD:** We will be assembling the Dp44mT analogue with a peptide sequence and an Fe/Fe_3O_4- nanoparticle. The peptide sequence will comprise two important sequences, which are the CGKRK peptide, providing tumor homing ability, and $_D[KLAKLAK]_2$, disrupting the mitochondrial cell walls and initiating cell death (apoptosis). The nanoparticle can enhance apoptosis by selective heating hyperthermia. Fe/Fe_3O_4- nanoparticles can also be used for imaging purposes (MRI). **RESULTS:** We have successfully synthesized the Dp44mT analogue. Cell toxicity studies show Dp44mT to be affective against various cancer cell lines. The peptide CGKRK was successful in targeting various tumor cells lines. The peptide $_D[KLAKLAK]_2$ enhanced apoptosis. **CONCLUSION:** Results show that the iron chelator Dp44mT and peptide sequence CGKRK $_D[KLAKLAK]_2$, show high effectiveness towards treating tumors. This finding enables us to assemble a theranostic nanoplatform comprised of a central Fe/Fe_3O_4 core/shell nanoparticle with attached apoptosis-enhancing peptide sequences and iron chelators.

ASSOCIATION MAPPING OF QUANTITATIVE TRAIT LOCI FOR GRAIN COLOR IN U.S. WINTER WHEAT

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BACKGROUND AND PURPOSE: Red grain color of wheat cultivars is an important wheat quality trait that affects not only flour brightness but also pre-harvest sprouting (PHS) resistance. Several genes and associated markers for grain color have been reported. The objectives of this research is to determine genes which control grain color in US winter wheat. **METHOD:** Association mapping was conducted using a panel of 192 elite breeding lines and cultivars including 137 hard winter wheat (HWW) and 55 soft winter wheat (SWW) accessions. Seeds harvested from 2010 field and 2011 greenhouse experiments were evaluated for grain color intensity using a 1 (low) to 4 (high) visual score scale after soaking seeds in 1M/L sodium hydroxide solution for 2 h. The panel was screened using 450 simple sequence repeats (SSR), 5 primer sets for *Tamyb10* genes and 9K genome-wide single nucleotide polymorphism (SNP) chips. **RESULTS/FINDINGS:** Association analysis using Q model ($q < 0.05$) identified that grain color was significantly associated 6 SSRs and 4 primer sets for three *Tamyb10* genes. Among them, *Xwmc559* and two *Tamyb10* gene markers were the most significant markers on 3A, *Xbarc84* and one *Tamyb10* gene marker were the most significant on 3B, and one *Tamyb10* gene marker on 3D was the most significant marker on 3D. Significant markers were also detected on chromosome1A and 4A. In addition, several SNPs from different chromosomes were identified to be significantly associated with grain color. **CONCLUSION:** Grain color in US winter wheat mainly controlled by group 3 chromosomes, but chromosomes 1A may also contribute to grain color.

CLIMATE CHANGE AND WATER CONTROL STRUCTURES RISK ASSESSMENT IN KANSAS

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BACKGROUND AND PURPOSE: Currently water control structures are designed based on the maximum runoff rate resulting from storms with a specific return period and duration. Smaller or temporary structures such as terraces and grassed waterways should be able to control a 10-yr, 24-hr storm. The Rainfall Frequency Atlas (TP40), which is the basis for hydrologic structures design, was last updated for Kansas in 1961 using weather data from 1911 to 1958. In this study the 10-yr, 24-hr rainfall storms, which is used for water control structural designs in agricultural fields, is determined using daily precipitation data (1920 through 2011) from 23 stations in Kansas and 15 stations from adjacent states. **METHOD:** The generalized extreme value (GEV) function is used to calculate the precipitation probability distribution frequency of the maximum annual daily rainfall at each station. The risk analysis is done by calculating the probabilty of exceedance of rainfall events from the 10-yr, 24 hr based on our result and Hershfiled [1961] results. **RESULTS/FINDINGS:** Initial results showed that the 10-yr, 24 hr storms had an increasing trend across both time and space in Kansas from 1920 to 2011. In addition the number of rainfall events higher than 50 and 75 mm and the annual maximum rainfall events showed that the majority of stations had an increasing trend (19 of 23) from 1920 to 2011. Therefore there is a shift in rainfall distribution patterns in Kansas. **CONCLUSION:** This shift changes the design criteria for water management systems, both in runoff control and storage structures.

ARSENIC MITIGATION BY DEVELOPING A TOOL BASED ON GRAY AND BROWN SEDIMENT SOLID PHASE CHARACTERIZATION

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BACKGROUND AND PURPOSE: Our study area is in Matlab Upazilla, in Bangladesh. Our idea is to develop a sediment color based tool for the local drillers based on the hydrogeological and geochemical investigations as to (a) why red/brown to off-white sediments produces As-safe water but contains high Mn; (b) as to why light gray sediment produce low As and Mn free water; and (c) why dark gray sediments produce high As bearing water. Shallow tubewells excepting those installed in red/off-white sediments are mostly contaminated with high As. High Mn in many wells is also an additional problem in some shallow aquifer depths. **METHOD:** Core Samples have been analyzed by petrographic microscopy, microtopography and distribution of elements within sediment grains by FESEM-EDX and clay mineral and bulk mineralogy by XRD. Synchrotron aided μXANES and μXRD studies conducted for solid state As speciation (As^{3+} and As^{5+}) in different depth core samples. FINDINGS: The projected outcome is to incorporate detailed sediment characteristics of the different aquifers including all possible color variations available in the exploited depths in subsurface system of Matlab. **CONCLUSION:** We are proposing this study towards a broader scale regional remediation project that incorporates the enquiry of efficiency of sediment color as a simple and easy tool for identifying safe aquifers in major As risk prone areas. Knowing sediments more accurately would also enrich and strengthen the field based tools for identifying As-safe and As-Mn safe aquifers for tubewell installation.

PEROXIDE AND MEDIATOR: IMPORTANT FACTORS FOR 'RAPID' DECOLORIZATION OF SYNTHETIC DYES USING *ARABIDOPSIS THALIANA*

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BACKGROUND AND PURPOSE: Synthetic dyes are one of the major causes of water pollution in various developing countries. Secretory enzymes namely laccases and peroxidases from bacterial or fungal sources and even parts of plants in presence of peroxide and a mediator such as 1-hydroxybenzotriazole (HOBt) have been exploited for a long time in the bioremediation of these synthetic dyes but studies involving entire plants have not been well documented. Our goal is to establish the mechanism by which whole plants bring about decolorization of these synthetic dyes. **METHOD:** Dyes that were considered belonged to the monoazo (Methyl Orange), the disazo (Evans Blue) or the arylmethane (Brilliant Blue G) group. Hydroponically cultivated *Arabidopsis thaliana* plants were exposed to 20 mg/L of Evans Blue or 40 mg/L of Methyl Orange and Brilliant Blue G, all at pH-6.3 in presence or absence of peroxide and/or HOBt. **RESULTS/FINDINGS:** As expected, the extent of decolorization of the dyes from the different groups varied depending on the treatment. All the dyes definitely required the presence of both peroxide and HOBt together to achieve nearly 80% decolorization by plant in one day. Except for Brilliant Blue G which was decolorized to 65%, peroxide could only bring about 30% decolorization of Methyl Orange and Evans Blue. **CONCLUSION:** All these observations point towards the dependence of the plant on peroxide and mediator to carry out quick decolorization of dyes despite structural differences within the dyes. Identifying the end products of the decolorization using mass spectrometry is the future objective being explored.

CELL PENETRATING CATIONIC PEPTIDE NANOPARTICLE-BASED GENE THERAPY FOR THE TREATMENT OF LUNG METASTASIZED CANCER

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BACKGROUND AND PURPOSE: The lung metastasis is very common last stage event for many types of cancer and is the major cause of cancer-related death and morbidity. Therefore, procedures to control lung metastasis are most urgently needed in order to control cancer-related mortality. To investigate the potential of local therapy to control lung metastasis, the effect of intratracheal gene delivery using a modified TAT peptide nanoparticle (dimerized TAT peptides, i.e. dTAT NP) as a vector was studied. **RESULTS:** Cell culture studies clarified that the dTAT NP encapsulating luciferase plasmid DNA (dTAT-pLUC) caused effective gene transfection in lung cancer cells with negligible cytotoxicity. The *in vitro* study also revealed that the addition of calcium and glucose or sodium to the dTAT-pLUC caused effective DNA transfection in alveolar epithelial cells and lung cancer cells. *In vivo* expression efficiency of the dTAT NP-pDNA was evaluated by intratracheal (IT) spray of dTAT-pLUC in mice bearing autografts of Lewis lung carcinoma cells (1.5 x 10^6 cells/mouse) in C57BL/6 mice. Immunohistochemical analysis of the *in vivo* mouse gene expression studies revealed that dTAT NP vector successfully caused gene expression primarily in the tumor cells, bronchioloalveolar epithelial cells and macrophages. Gene expression in the tumor cells lasted for at least 14 days post-administration. **CONCLUSION:** These studies established a platform of effective gene delivery in lung tumor cells, alveolar epithelial cells and macrophages. Taken together, the current study suggests that dTAT-pDNA NP offers an effective strategy of local gene delivery for treating cancers metastasized in the lung.

HYDROCHEMISTRY AND ORGANIC MATTER CHARACTERIZATION OF AS POLLUTED REGIONS, MURSHIDABAD, WEST BENGAL, INDIA

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Mass poisoning of arsenic has affected roughly 60 million people in the Bengal Basin. This is referred to as the greatest natural mass poisoning in human history. Elevated levels of Mn is another alarming issue in the groundwaters of this region Arsenic is class I carcinogen and Manganese is a neurotoxin when consumed in high concentration with drinking water (MCLs: As<10µg/L and Mn< 0.4mg/l). Microbial mediated reductive dissolution of FeOOH is one of the major mechanisms by which sediment bound arsenic is released into groundwater. The present research work is targeted to understand the role, nature and source of dissolved organic matter in the distribution and retention of both As and Mn in the groundwaters of Bengal Basin. **BACKGROUND AND PURPOSE:** Signs of chronic arsenic toxicity include dermal lesions. peripheral neuropathy, skin cancer and peripheral vascular disease. Mn is another hazardous groundwater contaminant and is a neurotoxin. **METHOD:** The study focuses both geochemical mechanisms and hydrology; basic hydrologic data will be collected at each location of the field area. **RESULTS/FINDINGS:** The analyses of the groundwater show a positive correlation of arsenic with DOM, Fe^{2+}, PO_4^{3-}, and TDS content whereas Mn and Cl^- are negatively correlated with As in high-As area. Excitation Emission Matrix reveals that there is difference in fluorescence components of high and low As areas. **CONCLUSION:** This study signify high bacterial activity and possible surface water sources of microbially-derived organic matter transported to depth which enhances dissolution of FeOOH .

REGULATORY ROLE OF THE START LIPID/STEROL BINDING DOMAIN IN HOMEODOMAIN TRANSCRIPTION FACTORS

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BACKGROUND AND PURPOSE: The steroidogenic acute regulatory (StAR) protein-related lipid/sterol transfer (START) domain is an evolutionary conserved module that is found in class III and IV homeodomain leucine zipper (HD-ZIP) transcription factors from plants. To date, the molecular mechanisms underlying the function of the START domain in gene transcription are not known, nor has a structure or ligand been described for any plant START domain thus far. It is hypothesized that ligand binding is critical for transcription factor activity. We are undertaking various functional and structural strategies to address this hypothesis. **APPROACH:** To address the question if a START domain functions as a regulatory module in plants, mutational studies were done using GLABRA2 (GL2), a representative member of the HD-ZIP family. In a complementary approach, ChIP-SEQ will be performed to identify direct targets of GL2 and to determine whether the START domain is required for DNA binding by HD-START transcription factors. A domain-swap experiment is also being conducted to delineate the minimal requirements for the START domain sequence of GL2. **RESULTS AND CONCLUSION:** Site-directed mutagenesis of key residues lining predicted START domain hydrophobic cavity result in a compromised GL2 activity, suggesting that ligand binding is critical to HD-START function. In addition, we have successfully expressed a GST fusion to the 26 kDa START domain from PROTODERMAL FACTOR 2 (PDF2) family member. The recombinant protein is soluble and additional optimization of affinity purification is in progress to prepare sufficient protein for structural studies. The availability of soluble and properly folded protein will enable *in vitro* ligand binding studies.

MOLECULAR MECHANISMS OF HOST-RANGE GENES IN VACCINIA VIRUS

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BACKGROUND: Vaccinia virus is a member of the poxvirus family whose infection of a broad range of hosts is controlled by several host-range genes. These genes interact with host proteins involved in detecting and initiating an immune antiviral response in infected cells. Protein kinase R (PKR) is an antiviral protein that suppresses general translation during a virus infection. Two host-range genes from vaccinia virus, E3L and K3L, inhibit this function of PKR. E3L was previously shown to be dispensable for vaccinia virus infection of Syrian hamster cells but essential for infection of cells of other origin, however the molecular basis for this was unknown. **METHOD:** A luciferase reporter transfection system measured interactions between the host-range genes and PKR through their effect on translation using a line of HeLa cells deficient in PKR. Co-transfections of plasmids encoding different species' PKR with plasmids encoding E3L and K3L determined the inhibition levels of each host-range gene on each PKR. **RESULTS:** We show that Syrian hamster PKR is resistant to inhibition by E3L while being sensitive to inhibition by K3L. Conversely, the PKR of a closely related Armenian hamster species is sensitive to E3L inhibition but resistant to K3L. Regions in each PKR important for the differential sensitivity were identified through a comparative analysis of chimeric hamster PKRs. **CONCLUSION:** Determining the properties of PKR that control its sensitivity to viral inhibitors enables us to identify roles for these host-range genes in vaccinia virus and construct a PKR that could allow resistance to vaccinia virus infection within a host.

GENETIC PARAMETERS FOR UDDER QUALITY IN HEREFORD CATTLE

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BACKGROUND AND PURPOSE: Udder quality is an important trait for beef producers. Better udder quality is associated with increased cow longevity, meaning replacement heifer development cost decreases. When cows have smaller teats and good suspension, the newborn calf needs less assistance nursing, reducing labor costs and calf mortality. Previous research indicated udder quality had a heritability between 0.20 and 0.30, and the genetic correlation between teat size and suspension was 0.95. Data for overall score, teat size, and suspension were recorded soon after calving and range from 1 to 9 with 9 being ideal. The objective of this research is to calculate the heritability for each trait. **METHOD:** Records on 94,684 animals and a 3 generation pedigree with 199,667 animals were obtained from the American Hereford Association (AHA), Kansas City, MO. These records contained observations for overall score (n = 191,081), teat size (n = 42,530), and suspension (n = 42,530). Data were modeled with random effects of animal and permanent environment and with fixed effects of cow age and contemporary group defined as herd-year-season. Variances were estimated with ASREML 3.0. **RESULTS:** Heritability of overall score, teat size, and suspension was 0.28, 0.27, and 0.24 respectively with standard errors of 0.01. Repeatability of overall score, teat size, and suspension was 0.48, 0.52, and 0.52 respectively with standard errors less than 0.01. **CONCLUSION:** Because udder quality is heritable, the AHA can develop an udder quality expected progeny difference (EPD). Hereford breeders could select cattle based on the EPD to improve udder quality in their herds.

EEP CONFERS LYSOZYME RESISTANCE TO *ENTEROCOCCUS FAECALIS* VIA THE ACTIVATION OF AN EXTRA CYTOPLASMIC FUNCTION (ECF) SIGMA FACTOR

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BACKGROUND AND PURPOSE: *Enterococcus faecalis* is a commensal bacterium found in the gastro-intestinal tract of mammals including humans and is one of the leading causes of nosocomial infections. One of the hallmarks of *E. faecalis* is its unusual ability to tolerate high concentrations of lysozyme, which is an important innate immune component of the host. Previous studies have shown that the presence of lysozyme leads to the activation of SigV, an ECF sigma factor in *E. faecalis* and the deletion of *sigV* increases the susceptibility of the bacterium towards lysozyme. The activation of ECF sigma factors under a given stress requires the degradation of the anti-sigma factor sequestering the sigma factor by membrane proteases. However, the proteases degrading the anti-sigma factor in *E. faecalis* is hitherto unknown. Here we describe one such membrane protease called Eep. **METHOD:** Genes encoding Eep and SigV proteins were deleted from the parental strain and subjected to lysozyme minimum inhibitory concentration assays, Western blot analysis, Coomassie staining and Miller assays to determine whether an *eep* mutant phenocopies a *sigV* mutant. **RESULTS AND CONCLUSION:** The *eep* deletion mutant phenocopied the *sigV* deletion mutant in all the assays tested. Both mutants were 10 fold more sensitive to lysozyme compared to the parental strain indicating that Eep is essential for the activation of SigV. Western blotting revealed that in an *eep* deletion mutant, the anti-sigma factor is only partially degraded after lysozyme induction, suggesting that it is processed by an unknown protease prior to the action of Eep.

DETERMINING THE SITE OF ACTION OF A FUNGAL TRANSCRITION FACTOR

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BACKGROUND AND PURPOSE: Binuclear Zinc Cluster ($Zn(II)_2Cys_6$) Transcription Factors are specific to fungi and are involved in regulating a plethora of pathways, including nitrogen metabolism and the production of chemical compounds such as penicillin. Understanding how this specific class of proteins functions can help us in the fight against harmful pathogenic fungi of plants and animals (e.g *Cryptoccous*) as well as to improve commercially profitable strains of fungi (e.g. *Aspergillus*). TamA is a member of the $Zn(II)_2Cys_6$ family and functions as a co-activator of genes required for the breakdown of environmental nitrogen by the fungus *Aspergillus nidulans*. Previous research has suggested that TamA does not require the conserved DNA binding domain for full function. **METHOD:** We used LacZ reporter fusions and real-time PCR to measure gene expression in TamA mutants. A conserved site of action was then identified through bioinformatics and targeted mutagenesis **RESULTS AND CONCLUSION:** We identified two nitrogen metabolism genes, GdhA and GltA, that require a functional TamA DNA binding domain for full expression. We then characterized and mutated a conserved sequence in the GdhA promoter, determining it to be site of action for TamA. We have shown that TamA, a member of a fungal specific transcrition factor family of proteins, acts both dependently and independently of direct DNA binding.

ANALYSIS OF MUTATIONS WITHIN VARIABLE REGIONS OF THE PRRSV GENOME DURING INFECTION

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BACKGROUND AND PURPOSE: Genetic variation in both structural and non-structural genes is a key factor in the capacity of PRRSV to maintain persistence within an animal, and within a production system. However, the exact mechanisms of how genetic variation contributes to persistence remain unclear. As part of a study to understand the role of host genetics in disease resistance, we identified pigs that were still viremic at 42 days after PRRSV infection. We took advantage of this subpopulation to identify the dynamic changes in PRRSV genomes of the circulating viruses in pigs. The focus was on sequencing nine regions of the genome that show sequence hypervariability. **METHOD:** Specific and universal primers were designed for nine hypervariable regions within nsp1, nsp2, ORF3 and ORF5. Total RNA were extracted from 100 μL virus suspension of the parental virus NVSL 97-7895 and sera collected from four infected pigs at 4dpi, 28dpi and 42dpi using TRIzol and cDNA were generated by reverse transcription using random hexamer primers. The first round of PCR was performed using sequence-specific primers. A second amplification was performed using 454 adaptor multiplex identifier (MID) primers. For unidirectional sequencing, MID were included on only the forward primers. Amplicons were normalized and pooled together then subjected to emPCR before 454 sequencing. **RESULTS:** Mutations were identified in all regions, including distinct differences between pigs and at different frequencies within virus populations. **CONCLUSION:** This study illustrates the usefulness of deep sequencing for the analysis of PRRSV qausispecies.

CHILDREN'S ANTICIPATED RESPONSES TO TWO STORYBOOK CHARACTERS: EVIDENCE FOR (DE)STIGMATIZATION BY ASSOCIATION

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BACKGROUND AND PURPOSE: Children who have an undesirable characteristic are often stigmatized and treated harshly by peers (Barnett et al., 2012). Interestingly, children who associate with a stigmatized age-mate may, themselves, become stigmatized (i.e., *stigma by association*; Neuberg et al., 1994). However, no study to date has systematically examined whether the reason for the association influences children's tendency to devalue a typical peer who associates with a stigmatized peer, and whether this association may also impact children's evaluation of the stigmatized peer. **METHOD:** A total of 129 second- through fourth-grade children were read a storybook that described a typical boy who interacted with a stigmatized (effeminate or obese) boy for one of four reasons: teacher instructed, sympathy, curiosity, or no reason control. The children's anticipated responses to both storybook characters were assessed. **RESULTS AND CONCLUSION:** Although the children's anticipated responses to both stigmatized boys became more favorable after the typical boy associated with them (i.e., "destigmatization by association"), this effect was found to be more robust for the obese than effeminate boy. While the children's anticipated responses to the typical boy also became more favorable following his association with the obese boy, the typical boy was met with heightened derogation after he chose to interact with the effeminate boy out of curiosity (i.e., "stigmatization by association"). Therefore, the children's anticipated responses to the typical and stigmatized storybook characters were influenced by both the type of stigmatization depicted and the reason given for their association.

CONTRIBUTING FACTORS LEADING TO STUDENT-ATHLETE SUBSTANCE USE: A COMMUNICATION PERSPECTIVE

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BACKGROUND AND PURPOSE: College student-athletes have been identified as an at-risk subgroup for heavy alcohol and substance use. Because of their dual identities, student-athletes are faced with a unique challenge of managing stress from academic, physical, and social factors. In this present study, alcohol was used to represent a universally abused substance leading to numerous health risks. The study investigates factors contributing to alcohol use prevalence among student-athletes. This study is informed by two theories Theory of Planned Behavior and Social Identity Theory. It examines if certain attitudes and subjective norms (e.g. family, friends, coaches, teachers, classmates, fans, and media) lead to student-athete alcohol use, and what student-athletes' percieved behavior control towards alcohol use is. The social identify theory is applied in examinining if the mutliple identities of student-athletes is associated with alcohol use. **METHODS:** A survey of athletes competing at the NCAA Division I level. Correlations were used to show relationship between theory indicators and intoxicated behaviors. **RESULTS:** Results indicated that contributing factors of such as 'dealing with the emotional highs and lows of athletics,' 'stress associated with being a student-athlete,' and 'trying to live up to the expectations of a normal college student' were the strongest reasons for student-athlete alcohol use (r= 0.626; 0.588; and 0.577 respectfully). About 70% of student-athletes tend to drink heavily 4 or more drinks in one sitting. However, 77% of them only consume alcohol 2 times a week or less. **CONCLUSION:** The study recommends development of a stategic health communication campaign that targets student-athletes and athletic deptartments.

SUICIDE: THE UNDOCUMENTED, UNREPORTED KILLER OF AMERICAN YOUTH

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BACKGROUND/PURPOSE: Evidence-based research since the early 1980s has consistently concluded that communities cannot achieve lasting reduction in youth suicide — a leading cause of death among ages 15-24 — or attempted suicde without first installing real-time incident tracking systems. Such data is considered the foundation for school-based suicide prevention, intervention, and postvention systems as well as communitywide Public Health strategies. **METHOD:** More than 10 years of research as a mental health journalist, yielding an extenstive libary analysis of mental health "best practice" standards and countless interviews with public health experts. In addition, my current Master's project focuses on extensive textual analysis of mental health coverage by major news media. **RESULTS:** Mental health activists report that prevailing myths about suicide and suicide "contagion," coupled with persistent fears among local educators about school-based interventions, are major obstacle to installation of tracking systems. Notwithstanding, most communities possess the technological and statutory tools to install suicide surveillance technologies, using coroner death certificates and incident data reports from hospitals, fire and policies agenices.. **CONCLUSION:** Installation of mental health surveillance systems would provide essential public health information to local schools, civic leaders, and local news media similar to the real-time monitoring already in place to alert communities to other public health risks and/or epidemics. Such surveillance, accompanied by proper messaging/framing messages to overcome public fears and myths, can enable communities to measure the frequency and severity of suicide risks among local youth and take pre-emptive steps in response to spikes or "clusters" of suicide that currently are undetected and reported.

"LEGITIMATE RAPE" AND THE MEDIA'S RESPONSE: A NARRATIVE CRITICISM

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BACKGROUND AND PURPOSE: How a story is told greatly depends on who is doing the telling. This is no different within media constructed narratives. In August of 2012 U.S. Representative Todd Akin of Missouri made comments during a local television interview that implied only certain cases of rape were legitimate, and that it was only during legitimate rape that a woman could become pregnant. The story was picked up nationally and was reported by a variety of media sources. **METHOD:** This paper analyzes the narratives that were constructed by Fox News, a conservative news source, and MSNBC, a liberal news source, pertaining to these comments in order to investigate how narratives are constructed by news sources with perceived bias. Using Foss's (1996) methods for narrative criticism, the broadcast transcripts for each news source, one week after the incident, are examined. The investigation of these media narratives is an attempt to further understand how an issue is framed differently when constructed by a liberal news source, and by a conservative news source in order to contribute to the discussion of media constructed narratives and bias found in the media. **RESULTS AND CONCLUSIONS:** Through narrative analysis it was revealed that both liberal and news narratives are constructed consistently with the political standing of the news organization. Both Fox News and MSNBC used the values of their political standing to create and defend how they are aligned. Neither organization defended what Akin did, but the story of his comments were unique in plot, character, and setting.

DEVELOPMENT OF A CONCEPTUAL MODEL AND EMPIRCAL DEFINITION OF SOCIALLY RESPONSIBLE APPAREL CONSUMER BEHAVIOR

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Background: As social responsibility (SR) has developed within apparel and textile (AT) literature, the focus has been understanding and increasing corporate social responsibility (CSR). While apparel brands are influential regarding the industry's environmental and social impacts, the consumer must share responsibility in reducing the industry's negative effects. **Purpose:** Minimal research has probed the development of a definition for socially responsible consumer behavior (SRCB). The purpose of this study was to review literature regarding SRCB related to AT and develop an empirical definition and conceptual model. **Method:** Dickson and Eckman's (2006) definition of CSR was adapted as an organizational framework. The researchers set parameters for literature included in the review, resulting in 42 articles being included in the review. **Findings:** Based on the literature review, SRCB involves: 1) a *socially responsible consumer orientation,* 2) a *socially responsible consumer behavior,* and 3) a desire for *socially responsible consumer outcomes*. Additionally, the literature suggests that because most consumers have not been educated on the impacts of the apparel industry, SR is not a priority among most consumers when purchasing and disposing of apparel. Furthermore, consumers that consider themselves socially responsible still fail to behave as such during apparel consumption. The developed model illustrates the difficulties consumers face as they move from a socially responsible orientation to actual behavior, as well as the limitations that prevent consumers from forming socially responsible outcome goals. **Future Research:** Future research should test the model and investigate consumers' perceptions about the role they have on the environmental and social impacts of the AT industry.

AN ACOUSTIC EDUCATION: TESTING THE EFFECTIVENESS OF SOUNDWALKS AND LISTENING EXERCISES IN LANDSCAPE ARCHITECTURE TO PROMOTE CRITICAL LISTENING IN THE FIELD

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BACKGROUND AND PURPOSE: Soundmarks such as the church bells of Italy, water mills of Russia, and gongs of the Orient have shaped cities' acoustic identities in these regions for centuries. Such soundmarks are essential wayfinding cues and they weave a rich texture of time, place, and events into the landscape experience. As designers, landscape architects have a unique opportunity to harness sounds for the design of outdoor soundscapes. This study addresses the need for an acoustic education in landscape architecture and tests an approach to increasing aural awareness and sensitivity. **METHOD:** The methodology involved three parts. Part One surveyed 87 landscape architecture professionals and faculty members in the United States to reveal the current role, understanding of, and attention to sound in practice and education. Parts Two and Three involved an experiment that tested the effectiveness of soundwalks and listening exercises, adapted from those by soundscape pioneer R.M. Schafer, on 31 landscape architecture students. The students, who kept journals of their acoustic observations, were evaluated on their attention to sound through a series of soundwalks, sound terminology lessons, and listening exercises. **RESULTS/FINDINGS:** Survey findings revealed a disconnect between sound and landscape architecture. Journals and post-experiment surveys revealed the experiment to be effective for increasing aural awareness and sensitivity. **CONCLUSION:** The aim of the study is to promote critical thought about sound in the field. The absence of an acoustic component in the education and profession of landscape architects is a missed opportunity for a group deeply involved in the design of the outdoor environment.

CONSTRAITS ON DARK ENERGY MODELS USING OBERVATIONAL DATA

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BACKGROUND AND PURPOSE: We use 21 Hubble parameter versus redshift data points, from Gazta~naga et al. (2009), Stern et al. (2010), and Moresco et al. (2012), to place constraints on model parameters of constant and time-evolving dark energy cosmologies. This is the largest set of H(z) data considered to date. The inclusion of the 8 new Moresco et al. (2012) measurements results in H(z) constraints more restrictive than those derived by Chen & Ratra (2011b). **METHOD:** We use the simple beasiyan and chi-square analysis to find the constraits on different parameters of different cosmological models. **RESULTS/FINDINGS:** These constraints are now almost as restrictive as those that follow from current Type Ia supernova (SNIa) apparent magnitude versus redshift data (Suzuki et al. 2012), which now more carefully account for systematic uncertainties. This is a remarkable result. **CONCLUSION:** We emphasize however that SNIa data have been studied for a longer time than the H(z) data, possibly resulting in a better estimate of potential systematic errors in the SNIa case. A joint analysis of the H(z), baryon acoustic oscillation peak length scale, and SNIa data favors a spatially-flat cosmological model currently dominated by a time-independent cosmological constant but does not exclude slowly-evolving dark energy.

DOUBLE CHOOZ NEUTRON DETECTION EFFICIENCY WITH CALIBRATION SYSTEM

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BACKGROUND AND PURPOSE: The Double Chooz experiment is designed to search for a non-vanishing mixing angle theta13 with unprecedented sensitivity. The first results obtained using only the far detector indicate a non-zero value of theta13. The Double Chooz detector system consists of a main detector, an outer veto system and a number of calibration systems. The main detector consists of a series of concentric cylinders. The target vessel, a liquid scintillator loaded with 0.1% Gd, is surrounded by the gamma-catcher, a non-loaded liquid scintillator. A buffer region of non-scintillating liquid surrounds the gamma-catcher and serves to decrease the level of accidental background. There is the Inner Veto region outside the buffer. The experiment is calibrated with light sources, radioactive point sources, cosmics and natural radioactivity. The radio-isotopes sealed in miniature capsules are deployed in the target and the gamma-catcher. **METHOD:** Neutron detection efficiency is one of the major systematic components in the measurement of anti-neutrino disappearance. An untagged 252Cf source was used to determine fractions of neutron captures on Gd, neutron capture time systematic and neutron delayed energy systematic. **RESULTS/FINDINGS:** The total efficiency of the data and the correction of the predicted model will be represented in this presentation. **CONCLUSION:** This method can successfully estimate the neutron detection efficiency of the detector.

TESTING MODELS OF LOW-δ18O SILICIC MAGMATISM IN THE MID-MIOCENESANTA ROSA-CALICO VOLCANIC FIELD, NV

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BACKGROUND AND PURPOSE: The origin of Snake River Plain-Yellowstone volcanic province low-$\delta^{18}O$ silicic magmas is controversial, and centers in two disputed models: [1] a caldera collapse model that proposes a reworking of the hydrothermally altered intra-caldera fill into the underlying silicic magma body, where each successive eruption lowers the $\delta^{18}O$ of the magma eventually producing a low-$\delta^{18}O$ magma and [2] melting of previously hydrothermally altered mid-upper crust in a non-caldera setting, to form low-$\delta^{18}O$ magmas. The mid-Miocene Santa Rosa-Calico volcanic field (SC) lies in northern Nevada. Brueseke and Hart (2008) described the geology and petrology of the SC, however did not deal with ^{18}O compositions of any locally sourced silicic magmas. In the existing geologic framework of the SC, this project aims to evaluate the two disputed models for low-$\delta^{18}O$ silicic magma generation by analyzing $\delta^{18}O$ values of SC silicic eruptive products. **METHOD:** Fifteen samples were chosen for ^{18}O analyses bases on Sr-Nd-Pb isotope compositions and geochemical data. Each sample was crushed, sieved, and quartz and feldspar crystals were hand picked, described, and analyzed for ^{18}O compositions. **RESULTS AND CONCLUSION:** Low-$\delta^{18}O$ values exist in the SC and are limited to the youngest erupted silicic unit, the Cold Springs tuff. Normal $\delta^{18}O$ values have been found in older lava flows. Data synthesis is underway, but out current hypothesis is that previously altered crust was melted to produce these low-$\delta^{18}O$ Cold Springs magmas, based on their Sr-Nd-Pb isotopic compositions and previous work preformed on similar-aged hydrothermal systems in the volcanic field.

RARE EARTH ELEMENTS (REE) IN ORGANIC MATTER AS MATURATION INDICATORS; CASE STUDY OF THE WOODFORD SHALE, NORTH CENTRAL OKLAHOMA

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BACKGROUND AND PURPOSE: The REE distribution patterns and total concentrations of the organic matter of the Woodford shale reveal a new potential avenue to investigate hydrocarbon maturation processes in source rocks. REE concentration levels in an average shale range from 170ppm to 185ppm, and concentration levels in modern day plants occur in the ppb levels. The REE concentrations in the analyzed Woodford Shale's organic matter range from 300 to 800ppm. This difference in concentrations between modern day organic material and the organic material in the mature source rock suggests a local chemical interaction between the positively-charged REEs, and the organic matter during maturation processes. **METHOD:** Twelve samples of the organic matter fraction of the Woodford shale from north central Oklahoma were analyzed by methods developed at KSU. **RESULTS/FINDINGS:** Distribution patterns of the REE in the samples normalized to PAAS show three distinct patterns; one with a distinct Ce anomaly, one with a distinct enrichment in the middle REEs, and one with a HREE enrichment. We infer the first to be controlled by organic matter, the second by a phosphate-rich phase, and the third by a carbonate phase. The concentration and distribution of the REEs could be a reflection of mixed terrigenous-marine organic matter in the source rock. **CONCLUSION:** This research presents a new method to identify maturation reactions within the organic matter of the source rock, studying the inorganics and finding through them a tool to expand our understanding of the local chemical interactions that occur in the source rock as it undergoes maturation.

WITHDREW*

GEOCHEMICAL INVESTIGATION OF AN OXYANIONS MOBILITY: THE EMERGING CONTAMINANT TUNGSTEN

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INTRODUCTION: The element tungsten (W) was until recently, thought to be stable and benign in the environment. However, it has recently come under scrutiny following a CDC investigation of a leukemia cluster in Fallon, Nevada, in 2001 which noted high levels of tungsten in the drinking water. **BACKGROUND:** Tungsten is widely used in many industrial, military and domestic uses, due to its unique properties. Tungsten research has been lacking until recently and only recently have advancements been made to allow for the sensitivity and accuracy needed for detecting tungsten in natural substrates. **METHODS:** µXRF mapping with µXANES and µXRD on mineral/sediment grains, was used in this study as an important tool in understanding the association of W with other elements (eg.Ca, Fe, Mn, Cu, Zn) and in determining oxidation states of W. By combining these techniques with chemical data, relationships are understood to help elucidate mobility of W from sediments into groundwater. Three sites have been chosen for biogeochemical and mineralogical analysis and their role in controlling bioavailability of W. **RESULTS AND CONCLUSION:** Results of sediment chemistry from bulk speciation will be presented from two sites of high W concentrations (Fallon and Sierra Vista, AZ) and one site of low concentration (Carrizo aquifer, Texas). Sequential extractions clarify the partitioning of sediment fractions and preference of W to bind with other elements. This investigation underlines the significance of studies on mobility of toxic oxyanions in groundwaters such as W.

WITHDREW*

CONSTRUCTING A PROBABILISTIC RISK MAP OF ARSENIC-CONTAMINATED SEDIMENTARY AQUIFERS OF WEST BENGAL, INDIA

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BACKGROUND AND PURPOSE: Using geological/geochemical parameters and subsurface groundwater/contaminant transport modeling, statistics, and geographic information systems (ArcGIS), this study aims at developing a probabilistic risk map of groundwater contaminated with arsenic (As) in eastern parts of West Bengal, India (locations are: Murshidabad district, Nadia district, North 24 Parganas district, and the city of Kolkata). **METHOD:** The goal is to be able to predict if an area in West Bengal could have As-contaminated groundwater by inserting the respective values of the parameters for the given area into the model. The geological/geochemical parameters will be represented by maps in a GIS database and assigned numerical values based on a stepwise logistic regression procedure. Possible parameters include: age of sediments, depth of well, distance of well from rivers, evapotranspiration and precipitation, topsoil and subsoil geochemistry, organic carbon content of water, pH of water, and geomorphologic controls (deltaic/alluvial/floodplain deposits). **ANTICIPATED RESULTS AND CONCLUSION:** The model will be able to determine As contamination in West Bengal groundwater by inputting parameter values from all over the state and the eastern region of India. The research will demonstrate the significance of geological factors in human and ecological health. Since it includes areas that are relatively inaccessible where natural contamination of drinking water supplies have not been probed in adequate depth, the work will highlight potential health impacts and enable local health officials and policymakers to use the research results to plan detailed investigations and develop remediation guidelines or plan for alternative sources of water for the citizens.

Poster Abstracts

Graduate Student Posters

Agricultural Sciences

0

EFFECT OF SOYBEAN RESISTANCE ON SOYBEAN APHID (APHIS GLYCINES MATSUMURA) BIOTYPES

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BACKGROUND AND PURPOSE: The soybean aphid is an exotic pest of soybeans in the US and causing millions of dollars in losses to the soybean industry. Development of resistant varieties is one of the important methods to control this pest. Thus, the objective includes population comparison of aphid biotypes on different soybean genotypes and the characterization, and impact of soybean resistance on these biotypes. **METHOD:** In this study, we used three soybean aphid biotypes (B1, B2, and B3) for the experiments with different soybean genotypes. Here, screening and characterization studies were included to categorize and quantify soybean resistance. **RESULTS/FINDINGS:** Results showed that the soybean genotypes varied in their resistance and susceptibility to the three aphid biotypes. B1 was found to be less virulent compared to the other two biotypes in most of the genotypes, and surprisingly some genotypes were earlier found to have resistance to B1 and susceptible to B2, thus showing a revival in resistance with B3. Characterization and chlorophyll loss studies found significant differences between resistant and susceptible genotypes for these biotypes, as well as categories of resistance varying with biotypes in different soybean genotypes. **CONCLUSION:** This gain and loss of virulence in aphid biotypes for different soybean genotypes can be used for future development of resistant varieties in soybean.

1

FACTORS IN WHEAT AFFECTING WATER ABSORPTION TOLERANCE

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BACKGROUND AND PURPOSE: Hard winter wheat flour is predominantly used for bread production. Optimal dough handling properties are critical in commercial bread production. Variation in flour water absorption tolerance dramatically affects dough handling. A previous study found the γ-gliadin protein fraction correlated highly with water absorption tolerance. The objectives of this study are to confirm the effect of γ-gliadin and investigate the effects of genetics and environment on water absorption tolerance. **METHOD:** Nineteen hard winter wheat cultivars consisting of released varieties and experimental breeding lines from the Pacific North West grown in 2011 in 2 locations in Oregon (Pendleton and Arlington) were obtained. Quality evaluations were conducted on the wheat kernels and resulting flours. Mixograph water absorption tolerance behavior was ranked as high, medium or low. **RESULTS/FINDINGS:** Farnum and OR2080156H grown at Arlington had the highest water absorption tolerance range (16%) while Farnum, Eddy, Paladin and OR2080227H grown at Pendleton exhibited the lowest interval (4%). No wheat or flour parameters measured showed high correlation with water absorption tolerance. Moderate correlation was observed between water absorption tolerance and kernel weight ($r = 0.39$), kernel diameter ($r = 0.37$), and starch damage ($r = 0.33$). Protein fraction analysis, currently underway, is expected to show a high correlation between the gliadin protein fraction and water absorption tolerance. **CONCLUSION:** Understanding the factors which affect water absorption tolerance and the influences of genotype, environment, and their interaction on those factors will improve breeding efforts and production practices to improve the quality of bread wheat.

2

CHROMOSOME ENGINEERING FOR FUSARIUM HEAD BLIGHT RESISTANCE FROM *ELYMUS TSUKUSHIENSIS* IN HARD RED WINTER WHEAT

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BACKGROUND AND PURPOSE: Fusarium head blight (FHB) or scab is a devastating wheat disease usually limited to the eastern third of Kansas. The disease can reduce both yield and quality of the grain. Genetic resistance is usually the most effective, economical and environmentally-sound method of control. A novel source of resistance to FHB is from *Elymus tsukushiensis*, a wild relative of wheat. FHB resistance is derived from a group-1 *E. tsukushiensis* chromosome $1E^{ts}$#1, which was transferred to wheat in the form of a disomic chromosome addition ($DA1E^{ts}$#1), a ditelosomic addition ($DtA1E^{ts}$#1S), and a disomic addition/translocation ($DATW{\cdot}1E^{ts}$#1S). We wanted to transfer this resistance to a winter wheat background. **METHOD:** We used chromosome engineering through *ph1b*-induced homoeologous recombination to produce wheat-*Elymus tsukushiensis* recombinants. Molecular screenings through PCR markers and genomic *in situ* hybridization (GISH) identified distal ($TWL{\cdot}WS\text{-}1E^{ts}$#1S) and interstitial ($Ti1WL{\cdot}1WS\text{-}1E^{ts}$#1S-1WS) recombinants. **RESULTS/FINDINGS:** We have transferred these recombinants into a winter wheat background. Stocks homozygous for both recombinants were recovered and have been tested in the greenhouse and field. Point inoculation in greenhouse tests conferred type-2 resistance which may be used in cultivar improvement.

3

NUTRITIONAL COMPOSITION AND COLOR COMPARISON OF HERITAGE BRED CHICKENS (120 DAY GROWTH) VS. COMMERCIAL (50 DAY GROWTH) BROILERS

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BACKGROUND AND PURPOSE: Efficiency in animal production has resulted in increased growth rate which has affected nutritional composition of commercial broilers. The objective of this study was to determine the proximate analysis, yield, instrumental color, and fatty acid composition of breast and thigh meat and skin from heritage bred (Barred Rock) chickens raised for 120 days compared to commerical broilers raised for approximately 50 days prior to harvest. **METHOD:** Twenty whole bird carcasses for each treatment were obtained from retail venders. Carcasses were weighed prior to color analysis, and then deboned. Meat and skin were prepared for moisture, protein, fat, and fatty acid determination, and raw weight yields on breast and thigh muscles were measured. **RESULTS/FINDINGS:** Commercial broiler thigh meat a had higher fat content compared with heritage chicken; however, no difference was found between breast fat content. Heritage chicken meat had higher protein than commerical broiler meat. Thigh meat contained more long chain fatty acids than breast meat, regardless of breed type; however, commercial broilers had a greater amount than heritage chickens. Heritage breast and thigh meat had a lower ω6/ω3 ratio than commercial broiler breast and thigh meat. Commercial breast and thigh meat had lighter color while heritage breast and thigh meat had more yellow color. While commercial broilers had heavier whole carcass, breast, and thigh weights, heritage thighs made up a larger percentage of the total yield. Differences were significant when $P<0.05$. **CONCLUSION:** Heritage birds display advantages in nutritional composition, but result in lower meat yields.

4

CROP CANOPY EFFECTS ON *Kochia scoparia* IN KANSAS

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BACKGROUND AND PURPOSE: A better understanding of kochia (*Kochia scoparia*) seed dynamics is necessary for long term management of this increasingly troublesome weed. The objective of this research was to evaluate maternal environmental effects on kochia growth and seed production and document variability of seed dormancy and viability within a single kochia plant. **METHOD:** Seed from two kochia populations (cropland and non-cropland sources) from Hays, KS were grown in the greenhouse and limited to self-pollination. Seed were harvested from mature plants that were divided into top, middle, and bottom sections. Germinability of 50 seed per plant section was determined over six weeks. A field experiment was conducted in 2012 at the Agricultural Research Center in Hays, KS. Kochia seed from cropland and non-cropland populations were planted with five different crop canopies including corn, soybean, grain sorghum, wheat stubble, and other kochia plants. Plant heights of kochia and crops were taken weekly for the duration of the summer. **RESULTS/FINDINGS:** In general, plants that flowered first in the greenhouse had seed that germinated quickly with little difference based on location on the plant, while later flowering plants had seed that germinated more slowly. Kochia height was tallest when grown with corn compared to the other crop canopies. Average kochia heights at the end of the season ranged from 44 to 78 cm across the crop canopies. **CONCLUSION:** Based on these preliminary observations, variability is seen within kochia plants regarding growth in different crop canopies and among kochia seed regarding rate of germination.

5

REDUCED INSECTICIDE USE IN SOYBEAN: A LOOK INTO THE DEVELOPMENT OF SITE SPECIFIC STRATEGIES TO MANAGE *DECTES TEXANUS*

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BACKGROUND AND PURPOSE: The soybean stem borer, *Dectes texanus* Leconte (Coleoptera: Cerambycidae), is a native North American beetle that has become an important pest in soybean (*Glycine max* L.) in recent decades. Current management practices targeting adult *D. texanus* can reduce infestation in the field; however, short comes from these strategies include knowing where and when adults are occuring in the field. To address these issues it is important to monitor adult activity in soybean fields through time (June-August) to identify patterns in colonization. In doing so, the ability to develop site-specific pest management strategies that increase the effectiveness of insecticide applications for managing adults could prove to be useful for farmers. Therefore, the objective of this study was to examine the within-field spatial distribution of adult *D. texanus* through time to examine the potential for developing site-specific pest management strategies. **METHODS:** For this study, two fields infested with *D. texanus* were used for examining the spatial distribution of adults across each production field through time (June-August). Fields were sampled weekly by performing a set of 20 sweeps in each cardinal direction for all waypoints within a sampling grid. We predicted to see early colonization by *D. texanus* showing aggregation along field edges then dispersing throughout the field towards the end of adult activity. **RESULTS AND CONCLUSIONS:** Preliminary results suggest variation between individual fields as well as changes in adult distributions through time. This variation may be influenced by previous and current sourrounding crop types. Implications from these results on current management strategies will be discussed.

6

SOYBEAN INOCULANT AND SEED TREATMENT INTERACTIONS

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BACKGROUND AND PURPOSE: Soybean seed treatments provide protection against various seedling pests and diseases. Potential interactions of seed treatment formulations with seed applied *Bradyrhizobium japonicum* bacterial inoculants are of interest. Survival of seed-applied bacterial inoculants is critical in situations where there is no *B. japonicum* present in the soil in order to achieve adequate nodulation and nitrogen fixation. The objective of this study was to investigate possible interactions of various seed treatment formulations with soybean bacterial inoculants. **METHOD:** A factorial experimental design with seed treatments and inoculant products was employed. Seed treatments included ApronMaxx® RFC; ApronMaxx® RFC, Cruiser®; ApronMaxx® RFC, Cruiser®, Avicta®; and ApronMaxx® RFC, Poncho®/VOTiVO™. Inoculant products applied in conjunction with these seed treatments included Advanced Biological Marketing, ExcalibreSA™; Becker Underwood, Vault® HP; Novozymes, Optimize® 400, and Terramax Maximize. Seven field experiments were set up in a randomized complete block design with four replications at five locations. **RESULTS/FINDINGS:** There were no negative impacts in nodulation performance with any of the seed treatments. There were significant differences in yield between treatments at one location in 2011. However, differences were small and the raw seed yielded as well or better than all treatment/inoculant combinations. At the other sites, yield was not significantly influenced by seed treatment and inoculant combinations. **CONCLUSION:** The results conclude that seed treatment formulations did not significantly impact bacterial inoculant product performance, soybean nodulation, or yield.

7

WHEAT MILL STREAM PROPERTIES FOR DISCRETE ELEMENT METHOD MODELING

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BACKGROUND AND PURPOSE: Discrete element method (DEM) is a technique used for the mechanical simulation of granular material. Application of DEM modeling in grain processing includes size reduction, flow characterization and mixing. Knowledge on the physical and mechanical properties of particulate matter is important to apply the DEM principles. Wheat milling process, with different product streams, involves multiple size reduction and sieving steps. As a first step to develop a DEM model for the wheat milling process, this study concentrates on finding the physical and mechanical properties of wheat mill streams. **METHOD:** The model parameters measured are particle size, particle size distribution, bulk density, young's modulus, and static and rolling coefficient of friction. Effect of moisture content (12 – 16 %, wet basis) on these properties will also be evaluated. Above mentioned properties are quantified for wheat kernels, first break milled wheat, second break milled wheat and flour. The particle size and particle size distribution was measured using the ASABE standard, young's modulus was measured using an Instron Universal Testing Machine. **RESULTS/FINDINGS & CONCLUSION:** From this study we intent to optimize the energy consumtion during the wheat milling process by accurately predicting the wheat kernel size reduction behaviour and also by predicting the force of attachment of the bran layers in a kernel.

8

PALMER AMARANTH CONTROL IN ESTABLISHED ALFALFA UNDER DRYLAND AND IRRIGATED CONDITIONS

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BACKGROUND AND PURPOSE: Palmer amaranth is a weed species capable of significantly reducing crops yields. It is a serious production problem for alfalfa growers in the southern Great Plains region. An experiment was conducted in 2012 near Clay Center, KS to evaluate several dormant and between cutting herbicide treatments for residual control of Palmer amaranth under dryland and irrigated conditions. **METHOD:** Dormant herbicide treatments were applied on March 9 and between cutting treatments were applied three days after the first cutting and harvest on April 23. The experiment was a randomized complete block with three replications. Crop injury and Palmer amaranth control were visually evaluated at regular intervals throughout the growing season. Palmer amaranth emergence was monitored in four 0.25 m^2 quadrats by removing emerged plants and recording them at equal intervals throughout the season. **RESULTS:** Several dormant season treatments caused substantial necrosis shortly after application, but new growth was unaffected. Alfalfa yields and quality were unaffected and did not differ among treatments. Season-long Palmer amaranth control was greatest with flumioxazin or diuron herbicide treatments. Control with these two herbicides ranged from 85 to 98% depending on application timing and rate. Palmer amaranth emerged throughout the growing season starting as early as May 1 and continuing to August 5. **CONCLUSIONS:** Palmer amaranth can emerge throughout the growing season and therefore, herbicides with good residual activity are necessary for controlling this pigweed species.

9

EFFECT OF REWORK INCLUSION ON THE PROCESSING AND FINAL PRODUCT CHARACTERISTICS OF A PET FOOD

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BACKGROUND AND PURPOSE: When manufacturing pet food, a certain portion of the product does not comply with specifications. This material is called "rework." If not utilized, it represents an economic loss. Thus, rework is commonly used in the pet food industry. The American Association of Feed Control Officials has no restrictions for the use of rework, so pet food companies determine their own levels of rework used during formulation of diets. Since pet food formulations are proprietary, inclusion levels of rework are unknown and little research has been published in this area. The purpose of this study was to examine how increasing levels of rework impacts processing and final product characteristics. **METHODS:** Rework was added to a base diet at 5%, 10%, 15%, 20%, and 50%. A 100% rework treatment was also prepared. The base diet also served as the control, and contained no rework. This was done to simulate an ideal pet food and allows a baseline comparison to the rework treatments. **RESULTS AND CONCLUSION:** Expansion ratio increased from 0% to 15% rework levels and became steady for the remaining treatments. Specific length and piece density decreased from 0 % to 15% rework then increased onwards to the 100% rework treatment. However, texture of the final pet food product varied drastically between each of the treatments. Limitations on rework are likely driven more by animal responses over matters such as texture than processing alterations or physical size and shape considerations.

10

DEEP SOIL STORAGE OF CARBON AS AFFECTED BY TILLAGE AND NUTRIENT SOURCE

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BACKGROUND AND PURPOSE: With the threat of global climate change due to rising greenhouse gas emissions, specifically carbon dioxide (CO_2), carbon sequestration in soil has been considered as one strategy to mitigate increases in atmospheric CO_2. Soil accounts for nearly 75% of the terrestrial carbon pool, and thus plays a critical role in the carbon cycle. Soil microorganisms play a major role in the soil carbon cycle. No-till (NT) cropping systems can increase protection and storage of carbon in soils relative to conventional tillage (CT). Typically, studies of soil carbon studies have been confined to the surface 30 cm of soil. Recent studies have indicated that carbon in the deeper soil layers are more dynamic than previously thought. This study investigated soil carbon stability and associated microbial community to 1.2 m. **METHODS:** Samples were collected from a field site under continuous corn (*Zea mays*) production since 1990. The experiment was a split-block design with main treatments of NT and CT and subtreatments of mineral fertilizer (MF) and organic fertilizer (OF). Soil samples were incubated and analyzed for CO_2 and $\delta^{13}C$ to measure stability and source of carbon. Microbial community structure was analyzed by phospholipid fatty acid (PLFA) analysis. **HYPOTHESES:** It is hypothesized that NT will enhance deposition of carbon deeper in the soil profile. This deep carbon will be more stable than carbon in the surface layers of the soil profile.

11

EFFECT OF GAP JUNCTION ENHANCER IN COLON CANCER CELLS

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BACKGROUND: A hallmark of cancer is the loss of gap junction intercellular communication (GJIC). It has been shown that gap junctional proteins, connexins, are dramatically decreased in colon cancer cells: HT29, Caco-2, SW480, and SW620. Recent publications demonstrated that newly identified gap junction enhancer, a small molecule known as PQ1, can increase gap junctional activities and upregulate apoptotic pathway in breast cancer cells. PQ1 was designed based on the computational docking of the C terminal domain of connexin 43. Previously, PQ1 has been shown to increase GJIC in SW480 colon cancer cells. **METHOD:** The effect of PQ1 on cell proliferation and viability is being evaluated in four colon cancer cell lines. Furthermore, differential pattern of connexins 26, 32, 43 and 46; survivin; caspase 3, 8, and 9; Apc; PKCs α, β, and γ are being characterized using Western blot analysis. Microinjection is being performed to observe GJIC. Describe how you conducted your research or scholarly work and the steps you took to pursue your research goals. **FUTURE DIRECTION AND PURPOSE:** To conduct in vitro studies in establishing the mechanism of action for the PQ1-mediated GJIC. Mutagenesis of the C-terminal domain of connexin 43 will be generated and expressed in colon cancer cells. The significance of this project is to shed light on how gap junction enhancer alone can affect cell proliferation and viability via the enhancement of GJIC.

12

MIDGUT MICROBIAL COMMUNITY PLAYS A SIGNIFICANT ROLE IN THE VECTOR COMPETENCE OF *PHLEBOTOMUS DUBOSCQI* FOR *LEISHMANIA MAJOR*

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BACKGROUND AND PURPOSE: *Phlebotomus* sand flies (females) are blood sucking insects that vector *Leishmania* parasites causing leishmaniasis in humans and other vertebrates. A crucial step in *Leishmania* transmission is the development of the parasite in the sand fly midgut. This study investigated the significance of the midgut bacterial community in the vector competence of *Phlebotomus duboscqi* for *Leishmania major*. **METHOD:** Sand flies were fed heparinized mice blood inoculated with *L. major* parasites (~$4x10^6$/ml). From day 4 post-infection, flies were given on a daily basis either penicillin/streptomycin (P/S) in sucrose (30% w/v) solution to reduce their gut microbiota (treatment group) or sucrose (30% w/v) without antibiotics (control group). Subsequently, sand flies from these groups were dissected at different time points to count the parasite numbers and to assess the concentration (colony forming unit counts) and diversity of the gut bacteria (culturing as well as culture independent approach). Additionally, the effect of P/S on the parasite survival *in vitro* was evaluated. **RESULTS:** P/S treated sand flies showed a significant (~1000x) reduction in the number of gut bacteria along with parasite numbers (>100x) compared to that of control flies. *In vitro* experiments revealed that P/S does not affect parasite survival directly. *Ochrobactrum* and *Rahnella* spp. were dominant in the gut of control flies and were replaced by *Leifsonia* spp. in the P/S treated flies. **CONCLUSION:** The bacterial community in the sand fly gut is essential for *L. major* development and might be used for manipulating the sand fly vector competence and for a paratransgenic approach to control *Leishmania* transmission.

13

REDUNDANT NUCLEAR LOCALIZATION SIGNALS MEDIATE NUCLEAR IMPORT OF THE *ASPERGILLUS NIDULANS* TRANSCRIPTION ACTIVATOR OF NITROGEN METABOLIC GENES AREA

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BACKGROUND AND PURPOSE: The *Aspergillus nidulans* GATA transcription factor AreA activates transcription of nitrogen metabolic genes. AreA accumulates in the nucleus during nitrogen starvation but not in the presence of nitrogen sources. AreA contains five putative classical nuclear localization sequences (NLSs) and one putative non-canonical bipartite NLS. **METHOD:** We used two approaches to identify the functional NLSs. First, we constructed epitope-tagged gene replacement *areA* mutants affected in individual NLSs or combinations of NLSs to identify sequences required for nuclear localization. Deletion of all five classical NLSs did not affect utilization of nitrogen sources and did not prevent AreA nuclear localization. Mutation of the bipartite NLS conferred inability to utilize alternative nitrogen sources but did not prevent AreA nuclear localization. Combinations of mutations of the six NLSs indicate redundancy among the AreA NLSs. Second, we constructed Green Fluorescent Protein (GFP)-AreA NLS fusion genes and introduced them into *A. nidulans*. **RESULTS:** The bipartite NLS strongly directs GFP to the nucleus, one of the classical NLSs weakly directs GFP to the nucleus and the other four classical NLSs collaborate to direct GFP to the nucleus.

WITHDREW **14**

SELECT AMINO ACIDS INDUCED EXPRESSION OF HUMAN-BETA DEFENSIN IN CACO-2 CELLS

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BACKGROUND AND PURPOSE: Host defense peptides (HDPs) are important components of the innate immune system and contribute to protection of the intestinal epithelium. Human beta defensin 2 (HBD2) is a HDP expressed by the epithelial cells of skin, gastrointestinal tract and the respiratory tract and plays an important role in protecting these tissues. The objective of this study was to investigate the role of specific amino acids in inducing human defensin-2 in Caco-2 cells. Previous studies showed individual amino acids such as isoleucine, glutamine, or arginine can induce HDP in epithelial cells. There appears to be a gap in information on to which extent a combination of different amino acids influence the expression of beta defensins. Here we look at the role of isoleucine, arginine and glutamine (all L-forms, individually or in combination) in inducing the expression of HBD2 in Caco-2 cells. **METHODS:** Cell lines were grown and exposed to different concentrations of amino acids. The effect of time and concentration of the different amino acids (alone or combined) on the expression of HBD2 was determined. HBD2 expression was evaluated using RT-PCR with specific forward and reverse primers for HBD2. **RESULTS/FINDINGS:** Results from our preliminary studies show that HBD2 expression by Caco-2 cells is enhanced by a combination of at least two amino acids at a micromol concentration. **CONCLUSION:** Amino acids as immunomodulators have promising clinical implications in gastrointestinal disorders.

15

BIOCHEMISTRY AND IMMUNOLOGY OF GRAM-POSITIVE BACTERIAL HEME ACQUISITION SYSTEMS

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BACKGROUND AND PURPOSE: Gram-positive pathogenic bacteria scavenge heme from their hosts during infection. Six heme binding proteins exist in L. *monocytogenes* (Hbp1 and 2) and S. *aureus*, (IsdA, B, C and H) that contain NEAT-domains which interact with heme during its uptake. **METHOD:** The ability to acquire heme is vital for bacterial infection. We cloned the structural genes, purified and characterized the corresponding proteins to understand their specificities, affinities and interactions. We used affinity purified, 6H-tagged proteins to generate murine polyclonal and monoclonal antibodies. **RESULTS/FINDINGS:** The resulting high-titer antisera showed specificity for the original immunogens, as well as cross-reactivity to other NEAT-domain containing orthologous and paralogous proteins. These sera inhibited the uptake of hemin (Hn) and hemoglobin (Hb) by L. monocytogenes and S. aureus, and retarded the pathogenesis of these strains in a mouse sepsis model system. Anti-Hbp1 and 2 sera were cross-reactive with IsdH and attenuated the virulence of L. monocytogenes. **CONCLUSION:** Cross-reactivity between NEAT-domain containing proteins suggests that antibodies generated against the iron acquisition system of one Gram positive organism may provide immunity to infection by other Gram positive organisms, likely because the sera inhibit heme acquisition. In the future, we will introduce cysteines at key exposed residues, and label the Cys sulfhydryls with extrinsic fluorophores to evaluate localization of these proteins in the bacterial cell wall.

16

ELUCIDATING THE STRUCTURAL FEATURES THAT DEFINE SUBSTRATE SPECIFICITY AND ACTIVITY OF *EUONYMUS ALATUS* DIACYLGLYCEROL ACETYLTRANSFERASE (EADACT)

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BACKGROUND AND PURPOSE: Unusual triacylglycerol molecules, named acetyl-TAGs (acTAGs), are found in embryo and endosperm tissues of *Euonymus alatus*. Unlike regular TAGs having a long chain fatty acid esterified at the *sn*-3 position of the glycerol backbone, acTAGs possess an acetyl group at that position instead. Due to this unusual structure, acTAGs are 30% less viscous than regular TAGs and thus can possibly be used directly as a biofuel. The enzyme that participates in the last step of acTAGs synthesis was isolated from *Euonymus alatus* and named Diacylglycerol Acetyltransferase (EaDAcT). Despite the biofuel potential of its product, knowledge of the enzyme's ability to use a very unique acyl donor substrate is not known yet. Thus, we are trying to determine topology and functional residues involved in acetyltransferase activity of EaDAcT. **METHOD**: N- and C-terminal ends of EaDAcT were tagged with Myc and HA epitopes respectively. Proteinase protection assay followed by immunobloting with anti-Myc or anti-HA antibodies were carried out to determine orientations of N- and C-terminal ends. To study functional residues of EaDAcT, single point mutations were introduced at the predicted functional residues of EaDAcT. Expression and activity of mutated proteins were studied by immunoblot analysis and *in vitro* acetyltransferase assay. **RESULTS**: Preliminary data suggested that EaDAcT may have even number of transmembrane segments with both N-and C-terminal ends are localized inside the lumen. Serine 253, and Valine 263 may be required for structural formation while Histidine 257 and Aspatate 258 may involve in enzymatic activity of the enzyme.

17

CHOLERA TOXIN ENHANCES SODIUM ABSORPTION VIA ENaC ACROSS CULTURED HUMAN MAMMARY GLAND EPITHELIA

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BACKGROUND AND PURPOSE: Cellular mechanisms to account for the low Na^+ concentration in human milk are poorly defined. This study was conducted to determine how cholera toxin (Ctx) elevates sodium absorption across cultured human mammary epithelium. **METHOD:** MCF10A cells, derived from human mammary epithelium, were grown on permeable supports with or without Ctx for 2h to 7d. Electrophysiological studies were conducted with a modified Ussing-style flux chamber and followed by RNA isolation for RT-PCR and protein isolation for immunoblots. **RESULTS:** MCF10A cells exhibited amiloride- and benzamil-sensitive ion transport (I_{sc}), suggesting activity of the epithelial Na^+ channel, ENaC. When cultured with Ctx, MCF10A cells exhibited greater amiloride sensitive I_{sc} at all time points tested. Similarly, the amiloride sensitive I_{sc} remains elevated by Ctx with inhibitors for PKA (H-89), PI3 kinase (LY294002) and protein trafficking (brefeldin A). Ctx B subunit, alone, did not replicate such effects. There are no significant increases in either the mRNA or total protein expression for α, β, or, γ-ENaC subunits. Biotinylation analysis showed that Ctx increased β, and γ-ENaC expression on the apical cell surface. **CONCLUSION:** These results demonstrate that human mammary epithelia express ENaC, which can account for low milk Na^+ concentration, and that Ctx enhances ENaC localization at the apical membrane. The underlying mechanism linking Ctx to elevated ENaC function remains to be characterized and appears to be novel. This new mechanism may contribute to Na^+ transport in other tissues and, thus, might eventually be exploited to address certain diseases associated with abnormalities in fluid or electrolyte balance.

18

SEROPREVALENCE OF PORCINE REPRODUCTIVE AND RESPIRATORY SYNDROME VIRUS (PRRSV), SWINE INFLUENZA (SIV), AND PORCINE CIRCOVIRUS 2 (PCV2) IN FERAL HAWAIIAN SWINE

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BACKGROUND AND PURPOSE: Little is known about the prevalence of PRRSV, PCV2, and SIV in feral swine in the state of Hawaii. The overall goal of this project was to apply a multiplex serological test for the detection of IgG and IgM antibodies to PRRSV N protein (N), PCV2 capsid protein (CP), and SIV nucleoprotein (SIV NP). **METHOD:** Serum samples were collected from 345 feral swine in the counties of Hawaii and Honolulu over a four year period (2007-2010). Target proteins were expressed in E. coli and coated onto Luminex beads, using standard protocols. Antibodies to the three antigens were present in the population. **RESULTS/FINDINGS:** Overall, PCV2-specific antibody was most prevalent with 61% of the samples testing positive for PCV2-specific IgG. SIV and PRRSV N IgG antibodies were detected at much lower rates of 7% and 3.5%, respectively. Approximately 3% of samples were positive for the presence of PCV2-specific IgM. Five of the PCV2 IgM-positive samples were further subjected to PCR amplification for the detection of genomic DNA. Products were obtained from three of the samples. Sequencing showed the presence of PCV2b-like viruses. **CONCLUSION:** The results illustrate the utility of multiplex serological assays for disease surveillance in feral populations.

19

CHAPERONE MEDIATED ASSEMBLY OF THE PROTEASOME: CONSTRUCTING THE DESTRUCTION

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BACKGROUND AND PURPOSE: The proteasome is a complex protease responsible for the degradation of most ubiquitinated proteins in the cell. It plays an important role in neurodegenerative diseases and certain cancers. To form a functional complex inside the cell, the 20S core particle (CP), which harbors the proteolytic active sites, needs to associate with the 19S regulatory particle (RP). However, the CP can also associate with other complexes, thereby preventing the RP-CP association. The goal of my project is to understand the role of chaperones in regulation of the interaction of CP with RP and other complexes. **METHODS:** Chaperones and different proteasome sub-complexes were isolated and used in *in-vitro* reconstitution assays to study the regulation and pathways of the assembly. For *in-vivo* studies, different subunits of the proteasome were GFP tagged and their localization was studied in budding yeast where chaperones were mutated. **RESULTS/FINDINGS:** Our results indicate that the order of addition of chaperones and proteasome sub-complexes can dictate the type of complexes formed, suggesting that *in-vivo* association of the different factors can influence which proteasome complexes are formed inside the cell. Preliminary data also suggests a role for some chaperones in the cellular localization of proteasomes. **CONCLUSION:** These studies aim to achieve a better understanding of the mechanism of assembly of the proteasome. With this we can potentially identify new targets to manipulate proteasome levels and activity inside the cell. This might ultimately result in new drugs for e.g. the treatment of patients who have multiple meyloma's resistant to treatment with proteasome inhibitors.

20

HUMAN UMBILICAL CORD MATRIX DERIVED STEM CELLS CONTROL TUMOR GROWTH BY TUMOR SUPPRESSOR GENE EXPRESSION

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BACKGROUND AND PURPOSE: We have previously shown that naïve rat and human umbilical cord matrix derived stem cells (UCMSC) have significantly attenuated the proliferation of breast cancer cells. However, the tumoricidal ability of rat UCMSC is consistently stronger than that of human UCMSC. **METHOD:** To clarify their different tumoricidal abilities, gene expression profiles of human and rat UCMSC untreated and those co-cultured with either human (MDA-231) or rat breast carcinoma cells (Mat B III) were studied by Illumina BeadChip microarray. Selection criteria of candidate genes associated with UCMSC-dependent tumoricidal ability are 1) gene expression difference should be at least 1.5-fold between naive UCMSC and those co-cultured with mammary tumor cells; 2) they must encode secretory proteins and 3) cell growth regulation-related proteins. **RESULTS:** Seventeen common genes from both human and rat UCMSC were screened. The comparison between two sets of gene expression profiles identified that two tumor suppressor genes, adipose-differentiation related protein (ADRP) and follistatin (FST), were specifically up-regulated in rat UCMSC, whereas they were down-regulated in human UCMSC. Over-expression of FST by adenovirus vector in human UCMSC enhanced their tumoricidal ability. In the experimental lung metastasis model with MDA-231 cells in immunodeficient mice, treatment three times weekly with FST-over-expressing human UCMSC showed a significant decrease in the number of lung tumor nodules. **CONCLUSION:** These results suggest that FST may play an important role in exhibiting a stronger tumoricidal ability in rat UCMSC than in human UCMSC and may imply that human UCMSC can be transformed into stronger tumoricidal cells by enhancing tumor suppressor gene expression.

21

INFLUENCE OF ABIOTIC AND BIOTIC PROCESSES ON THE MOBILIZATION OF ARSENIC IN GROUNDWATER OF THE OKAVANGO DELTA, BOTSWANA

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BACKGROUND AND PURPOSE: Arsenic (As) is a naturally occurring trace element that has been found in high concentrations in many deltaic aquifers. The Okavango Delta is an arid-zone wetland that contains tens of thousands of islands, and recent studies have shown that groundwater beneath these islands can have dissolved As concentrations as high as 3 ppm. In arid environments with high evaporation, abiotic processes such as evapoconcentration and alkaline pH are commonly thought to be responsible for high As concentrations. The dissolution of iron-containing sediments has been proposed as the initial step in releasing arsenic from sediment. The key driver for iron-reductive dissolution is dissolved organic matter (DOM), which serves as an energy source for bacteria. The purpose of our research is to evaluate how abiotic and biotic mechanisms influence As mobility in this setting. **METHOD:** We collected groundwater samples from an island transect in October 2011. We measured different groundwater quality parameters and sulfate reducing bacteria (SRB) in water. **RESULTS/FINDINGS:** Our analyses suggest that elevated arsenic was associated with high conductivity and pH, and may be the result of desorption of arsenic from the sediments under those conditions. We observed a transformation in DOM quality that may be due biotransformation of DOM by SRB, which were also quantified. We are now investigating whether SRB have an active role in arsenic sequestration in samples collected in earlier parts of the groundwater flowpath. **CONCLUSION:** In this arid deltaic groundwater environment, where abiotic processes are expected to dominate, microbial processes and DOM transformations may have an additional role in arsenic mobility.

22

MACHINE LEARNING METHODS FOR ESTIMATION OF WEATHER-RELATED OUTAGES ON OVERHEAD DISTRIBUTION FEEDERS

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BACKGROUND: Power has become a basic necessity in our daily life. Any disturbance in the power lines causes a great inconvenience to the customers, who expect a high level of reliability. Further the interruptions are associated with a significant economic loss and business interruptions. It is the responsibility of electric utility companies to supply uninterrupted electricity to the customers. Empirical analysis and outage studies shows that overhead lines are highly susceptible to various environmental factors such as weather, animals, and trees. Among various weather factors, it has been shown in the literature that wind and lightning are major cause of outages in the distribution system. **PURPOSE:** The main focus of this work is to verify the existing models and to develop more accurate models to study the effects of wind and lighting on performance of the distribution system and to estimate the outages. To accomplish the objectives, machine learning methods such as linear and exponential regression, neural networks, committee machines and adaboost are proposed. **DATA:** The weather related outages caused by lightning, trees, wind, and equipment and unknown outages possibly caused by lightning and wind from the year 2005 to 2011 in the urban overhead distribution system of Manhattan, Topeka, Wichita and Lawrence in Kansas of Westar Energy were considered for the study. **RESULTS/FINDINGS:** To evaluate the performance of the developed models MSE and AAE error criteria are used. Among all the developed machine learning models, the performance of Committee Machines algorithm is superior.

23

TRACKING THE CONTRIBUTION OF AIRBORNE BACTERIA TO THE DISSOLVED ORGANIC CARBON LOAD IN ALPINE ENVIRONMENTS

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BACKGROUND AND PURPOSE: The Colorado Front Range of the Rocky Mountains contains undeveloped, barren soils, yet in this environment there is strong evidence for a microbial role in increased nitrogen (N) export. Barren soils in alpine environments are severely carbon-limited, which is the main energy source for microbial activity and sustenance of life. It has been shown that atmospheric deposition can contain high amounts of organic carbon (C). Atmospheric pollutants, dust events, and biological aerosols, such as bacteria, may be important contributors to the atmospheric organic C load. **METHOD:** In this stage of the research we used fluorescence spectroscopy as a rapid technique to identify and track the contribution of airborne bacteria to the dissolved organic carbon load in alpine environments, such as the Rocky Mountains of Colorado and the Sierra Nevada Mountains of southern Spain. We are also evaluating seasonal trends in specific organic compounds and atmospheric particles in wet and dry deposition and snow. **RESULTS AND CONCLUSION:** We have found that there is a unique fluorescent fingerprint in both of these environments attributed to fluorescent pigments in bacteria, which is seasonally variable. These results are relevant because biological aerosols may be a labile source of carbon for microbes in the barren soils of the alpine.

24

PRODUCTION OF DIMETHYLFURAN FROM HYDROXYMETHYLFURFURAL, A BIOMASS DERIVED PRODUCT, USING A RUTHENIUM CATALYST COATED POLYMERIC MEMBRANE REACTOR

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BACKGROUND AND PURPOSE: As non-renewable fossil fuels are depleted and the demand for transportation fuels increases, suitable sustainable alternatives are needed. Ethanol is the only currently mass produced liquid fuel from renewable sources but does suffer from some limitations. An attractive alternative is 2,5-dimethylfuran (DMF), which has physical characteristics more closely resembling that of gasoline. Hydroxymethylfurfural (HMF) is a biomass-based platform chemical that can be hydrogenolyzed to produce DMF. Recent work has been performed on this reaction using a copper-ruthenium catalyst with traditional reactors. A new method is proposed using a catalyst coated polymeric membrane reactor that allows for a direct and abundant supply of hydrogen to the catalytic sites on the membrane surface. The polymeric membranes utilized are selective for hydrogen transport, thus also acting as a liquid/gas barrier. **METHOD:** Different polyimide polymers are being investigated for high temperature stability and chemical resistance. Suitable polymers are cast into flat sheet asymmetric membranes and characterized for hydrogen and nitrogen flux and selectivity. Butanol is the solvent used, but others may be explored. The temperature range being investigated for this hydrogenolysis reaction is 200-220°C with a hydrogen supply pressure of one to two atmospheres. **RESULTS AND CONCLUSIONS:** If shown to produce significant conversion of HMF while maintaining long-term membrane reactor stability and performance, the hydrogenolysis reaction of HMF to DMF using a catalyst coated polymeric membrane will serve as a model reactor/reaction for other biorefinery operations.

25

THE INTERACTIONS OF THE CORN PROTEIN ZEIN AND IONIC LIQUIDS

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BACKGROUND AND PURPOSE: The corn protein zein is a biodegradable protein that does not dissolve in water. Zein has many potential applications such as pill coatings, fabrics, inks, and plastics. However, its high cost of production means it is not economically viable in all but high margin fields. Ionic liquids, organic salts with low melting points, may be able to serve as a solvent for zein to promote commercial applications of the protein. This research will examine what changes zein undergoes in ionic liquid solution and why, with a view towards designing superior solvents in the future. **METHOD:** Gravimetric solubility and infrared spectroscopy were used to examine the interactions of the protein and the ionic liquid solvents, as well as compare zein's structure and behavior in other solvents. **RESULTS:** This research found that there are several ionic liquids that are better solvents for zein than the commercially used aqueous ethanol solutions. Both higher solubility and equivalent protein structures have been found for zein dissolved in the ionic liquid 1-methylimidazolium acetate, as compared to zein dissolved in 70 vol% aqueous ethanol. However, other research revealed that some types of ionic liquids greatly affect the protein's structure, possibly changing the protein's properties. **CONCLUSION:** This work has demonstrated that ionic liquids can dissolve the corn protein zein and both affect and not affect the structure of the protein. This work will be useful for future protein in ionic liquid research where the unique solvent properties of ionic liquids will be useful to control protein structure and properties.

26

PRODUCTION OF HYDROGEN FROM HIGHER HYDROCARBONS THROUGH AUTOTHERMAL REFORMING PROCESS

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BACKGROUND AND PURPOSE: Hydrogen, which shows great promise as the clean energy for the proton-exchange membrane fuel cells (PEM), is hard to store and transport. Thus, on site production of hydrogen is necessary to facilitate the application of hydrogen as fuels for the PEM.**METHOD:** In this work, the catalytic autothermal reforming and partial oxidation of hexadecane by Pt/Ni bimetallic nanoparticles on various supports were investigated. The Pt/Ni mole ratio of nanocatalysts ranged from 3/97 to 30/70. Supports such as alumina, ceric oxide, or Zirconium-doped ceric oxide were used. The performance of Pt/Ni bimetallic catalysts with different mole ratios and the effect of various supports were compared by the hydrogen yield and CO, CO_2 and olefin selectivities. **RESULTS AND CONCLUSION:** The addition of steam greatly increased the hydrogen yield and reduced the total olefin selectivity. The performance of catalysts could also be enhanced by using catalysts loaded on ceria-based supports or by increasing the mole ratio of Pt in nanoparticles.

27

ONE-STEP CONVERSION OF 2,3-BUTANEDIOL TO BUTENE OVER BIFUNCTIONAL CATALYSTS

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BACKGROUND AND PURPOSE: The objective of this research is to convert 2,3-butanediol (2,3-BDO) produced via fermentation of biomass to butene in a single step over a bifunctional (acid and metal) catalyst. This process involves a bifunctional pathway, in which 2,3-butanediol is dehydrated on an acid site to Methyl Ethyl Ketone (MEK), isobutylaldehyde, and even butadiene, which are subsequently hydrogenated to butene on the metal site at temperatures of 200-300 ^{o}C. The major challenge for this research is to balance dehydration and hydrogenation pathways in order to selectively produce butene. **METHOD:** The reaction was carried out in the gas phase in a continuous flow reaction system. To investigate the influence of catalyst composition on the reaction, zeolite-supported copper and nickel catalysts of varying metal loading were prepared by incipient wetness impregnation of commercial HZSM-5 (Zeolyst) with various Si/Al atomic ratios (23, 50, 80 and 280). **RESULTS AND CONCLUSION:** Preliminary results showed that butene could be produced selectively in the gas-phase on Cu/ZSM-5 and the optimal reaction temperature was 250 ^{o}C. The conversion ratio of 2,3-butanediol could reach approximately 100%, and the maximum selectivity to butene and 1,3-butadiene could be 17%, but the catalyst activity decreased gradually due to coking on the surface of catalyst. The results showed that the appropriate addition of water could prevent the occurrence of coking without lowering the selectivity of butene, thus extending the lifetime of the catalyst.

*****WITHDREW***** **28**

THE POSSIBILITY OF CONTRACTING OR CAUSING A FOODBORNE ILLNESS: THE IMPACT ON PERCEPTIONS AND BELIEFS OF HANDWASHING AMONG THE DIVERSE WORKFORCE REPRESENTED IN A COLLEGE DINING SERVICE FACILITY

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BACKGROUND AND PURPOSE: The Centers for Disease Control (CDC) estimates that each year 48 million Americans become ill, 128,000 are hospitalized, and 3,000 die of foodborne diseases. The United States Department of Agriculture defines a foodborne disease as an illness that occurs from eating a contaminated food. In 2011, the CDC reported that Norovirus caused the majority of all foodborne diseases and it can be eliminated with proper handwashing which is the number one way to prevent the spread of foodborne disease. The purpose of this study, through the use of the Health Belief Model (HBM), is to determine the possibility of contracting or causing a foodborne illness and personal predictors' impact on perceptions and beliefs about handwashing among campus dining service employees. Knowing if the HBM constructs of perceived susceptiblity, severity, barriers, benefits, and behavioral intentions about handwashing are different among foodservice employees are important to understand and more research is needed to explain these concepts. **METHOD:** A survey instrument will be developed from the review of literature, focus group data, and a pilot study within Kansas State University's dining services (with IRB approval). The final instrument will be distributed to all dining service employees using Axio and paper surveys. **RESULTS AND CONCLUSION:** Identifying the differences in employee beliefs and perceptions of handwashing in these results will assist dining service managers in training development to assure the understanding of the importance of handwashing. With this knowledge and development of training instruments, industry expenses and brand damage due to preventable foodborne illness outbreaks can be reduced.

29

A 21ST CENTURY CAMPUS AESTHETIC: PHOTOGRAPHY. MEMORY. PERFORMANCE.

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BACKGROUND AND PURPOSE: Advancements in technology and ecological concerns characterize the 21st century practice of architecture and landscape design. Unfortunately, many university campuses, with professional programs that teach and promote such advancements, do not reflect a vision of innovation. Rather, their exterior environments portray a 19th century gardenesque aesthetic -- a familiar "park-like" appearance that discounts ecological functions. At Kansas State University a commemorative open space, Coffman Commons, will be examined to challenge its current aesthetic performance by designing a community amenity that enriches aesthetic experience while visibly/spatially celebrating the ecological process of stormwater. **METHOD:** Methods of photo journaling and design will be conducted. Photo journaling will be used to collect aesthetic responses to Coffman Commons from students, faculty, and staff at K-State. Their photographic and textual responses will inform the re-design of the space. Re-design will incorporate a community amenity – increasing social and ecological performance of the Commons. **PREDICTED FINDINGS:** The photography process allows each participant to confer importance to aspects of the landscape that moved them. Through a process of coding and content analysis, I will discover commonalities in the landscape with which each person identifies. The participants' written descriptions will inform my understanding of expectations for Coffman Commons and my design process. **CONCLUSION:** The aesthetic responses will enrich the design – making it contextually specific and personable. The design will exhibit an amphitheater which invites social activity to Coffman Commons. Ecological performance will be made visible with green infrastructure. This project will make recommendations that would transform a gardenesque landscape into an ecologically-based "high-performance" landscape.

30

ALEXANDER GRETCHANINOFF – FORGOTTEN COMPOSER FROM RUSSIA'S ROMANTIC AGE

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BACKGROUND AND PURPOSE: Virtually no research has been conducted concerning the life and musical works of Russian Romantic composer, Alexander Gretchaninoff (1864-1956). Secondary source materials rarely mention him and only a few primary sources exist that provide analyses or descriptions of Gretchaninoff's compositions. Gretchaninoff was a prolific composer who explored the art of musical writing within an extensive number of genres and forms and showed an unusually strong interest in the creation of solo piano pieces for and about children. It is important that musicians in general and pianists in particular investigate his compositions and gain an understanding of their nature and potential usefulness as teaching pieces and as works worthy of public performance. The purpose of this research is to draw attention to the significance of Gretchaninoff's musical legacy and to encourage musicians to perform his pieces more frequently. **METHOD:** My research consisted of an examination of Gretchaninoff's autobiography, the study of numerous secondary accounts of his life and personal analysis of musical scores written by the master. **RESULTS/FINDINGS:** My investigation uncovered the almost hidden existence of a large number of attractive musical works which Gretchaninoff wrote for solo piano as well as insightful details concerning the circumstances and motives that inspired the master to compose within the parameters of this genre. **CONCLUSION:** The beauty and richness of Gretchaninoff's original compositions should be examined and exploited by serious students of the music from Russia's Romantic era who wish to obtain a comprehensive understanding of the range and depth of artistic expression that characterized this age.

31

ASSESSING THE USE OF FRESH FRUITS, VEGETABLES AND OTHER NATIVE FOODS ON INDIAN RESERVATIONS IN KANSAS

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BACKGROUND AND PURPOSE: Relocation from the native lands made drastic changes to the cultures and traditions of the Native Americans which ultimately changed their dietary habits and physical activity, which is the leading cause of the high prevalence of obesity and obesity related diseases among these populations. Therefore, the objective of this project is to increase the fresh vegetable availability and gardening activity for two Indian tribes in northeast Kansas, the Prairie Band Potawatomi Nation (PBPN) and the Kickapoo Tribe in Kansas (KTK). **METHOD:** Pre-season workshops were held on each reservation in Spring 2012, to provide gardening advice. To survey gardening behavior, a written questionnaire was given to all workshop participants to complete. Transplants of recommended hybrid tomato and pepper cultivars were distributed among the participants to support in-place gardening initiatives. Research and demonstration gardens were established at the Haskell Indian Nations University, PBPN, and Kansas State University. Vegetable trials in these locations, integrated with the ongoing state-wide Master Gardener trials evaluated the suitability of different open-pollinated and hybrid varieties of tomatoes, peppers and eggplants to Kansas soils and climate. The best performing varieties will be offered to the tribal members in the next growing season. A survey was distributed at the PBPN Harvest Feast in November 2012 to study the consumption of fruits, vegetables and other traditional foods, and health status, physical activity and the socio-economic status of the study group. **RESULTS AND CONCLUSION:** Results of the surveys and vegetable trials will be included in the presentation.

32

DO NOT WASTE MY TIME: KANSAS STATE UNIVERSITY STUDENTS' VIEW ON POLITICAL MESSAGING

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BACKGROUND AND PURPOSE: There is a growing trend of targeting college students in marketing efforts. In order to better understand what messages are most effective for Kansas State University students, the researchers focused on campaign efforts of the United States of America's 2012 presidential election. The study's purpose was to gain insight into what kind of campaign messages, from where, and how Kansas State University students prefer. **METHOD:** Using three different focus groups; the researchers gathered opinions on the 2012 presidential campaign messaging tactics. The three groups were separated by; males, females, and student government leaders. Qualitative research was appropriate in gaining belief, explanation, and ideas from the participatnts. **RESULTS/FINDINGS:** The focus groups conducted indicated that at Kansas State University, there is a positive correlation between social media activity, political knowledge, and voter behavior. Students want their information easily accessible, in simple terms, in aesthetically pleasing formats, and short. Any messages targeting college students at Kansas State University, the researchers found, need to not require much time to consume, in order to be effective. **CONCLUSION:** The research was apparent on how and in what forms college students prefer their political messaging, the study gives the opportunity to explore this topic deeper. Future research is recommended on; tactics getting college students to register to vote, election process education, and how to engage college students in a specific campaign. The findings from the study can benefit those in future presidential elections, in any marketing effort, or in initiatives intended to target college students at Kansas State University.

*******WITHDREW***** 33**

AN ECONOMIC ANALYSIS OF THE UTILIZATION OF CRP LAND FOR GROWING CELLULOSIC ETHANOL FEEDSTOCKS

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BACKGROUND AND PURPOSE: The objective of this study is to determine the feasibility of utilizing biomass grown on Conservation Reserve Program (CRP) land in Kansas to help meet the cellulosic ethanol mandates set by the 2007 renewable fuel standards. These mandates require that 16 billion gallons of cellulosic biofuel be produced annually by the year 2022. Various studies have identified CRP land as a potential resource for cultivating and harvesting biomass for cellulosic biofuel and according to the USDA and Farm Service Agency (FSA), in October 2012 there were about 2.3 million acres of land enrolled in CRP in Kansas. This constitutes close to 9% of total CRP acres in the U.S., making Kansas an important location to consider when determining where biomass for cellulosic ethanol production can be obtained. **METHOD:** Using data from Kansas State University (KSU) Research and Extension, GIS databases, USDA/NRCS, KFMA survey projects, and established agronomic and cellulosic ethanol industries, a study of the price elasticities of supply and demand for CRP grown feedstock will be conducted, along with a sensitivity analysis of various government support programs. **CONCLUSION:** By determining the flexibility or rigidity of the costs of growing, harvesting, transporting, and processing the biomass, as well as the potential for a market for perennial grasses, we will be better suited to assess the feasibility of utilizing CRP land for growing cellulosic ethanol feedstock.

34

VIDEO LECTURE OR FACE - TO - FACE: SOCIAL PRESENCE THEORY AT PLAY IN THE CLASSROOM

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BACKGROUND: Distance learning is a growing trend within the American higher education system. With a focus on keeping costs down while keeping student achievement at a consistently high level, a large percentage of colleges are turning to online and hybrid class options in order to offer students, on and off college campuses, the courses they need while utilizing the latest technology. **PURPOSE, GOALS, HYPOTHESES:** The purpose of this study is to evaluate the differences in instruction presented in video format vs. face-to-face instruction within 3 undergraduate college classrooms of approximately 40 – 50 undergraduate speech communication students. Social Presence Theory (Short, Williams, Christie, 1976) serves as the lens through which the analysis occurs. Instruments based on Gunawardena & Zittle's (1997) will be used to assess immediacy in regard to social presence. Student retention will also be assessed. **METHODS:** Data from both instruments were analyzed using single factor analysis of the variance. Cronbach's alpha was used to determine the reliability of the instruments. This study aims to fill a research gap that exists in the topic of distance education by isolating the video aspect of distance education to determine the effects of two-dimensional vs. three dimensional appearance of the instructor on student's perception social presence and student information recall. **RESULTS** After analysis it was determined that no significant difference in the social presence of the classrooms existed which in turn did not warrant the analysis of the student's recall ability.

35

A SURVEY OF THE CURRENT CONDITIONS IN HORTICULTURAL THERAPY IN THE UNITED STATES

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BACKGROUND AND PURPOSE: The profession of Horticultural Therapy (HT) in the United States is considered an emerging profession yet one can find historical reference to the use of gardening and farming in health care in the early days of our country. Limited research has been reported on the profession, including studies on the characteristics and HT professional aptitudes. The study purpose is to understand the current conditions of HT including demographic characteristics, employment, educational system, certification procedure and other practical problems, of HT practitioners in the U.S. The final goal of this research is to advance further growth of the HT profession. **METHOD**: American Horticultural Therapy Association members participated in an online survey which was available from October to December 2012. The survey included items from earlier studies on the profession and adapted questions from studies in other allied therapies. The questionnaire was pilot tested with local professionals. **RESULTS/FINDINGS**: and **CONCLUSION**: A 40% response rate was achieved. Data analysis will occur in January and February.

36

PHYSICAL ACTIVITY IN PRESCHOOL-AGED CHILDREN IN A CHILD CARE SETTING

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BACKGROUND AND PURPOSE: Current research suggests that young children in child care are predominantly sedentary (Brown et al., 2006, 2009). Further, research suggests a relationship between the frequency and intensity of physical activity (PA) early in life and later health risks in adolescence and adults (Institutes of Medicine, 2011). Consequently, for 7.4 million children under five years experiencing out-of-home care, high rates of sedentary activity is of serious concern. This study replicated research by Brown and colleagues' in a local early education program to assess reliability of this phenomenon examining overall activity level inside and outside comparing genders. **METHOD:** Participants included children (N=23; 12 males; *M* = 48 mos.; range 37-58 mos.), randomly selected from four classrooms providing full or part-day programming. Researchers videotaped children for 20 minutes in the morning inside and again outside. Level of PA was rated using the Child Activity Rating Scale (CARS: Puhls et al., 1990) on a five point scale from sedentary/no movement to vigorous intensity. **RESULTS:** Overall, 45% of all PA was categorized as stationary-with-easy-limb-movement. Results reveal no significant gender differences at each of the four PA levels (no vigorous PA observed) and that preschoolers engage more frequently in low and moderate intensity PA outside compared to sedentary and sedentary-with-limb-movement PA inside. **CONCLUSION:** Findings are consistent with Brown and colleagues suggesting adults in early education settings must intentionally plan moderate to vigorous movement experiences within the curriculum throughout the day. Further research is essential to examine the relationship between materials present and activity levels.

37

"IT IS SIX WOMEN, BUT IT IS THEIR LIVES, IT IS THEIR LIVES": BLACK WOMEN'S VOICES ABOUT THE EXPERIENCE OF SINGLEHOOD

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BACKGROUND AND PURPOSE: There has been a decline in marriage rates in the U.S., with Blacks showing the lowest numbers in relation to other racial groups. Unlike previous generations where marriage was associated with a sense of familism, today marriage is related to individual growth and creation of a fulfilling relationship. Based on Knudson-Martin's (1996) reframed concept of differentiation, the purpose of this study was to understand how single middle class Black women manage the tension between individuality and togetherness. **METHOD:** A phenomenological study was conducted to explore the lived experience of six single Black women living in Manhattan, KS. **RESULTS:** Findings support the concept of differentiation and previous studies pertaining to family and community values' influence on perspectives about gendered roles in marriage. Findings suggest that participants presented with an 'integrated self' whereby they show the ability to follow their individual life goals while remaining connected to their family/community. The inherited meaning of what it is to be a Black woman has impacted participants' self-identity, experience of singlehood and perspective about marriage. Participants' experience of singlehood seemed influenced by the geographical location, as participants consider that there are particularities about being in the U.S. Midwest. **CONCLUSION:** Gendered-power imbalance appears to be a main contributor to ambivalence about marriage although marriage remained valued and desired. Findings allow helping professionals to better understand viability of singlehood among Black women and prevent the imposition of our socialized worldview that values intact families, marriage, and gendered-power equity. Clinical and research implications will be discussed.

38

EFFECTS OF VIRGINIAMYCIN AND MEGASPHAERA ELSDENII ON CECAL FERMENTATION

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PURPOSE: Previous experiments measured effects on fermentation by addition of Virginiamycin (VG) to *in vitro* batch cultures of cecal microorganisms fed corn starch (CS) or oligofructan (OF). Research focus is on effects of VG and an equine-derived strain of *Megasphaera elsdenii* (ME), alone or in combination. **METHODS:** Aliquots (2.5g), OF and CS, were placed into 250-mL bottles equipped with head-space pressure monitors (Ankom Technologies; Macedon, NY). Cecal fluid was collected from 5 cannulated Quarter horses fed bromegrass *ad libitum* and 1 kg/horse of commercial concentrate, strained through cheesecloth, commingled, sparged with N_2, and placed into separatory funnels in a 39ºC incubator. The particulate-free layer was combined with McDougall's buffer (1:2 ratio), and 150-mL buffered fluid were placed into fermentation bottles in combination of VG and ME (1.5-mg, 1.56x108 CFU, respectively). Bottles were incubated at 39ºC, and cumulative gas production (GP) was monitored continuously. Culture pH was measured after 48 hours, 4mL of supernatant were removed for VFA analysis. Remaining contents were dried to determine *in vitro* dry matter disappearance (IVDMD). **RESULTS:** Effects of VG on GP, IVDMD, and pH were substrate dependant. VG improved fermentation of OF, but depressed fermentation of CS ($P<0.01$). The ME increased GP in cultures containing CS, but not OF (interaction, $P<0.01$). Total VFA, acetate, and propionate were greater for CS compared to OF ($P<0.01$), VG effects were substrate dependant (interaction, $P<0.01$), and addition of ME increased VFA production ($P<0.01$). **CONCLUSION:** Both VG and ME can alter fermentation, but effects are dissimilar and substrate dependant.

39

PORCINE ENDOGENOUS RETROVIRUS EXPRESSION IS ASSOCIATED WITH MACROPHAGE ACTIVATION STATUS

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BACKGROUND AND PURPOSE: Endogenous retroviruses (ERVs) are remnants of ancestral retroviral integration in the genome of germ-line cells with animal genomes containing 4-8% ERVs. Expression of ERVs has been associated with obesity, autoimmune disorders, cancer, infectious diseases and the safety of xenotransplantation. However, the genome-wide distribution of porcine ERVs (PERVs) and their expression in immune cells have not been well studied. Our objective was to study the regulated expression of PERVs in porcine macrophages at different activation statuses based on genome-wide prediction of PERVs. **METHOD:** Genome-wide distribution of ERV-like sequences was predicted using several bioinformatic programs against the current swine genome assembly, Sscrofa10.2. The expression of prominent PERVs in porcine macrophages was analyzed using transcriptomic shotgun sequencing (RNA-seq) and confirmed by real time RT-PCR assays. **RESULTS AND CONCLUSION:** Bioinformatic analyses revealed >500 ERV-like sequences occupying approximately 4.5% of the swine genome in comparison to 7-8% in human and mouse genomes. The majority of PERVs belong to the γ-group including previously identified PERV-A, -B and -C subtypes, which pose an infectious risk in xenotransplantation. Our RNA-seq data shows the expression of PERVs, particularly PERV-A and -C subtypes, is influenced by the activation status of porcine macrophages potentially through different mechanisms, including DNA methylation and differential expression of antiviral restriction factors. These data indicate that ERVs are differentially expressed and regulated in macrophages at different activation statuses and provide a framework for studying cellular mechanisms regulating ERV expression and immune homeostasis.

*These authors contributed equally to this work.

40

GENETIC ANALYSIS OF THE INTERACTION BETWEEN THE NUCLEAR EXPORT SEQUENCE OF A GATA TRANSCRIPTION FACTOR AND A NUCLEAR EXPORTIN

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BACKGROUND AND PURPOSE: Human GATA transcription factors regulate cell growth, embryonic cardiac development, and hematopoietic cell differentiation. Mutations in genes in the GATA family are involved in cancers and disease. In the model eukaryote *Aspergillus nidulans*, the GATA transcription factor AreA regulates genes required for nitrogen nutrient utilization. In times of nitrogen starvation AreA accumulates in the nucleus due to a block in nuclear export via the CrmA exportin. The AreA Nuclear Export Sequence (NES), which is conserved in mammalian GATA factors, is required for AreA nuclear export. We aim to determine the molecular mechanisms controlling AreA nuclear export. **METHOD:** We conducted a genetic screen for mutants affected in regulation of the AreA NES-CrmA interaction. Mutants were selected for loss of AreA NES function in a fusion protein in which the AreA NES was fused to the constitutively nuclear protein PrnA and Green Fluorescent Protein (GFP). We categorized mutants by genetic crosses in order to determine whether the mutations are linked to the *prnA-areA* NES-*gfp* fusion gene, or the *crmA* gene, or in another gene. Mutations tightly linked to *prnA-areA* NES-*gfp* are most likely in the AreA NES of the fusion construct. The NES region was PCR-amplified and sequenced from mutants of this class. **RESULTS:** Mutations were found within the *prnA-areA* NES-*gfp* fusion gene that truncate the encoded fusion protein. **CONCLUSION:** Residues required for nuclear export function were localized within the NES of AreA.

41

PHENOLOGY AND FITNESS IN BIG BLUESTEM (*Andropogon gerardii*) ECOTYPES IN GREAT PLAINS RECIPROCAL GARDENS: THE ROLE OF SITE AND ECOTYPE

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BACKGROUND AND PURPOSE: Big bluestem, a dominant C_4 grass of the Great Plains, grows across a sharp precipitation gradient. Our main questions: *1) Is there variation among ecotypes (genetically distinct varieties) and growing sites in seed production?* We predicted ecotypes should have greatest seed production in their home environment. 2) *Is there ecotypic variation in phenology and time to flowering?* We predict that the drought-adapted central KS ecotype will show advanced flowering in response to the shorter growing season and drought. **METHOD:** We investigate seed production and phenology among ecotypes using reciprocal gardens across the precipitation gradient. The three ecotypes (each comprised of four populations in central KS, eastern KS, and Illinois) were reciprocally planted in replicate blocks in Carbondale, IL, and Manhattan, Hays, and Colby KS. **RESULTS/FINDINGS:** Seed production shows strong ecotype and site effects. The Illinois ecotype had significantly lower seed production in the drier planting sites, due to inadequate time to reach flowering. First emergence varies by the location, but not by ecotype. Plants in the wetter sites emerged sooner than drier sites. Emergence by site was: Colby (day 91), Hays (84), Manhattan (83), Illinois (79). Our ecotype-specific flowering data is incomplete, but the central KS ecotype exhibited a significantly shorter days to flowering (17 and 20 days sooner in Manhattan and Illinois sites, respectively) compared to the Illinois ecotype. **CONCLUSION:** Our results provide clues about how adaptable big bluestem may be in drier climates as well as which sources to use in prairie restoration.

42

EMPOWERING LOCAL VILLAGERS FROM WEST BENGAL TO UNDERSTAND ARSENIC CONTAMINATION IN DRINKING WATER AND LOCATE ALTERNATIVE SOURCES

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BACKGROUND AND PURPOSE: Arsenic (As) contamination in drinking water poses a threat to more than 75 million people in the Bengal Delta. In an area of illiteracy, poverty and neglect, this mass contamination of drinking water makes up one of the worst environmental mass-poisoning in human history. In January 2012, water from tube wells, irrigation wells, ponds and shallow aquifer sediment samples were collected from four villages in Murshidabad, West Bengal, India. The aim of the study was to examine the relationship between sediment and water chemistry to understand the extent of As contamination in the groundwater in these four villages. Our objectives were to identify future drilling sites of low As, and educate local villagers about arsenic contamination. **METHOD:** Data was collected on household size, source of drinking water, number of tubewells, age and depth of tube well, proximity of tubewells to ponds and sewage outputs from households from on-site interviews as well as India census records. **RESULTS AND CONCLUSION:** Using onsite test kits, we identified areas of high As, warned owners in their villages of the As concentration and recommended alternative locations for safer drinking water. We trained drillers to detect As and test water quality parameters in order to identify As in newly-drilled wells. Along with scientific research in the area, we are empowering adults and children in the villages to become knowledgeable about arsenic contamination and the steps they can take to avoid the situation on their own.

43

AESTHETIC CONSIDERATIONS OF STRUCTURAL SYSTEMS FOR COVERED SOLAR POWERED CHARGE STATIONS LOCATED IN KANSAS

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BACKGROUND AND PURPOSE: The knowledge and benefits of solar energy have been known since 1838 when Edmund Becquerel observed and published his findings about the nature of materials turning light into energy. In 1830s, a variety of electric cars were invented, but were not a viable solution due to battery storage. Solar energy became a viable energy source in the 1970s during the OPEC oil embargo. More recently due to regulations approaching zero emission from cars and the advancement of new battery technology, electric cars are becoming a viable option. Covered solar powered charge stations are a viable option for parking. The purpose of this research is to investigate three structural materials – wood, reinforced concrete, and steel for the covered parking structure which support the solar panels and resists the environmental loads such as wind, and snow; the materials aesthetic impact; and cost of construction for each system. **METHOD:** A two-car, a four-car and a six-car canopy structures located in Manhattan, KS will be designed using the three materials; an aesthetic impact investigation will be performed by presenting the various solutions to ten different test groups; and a cost analysis of each structural system will be conducted. **RESULTS/FINDINGS:** The results will be used for the design basis for a solar charge station located on the Kansas State University campus. **CONCLUSION:** Future research in embodied energy and the life-cycle cost analysis of the structural systems based on durability to the enviromental conditions is needed.

44

EVALUATING COMPLEX FORMATION BETWEEN IRON, ARSENIC, AND DISSOLVED ORGANIC MATTER USING FLUORESCENCE SPECTROSCOPY

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BACKGROUND AND PURPOSE: In Bangledesh, drilling for groundwater is a method of obtaining drinking water for the population. Arsenic (As) and humic dissolved organic matter (humic DOM) are sorbed onto Iron (Fe(lll)) minerals and are released into the groundwater as a result of reductive dissolution by Fe-reducing bacteria. Arsenic is toxic trace element, and is very lethal for humans to drink in large quantity. The use of fluorescence will be used to see whether As is bridging to complexes from between Fe(lll) and humic DOM. **METHOD:** In this study, Aldrich Humic Acid(AHA) solution was made that was dilute enough to be analyzed by the fluorescence machine; Fe(lll) was added sequentially in order to see the change in three dimensional fluorescence spectrum of the solution. **RESULTS/FINDINGS:** My tests have shown that the addition of Fe(III) to the humic DOM solution quenches the fluorescence of AHA.**CONCLUSION:** These results provide evidence for complexation between iron and humic DOM. In the future, I will test the influence of sequential addition of As to AHA and Fe on the AHA fluorescence spectrum. The experiment will also be performed using different types of humic DOM and different Fe and As species.

45

MAKING MOUNTAINS OF MOLEHILLS: OPPORTUNITIES FOR JUSTIFICATION IN AN EMERGENCY INTERRACIAL HELPING SITUATION

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BACKGROUND AND PURPOSE: The study of helping situations has been a prominent theme in the examination of prejudice (Crosby, et al, 1980; Kuntsman & Plant, 2008; Saucier, Miller, & Doucet, 2005). Research has revealed that discrimination occurs in intergroup helping situations, especially when it can be justified. **METHOD:** Inspired by the justification-suppression model of prejudice and the arousal cost reward model of helping, emergency helping situations were created where White participants (*N*=78; prescreened as high or low in racism) competed against confederates (White or Black) to solve puzzles. The confederate appeared to pass out and in some conditions a divider separated the participant and confederate. The reactions observed by the confederate were if help was provided, how help was provided, and the overall reaction time of the participant when providing help. **RESULTS/FINDINGS:** Results unexpectedly revealed participants were more likely to help the Black confederate. However, they were slower to help the Black confederate when they helped. With Black confederates, participants high (versus low) in racism solved fewer puzzles, suggesting greater interracial anxiety. Interestingly, participants helped less and solved more puzzles against Black confederates when the divider was present, indicating the divider may have provided a justification for not helping and a buffer for interracial anxiety. **CONCLUSION:** This study further explains the processes that may produce discrimination in intergroup helping situations. Furthermore, this study has extended the prejudice research that has used helping paradigms to study less overt forms of racism by exploring the decision-making processes involved in providing help to the ingroup, relative to the outgroup.

46

GRADUATE RECRUITMENT IN SPECIALIZED AGRICULTURAL PROGRAMS

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BACKGROUND AND PURPOSE: Recent graduate enrollments in specialized fields of agriculture, in particular floriculture, are extremely low. **METHODS:** To discover trends in low enrollment and developed better recruitment strategies, six students from two separate state collages were interviewed with the same set of questions. Interview transcripts were then analyzed and themes of student's answers were grouped together to better see trends. **RESULTS/FINDINGS:** Positive trends included undergrad classes inspiring recruitment, and the value of personal interactions with faculty. Negative trends included the need for consolidated information online, recruitment that is focused on one part of the country, and the student's view of floriculture as a non-agricultural field. **CONCLUSION:** after evaluating the results of the research, Universities may be able to better reach their targeted audience by applying these findings.

The following graduate student posters were presented at the 9th annual Capitol Graduate Research Summit (CGRS) in Topeka on February 16, 2012. The CGRS is a showcase of scholarly research with implications for state-related issues conducted by graduate students at Kansas State University, University of Kansas, University of Kansas Medical Center, and Wichita State University. Participating students present their research to state legislators, the Kansas Board of Regents, and the public. The top two presenters from each institution were awarded $500 scholarships from Kansas Bioscience.

47

UTILIZATION OF HIGH LIGNIN RESIDUE ASH (HLRA) IN CONCRETE MATERIALS

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Cement, an essential ingredient of concrete, is the most expensive and energy-intensive product in most concrete. Considering the threat of climate change and global warming, efforts have been put forward to reduce the amount of CO_2 emission from the cement industry by considering alternative methods for producing more environmental friendly cement and concrete. One such way is using supplementary cementitious materials (SCMs) as a partial replacement of cement in concrete. It has been shown that agricultural residues can be potential resources for CSMs production. It is well established that dilute acid pretreatment techniques enhance the reactivity of agricultural residues ash (ARA) in concrete materials. However, the impact of dilute acid pretreatment followed by enzymatic hydrolysis of agricultural residue on the pozzolanic property of the ARA has not been addressed yet. In this study, pozzolanic reactivity of ash produced by burning high lignin residue (HLR) is documented. HLR, a byproduct of bioethanol production from corn stover, is actually dilute acid pretreated and enzymatic hydrolyzed corn stover. Based on heat of hydration, calcium hydroxide consumption, and compressive strength experiments, it was concluded that the ash produced by burning HLR is a very reactive pozzolanic material that can be used as a partial replacement of cement in concrete materials. Thus, HLR which are byproducts of biochemical conversion of AR can be utilized as valuable materials for CSMs production for concrete.

Relevance of Research to State-Related Topic(s)

Climate change and global warming caused by greenhouse gas, particularly carbon dioxide, emission is a major concern worldwide. Cement, an essential ingredient of concrete, is responsible for 8% global carbon dioxide emission. Therefore, my research aims to reduce the cement percentage in concrete materials and thus to lower the energy intensity and carbon footprint of concrete materials. My research investigates the utilization of agricultural residue ash (ARA) as a low cost and environmentally-friendly highly reactive supplementary cementitious material (SCM) that can be used as a partial replacement of cement in concrete. This will reduce carbon footprint as well as increase the durability of concrete materials, the most used material after water.

48

MEASURING GULLY EROSION IN TWO DISTURBED KANSAS LANDSCAPES

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Gully erosion creates human safety hazards, soil loss, and sediment and nutrient pollution. Gullies often form as a result of land use changes and interrelated factors such as soil compaction, vegetation removal and reduced rainwater infiltration. Kansas has deep, erodible soils, sporadic intense rainfall events, and heavy agricultural land management that usually increase the chance for gully erosion. This presentation describes a study of gully process in two types of heavily-used landscapes in Kansas – military training areas and agricultural fields. In both settings, heavy machinery alters the land surface, often leaving it exposed and unprotected from rainfall. My research goal is to understand gully erosion in order to predict where gullies form and how they grow. My first project objective is to measure gully growth with surveying equipment. My second objective is to identify and evaluate environmental factors that might explain gully growth, such as soil characteristics, antecedent moisture conditions, vegetative cover, slope, and drainage area. With direct field measurements and environmental characteristic data, I will attempt to correlate rates of gully growth to driving environmental forces. I expect the data will show that intense rain events, steep slopes, large drainage areas and shrink-swell clay soils contribute to erosion, while higher vegetation densities slow erosion. Finally, I will design innovative, sustainable gully mitigation measures for military training lands and agricultural fields of the Midwest. My preliminary measurements show that gully erosion is complex and inconsistent, which is why a greater understanding of gully process in Kansas is needed.

Relevance of Research to State-Related Topic(s)

Gullies are a world-wide problem, and driving factors in gully erosion vary greatly from region to region. Gullies create safety hazards, agricultural production losses, and sedimentation and pollution costs downstream. In Kansas, land directly controls the economic and ecological value of the state. In particular, Kansas agricultural production lands and military training lands are critical resources for the state and the country. Currently, there is a less-than-complete understanding of gully processes in Kansas, especially on Fort Riley, which is experiencing increasing soil and training space losses due to gullies. Knowing where gullies tend to form in the landscape, their rate of growth, and regional gully process in general will assist in the development of effective land-protection strategies. In turn, more effective land management would decrease sediment and nutrient problems downstream, including the sedimentation of Kansas reservoirs.

49

BOVINE VIRAL DIARRHEA VIRUS TRANSMISSION FROM PERSISTENTLY INFECTED CATTLE TO NON-PERSISTENTLY INFECTED CATTLE WHEN COMMINGLED: AN EVALUATION OF SERUM NEUTRALIZING ANTIBODY TITERS

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Worldwide, bovine viral diarrhea virus (BVDV) infects cattle of all ages causing huge economic loss due to ensuing morbidity and mortality. The objective of our study is to detect the presence of BVDV in cattle, following direct exposure to persistently infected (PI) cattle. Through funding from Kansas State Veterinary Diagnostic Laboratory, 53 cattle were introduced to 10 PI cattle and commingled for 27 days, becoming infected as early as 4 days post infection and maintaining infection for as long as 25 days. Serum and buffy coat samples were collected throughout the study and analyzed for the presence of BVDV nucleic acids via PCR. As demonstrated by positive buffy coat PCR, 50 of the 53 commingled cattle became transiently infected. Positive samples were submitted for genotype determination by 5' UTR sequencing. Serum neutralization assays (SN) were performed on serum collected prior to the commingling (Day -1) and on Days 8, 13, 20 and 27 to monitor seroconversion following infection. Analysis of SN and PCR data indicates that 100% of animals with no antibody titer on Day -1 became infected and seroconverted with high titer to at least one PI BVDV strain. Further analysis shows that animals with pre-existing SN antibody titers exhibited lower virus load and shorter viremia than their naïve counterparts. Among seropositive animals, those with the highest pre-existing SN titer exhibited lower virus load, shorter viremia, and were refractile to infection. Extrapolation of these field observations indicates the importance of proper immunization prior entry into the feedlot.

Relevance of Research to State-Related Topic(s)

As a leading agriculture state in the animal health corridor, animal health has continued to be an important topic in the State of Kansas. As the third largest producer of beef in the United States, beef cattle production is one of the driving factors in Kansas agriculture. Worldwide, bovine viral diarrhea virus (BVDV) infects cattle of all ages and is known to be a factor in development of Bovine Respiratory Disease Complex (BRDC). Ensuing morbidity and mortality from BVDV, BRDC and reproductive losses result in huge economic losses in cow-calf, stocker and feedlot operations. The ability to protect cattle through proper vaccination has long been known. Our study further illustrates that neutralizing antibody production, like that seen with vaccination, is indicated to decrease morbidity and mortality produced by BVDV.

50

PHYSICAL AND PROCESSING DIFFERENCES BETWEEN BAKED AND EXTRUDED PET FOODS

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In 2011, U.S. pet food industry sold $19.85 billion of pet food. There is a predicted growth of sales in the pet food market. There are two major types of dry pet food processing baking and extrusion. This study focuses on the physical differences of a pet food produced by extrusion and baking processes. Three iso-nutritional diets were formulated for 0, 10, and 20% fresh meat (FM) inclusions. Each diet was extruded at 353 and 453 RPMs using a single screw extruder while a 30 foot experimental oven at 425 $^{\circ}$F was used for baking. Proximate analysis confirmed kibbles were iso-nutritional post-processing. Products were measured for expansion ratio (ER), piece density (PD), peak crushing force (PF), starch gelatinization, and amylose-lipid complex (AL). As FM inclusion increased (0 – 20%), ER decreased (4.1-3.5) for the 353 RPM and fluctuated for 453 RPM (2.7 – 3.7), while expansion for baked kibbles was not evident (0.96). With the absence of mechanical shear, PD was 56% higher in the baked product than the extruded product indicating higher compaction and lower ER. Texture analysis for baked kibbles displayed smooth texture curve-PF (3.4-2.7 kg) and extruded kibbles-PF (2.9-1.5 kg) displaying a serrated curve. Differential Scanning Calorimeter thermograms exhibited complete gelatinization for extruded kibbles while baked kibbles had lower gelatinization levels (32 - 45%). Extrusion processing's high gelatinization was attributed to the combination of thermal and mechanical energy leading to expansion and cell structures. The baking process showed reduced levels of gelatinization without any AL complexes.

Relevance of Research to State-Related Topic(s)

Kansas is the epicenter of pet food processing for a majority of the United States. In the state of Kansas, there are approximately 1.25 million cats and dogs. Pets provide campanionship, amusement for their owners, and can be effective work partners in the livestock industry. According to the CDC, pets promote positive health attributes in their owners such as lowering blood pressure and lowering triglyceride levels. The primary goals of pet foods are to provide a nutritionally adequate diet for the consumer's pet, to promote longevity, and prevent pet disease. Baking and extrusion are two major types of dry pet food processing; 60% of all dry pet foods are extruded. Each type of processing adds certain textural attributes to pet foods and these textural attributes can contribute to pet's pet food preferences. This study is to determine the textural differences between baked and extruded pet foods.

51

NOVEL DELIVERY MECHANISM FOR NUTRITION USING SORGHUM BASED EXTRUDED PRE-COOKED "BEANS"

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This study was conducted to demonstrate an effective and novel nutrient delivery mechanism for humans by utilizing an alternate food crop, like sorghum. A novel pre-cooked bean-like product was manufactured using extrusion to overcome disadvantages associated with consumption of dry beans like hard to cook, flatulence, etc. The new product formulation consisted of a blend of sorghum, wheat and soy flours at different levels to achieve ideal functional and nutritional characteristics and was compared to navy beans. A low intensity extrusion with specific mechanical energy (SME) input between 27.4-36.5kJ/kg, led to partial gelatinization ranging from 54.1-93.6%. Pasting curves generated using Rapid Visco Analyzer showed absence of cold swelling, indicating minimal starch damage during extrusion. Instrumental texture analysis was used to standardize final product preparation to 2 hours of soaking followed by 30 minutes of cooking in boiling water, resulting in an absence of uncooked core and hardness (2814.2 ± 341.6 g force) comparable to that of cooked natural navy bean (2840.07 ± 302.8 g force). Product hardness was reduced through longer cooking times and with the inclusion of higher soy flour levels. Natural navy beans had significantly ($P<0.05$) different textural values (adhesiveness, cohesiveness, etc.) than the extruded product. All final product formulations had a water activity (a_w) below 0.61 which would lead to longer shelf life though these values were significantly ($P<0.05$) different from that of natural navy beans, which had a_w of 0.39.

Relevance of Research to State-Related Topic(s)

Kansas is the leading producer of grain sorghum in U.S. with a production of 110 million bushels (51% of total production) in 2011 valued at $671 million. Sorghum is earmarked for feed and fuel production and the results of this study would add to the utility and versatility of the grain by value addition in food applications. The product would provide wholesome nutrition to consumers leading to higher demand for grain sorghum. This would translate directly to better and higher economic returns to sorghum crop growers in addition to contributing to food security. The manufacturing technology has been developed using extruder manufactured locally in Kansas and technology transfer of this product could lead to sales of the equipment which again is an added income to the company as well as the state.

52

ASSESSING THE ADOLESCENT EXPERIENCE OF MINDFULNESS

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Mindfulness, a way of paying attention to the present moment with kindness and curiosity, is an ancient practice that is currently experiencing an upsurge of support. Medical experts, therapists, educators and corporate executives are touting the benefits of mindfulness interventions. Published research has shown mindfulness activities correlate with gains in emotional regulation, worksite stress, math anxiety, eating disorders, generalized anxiety disorder and a host of other illnesses and disorders. Only a few minutes of daily mindfulness practice help students to better focus and pay attention. This investigation explored an understudied aspect of mindfulness: the experience of ninth graders in a public school classroom in Kansas who practice a brief, daily mindfulness activity. The study utilized both qualitative and quantitative research methods. Transcribed interviews were analyzed using thematic analysis and the effect of classroom mindfulness was explored using the Child and Adolescent Mindfulness Measure (CAMM) with a control and experimental group. Results indicated that adolescents soon overcome their initial awkwardness with mindfulness and found the experience consistently positive and appreciated the improved classroom environment. The experimental group scored significantly higher in perceived mindfulness on the CAMM instrument at post-test, while the control group scored significantly higher.

Relevance of Research to State-Related Topic(s)

The practice of mindfulness has multiple benefits in education, health care and the workplace. Even novice practitioners of mindfulness have demonstrated shifts in the processing of negative emotions under stress. Mindfulness does not depend or compete with any religion, cultureal context or belief system. Our study provides critical information that mindfulness activities in the classroom can have a positive effect on classroom environment, stress relief and students' lives outside the classroom. Results of this study can help Kansas counselors, therapists, and educators develop mindfulness strategies that will assist adolescents in developing emotional regulation, manage anxiety, improve classroom behavior, and foster health and wellness.

53

COMPARISON OF GAMITHROMYCIN, TILMICOSIN AND TULATHROMYCIN: METAPHYLACTIC TREATMENTS IN HIGH RISK CALVES FOR BRD

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The objective of this experiment was to compare the effects of three metaphylaxis antibiotics on health and performance of high risk feedlot cattle. Heifers (n = 579, 403.7 ± 27.4 lbs) from Southwest Texas were identified as being at high risk for BRD and shipped to the Clayton Livestock Research Center in Clayton, NM. Cattle were randomly allocated within truck load lots into treatment pens (30 pens; 3 treatments; 10 reps) which contained 18 to 20 animals per pen. Pens within arrival replicate were randomly assigned to receive one of three metaphylactic antimicrobial treatments based on the randomly assigned treatment for their pen within each replicate: 1) Gamithromycin (6.0 mg/kg; GAM), 2) Tilmicosin (13.3 mg/kg; TIL), and 3) Tulathromycin (2.5 mg/kg; TUL). Treatments were administered during initial post-arrival processing. Cattle were fed for 56 to 60 days. Daily gain (ADG), dry matter intake, morbidity, and mortality were recorded. Cattle administered TUL had 0.29 lb higher ADG than cattle administered GAM ($P < 0.01$) and had 0.18 lb ($P = 0.09$) higher ADG than cattle that received TIL. TUL treated cattle had ($P = 0.12$) improved feed efficiency compared to GAM treated cattle. Cattle that received TUL (5.2%) had lower morbidity rates ($P < .02$) than TIL (14.6%) and GAM (12.79%) treated cattle. There were no treatment differences in dry matter intake or mortality. The results of this study indicate that tulathromycin was most effective at mitigating the effects of BRD in feedlot heifers.

Relevance of Research to State-Related Topic(s)

Bovine Respiratory Disease (BRD) continues to be one of the largest animal health concerns in the cattle industry. BRD is caused by a multifaceted group of pathogens, both viral and bacterial, that take advantage of an immune-compromised calf to cause disease. An estimated one billion dollars is lost nationally to BRD each year. Kansas is one of the largest beef producing states in the nation; therefore, animal health is of great importance to our state's economy. This study took aim at comparing three macrolide antibiotics to determine their effectiveness at mitigating the effects of BRD.

54

ABRUPT RAINFALL CHANGE DETECTION IN KANSAS

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Precipitation has direct impacts on agricultural production, water resource management, and recreational activities. Thus understanding rainfall trends is important, especially for states like Kansas that experience a highly variable climate. The annual rainfall trends were analyzed using precipitation data from 1890 through 2011 from 24 long-term stations in Kansas. The overall analysis showed that on average western Kansas received 500 mm annual rainfall with a gradual increase of up to 1000 mm along the eastern border. In addition, a gradual increase was found in the state average total annual rainfall with a greater increase for recent years (1956 through 2011) and in the eastern part of the state. A change-point analysis was conducted to determine if the trend in increasing annual rainfall had an abrupt change. The Pettitt and CUSUM methods were used to detect the change points for all 24 stations. The Pettitt method detected a significant change-point in 12 stations and CUSUM detected a significant change -point in 9 stations. These stations were spread across the state with no special tendency. In addition, the change-points vary across the state, with the earliest one happened in 1939 for Lakin in southwest and the latest one happened in 1981 for Winfield in south, which emphasizes the rainfall variability across the state. The most significant change-point occurred in 1981 for Winfield. The majority of change-points were a start of an increase in the trend except for St. Francis, which had an increasing trend from 1908 to 1950 and a decreasing trend from 1951 to 2011.

Relevance of Research to State-Related Topic(s)

Precipitation has direct impacts on agricultural production, water resource management, recreational purpose, etc., hence investigating the rainfall trend is vital especially for Kansas state where experiences a very variable climate. In addition, withdrawing groundwater more than discharge amount, particularly in western Kansas, emphasizes the indisputable usage of the rainfall analysis results. The large annual ranifall variablity from west to east of the state needs to be analyzed regionally. Rainfall trend analysis helps us to understand how the rainfall pattern is shifiting across the state. Based on the shift, there might be a need for new design criteria for water management systems, both in runoff control and storage structures.

55

IMPLEMENTATION OF INDUSTRY-ORIENTED ANIMAL WELFARE AND QUALITY ASSURANCE ASSESSMENT TOOLS IN COMMERCIAL CATTLE FEEDING OPERATIONS

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Consumer interest in production agriculture continues to prompt the beef industry to respond by developing tools to increase the accountability and transparency of management techniques within the industry. The purpose of this project was to demonstrate the ease of implementing an industry-oriented assessment, while recording useful data to show current practices within the cattle feeding industry. An assessment tool, developed by veterinarians, animal scientists and production specialists, was used to objectively evaluate key areas of beef cattle production such as animal handling, antibiotic residue avoidance, cattle comfort, food safety and others in commercial feedyards (n=56) that provide feed and care for 1,985,500 of the cattle on feed (one-time capacity) in the state of Kansas. Kansas State University personnel worked with cooperating feedyard personnel to complete the assessments. Nineteen of the 56 feedyards maintained current documentation of all management practices required by the assessment. During cattle handling observations, 78.5% of the feedyards performed at a level above passing according to the standards in the assessment. As an example, cattle handlers had to use an electric prod on only 3.98% of all cattle processed during observations. With respect to cattle comfort in the pen and feed bunks, 98% were considered acceptable; however, 25% of feedyards failed the water tank inspection. Implementation of this assessment will prove to be advantageous for management of employees while increasing consumer confidence in how cattle are handled and housed in cattle feeding operations using Kansas as a model for the rest of the beef industry.

Relevance of Research to State-Related Topic(s)

The state of Kansas' economy largely depends on production agriculture and the largest player in that portion of our economy is the cattle feeding industry. Kansas has a one-time total cattle feeding capacity of 2,370,000 cattle. This represents 16.8% of the total US inventory. Feedyards participating in this study account for 83.8% of the total cattle feeding capacity in Kansas. The results recorded are two-fold. First and foremost, it allows for documentation of normal practices of care which exceed an objective standard, while highlighting practices which may warrant improvement within operations that care for and feed cattle in the state. A study has never been conducted that demonstrates such a comprehensive assessment of animal welfare and food safety standards in the industry.

Author Index

(Presenting Authors Only)