

**K-State Graduate  
Research, Arts, and Discovery (GRAD)  
Forum**

Program Booklet

Thursday, March 30, 2017  
K-State Student Union

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Graduate Student Council  
Graduate School  
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# **PROGRAM SCHEDULE**

## **Morning Oral Presentations**

9:15am - 10:45am	Biological Sciences 1	<i>Cottonwood Room</i>
9:45am - 11:30am	Engineering/Math/Physical Sciences	<i>Big 12 Room</i>
10:00am - 11:30am	Interdisciplinary Research	<i>Flinthills Room</i>

## **Afternoon Oral Presentations**

12:45pm - 3:40pm	Social Sciences/Humanities/Education	<i>Flinthills Room</i>
1:15pm - 3:40pm	Biological Sciences 2	<i>Cottonwood Room</i>
2:30pm - 3:15pm	Agricultural Sciences	<i>Big 12 Room</i>

## **Poster Sessions**

9:30am - 4:30pm	Posters on display	<i>Union Courtyard</i>
10:00am– Noon	Poster judging Agricultural Sciences Social Sciences/Humanities/Education	
1:30pm - 3:30pm	Poster judging Engineering/Math/Physical Sciences Biological Sciences	

## **Awards Ceremony**

4:30pm	<i>Big 12 Room</i>
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\*The awards ceremony will include a special talk from Sarah Hancock, Communications Coordinator for the Vice President for Research Office.

## Oral Session Schedules

### **Biological Sciences 1**

Cottonwood Room

9:15AM – 10:45AM

- 9:15 **IMPACTS OF A ZOYSIAGRASS AND TALL FESCUE SEED MIXTURE ON BROWN PATCH DISEASE SEVERITY**  
*Mingying Xiang*
- 9:30 **ASSESSMENT OF HISTORICAL AND PROJECTED DROUGHT VARIABILITY IN THE GREAT PLAINS**  
*Zachary Zambreski*
- 9:45 **GENETIC AND PHENOTYPIC VARIATION OF THE DOMINANT PRAIRIE GRASS *ANDROPOGON GERARDII* AND ITS ASSOCIATION WITH CLIMATE ACROSS CENTRAL GRASSLANDS**  
*Jacob Alsdurf*
- 10:00 **RAPID EVOLUTION IN A DISTURBED ENVIRONMENT: EVOLUTIONARY RESPONSE OF NATIVE GRASS *ANDROPOGON VIRGINICUS* TO HEAVY METALS IN AN ABANDONED MINE SITE**  
*Samantha Sharpe*
- 10:15 **MORPHOLOGICAL AND ANATOMICAL ADAPTABILITY OF SORGHUM ROOTS EXPOSED TO WATER-DEFICIT STRESS DURING THE VEGETATIVE STAGE**  
*Regina Enninful*
- 10:30 **HESSIAN FLY, *MAYETIOLA DESTRUCTOR* (DIPTERA: CECIDOMYIIDAE), ATTRACTION TO LEDS UNDER FIELD CONDITIONS**  
*Ryan B. Schmid*

**Engineering, Math, and Physical Sciences**

Big 12 Room

9:45AM – 11:30AM

- 9:45      **EVALUATION OF MSNDS FOR FAST-NEUTRON DETECTION AND THE TREAT HODOSCOPE**  
*Priyarshini Ghosh*      **\*\*WITHDREW\*\***
- 10:00      **MAXIMIZING DC-BUS UTILIZATION IN THREE-PHASE DC-AC CONVERTERS**  
*Jacob Lamb*
- 10:15      **DESIGN OF THREE-PHASE GRID-CONNECTED VOLTAGE SOURCE INVERTERS IN WEAK GRIDS**  
*Aswad Adib*
- 10:30      **A NEW TECHNOLOGY TO IMPROVE THE SOLUBILITY AND STABILITY OF A COMMON FERTILIZER**  
*Bhupinder Sandhu*
- 10:45      **A NEW TECHNOLOGY FOR STABILIZING EXPLOSIVES AND ENERGETIC MATERIALS**  
*Janaka C. Gamekkanda Gamaethige*
- 11:00      **POLAR SOLVENTS-SOLUBLE EMISIVE INDIUM PHOSPHIDE NANOCRYSTALS BY IN-SITU LIGAND EXCHANGE SYNTHESIS**  
*Raghavender Siramdas*
- 11:15      **DOMAIN ADAPTATION FOR CLASSIFYING DISASTER-RELATED TWITTER DATA**  
*Oleksandra Sopova*

## **Interdisciplinary Research**

Flinthills Room

10:00AM – 11:30AM

10:00 **ONLINE CONSUMER REVIEWS BY QUALITY LEVEL: WHAT ATTRIBUTES BY HOTEL CLASS AFFECT CONSUMER EVALUATION?**

*Tian Liu*

10:15 **RE-ENGINEERED RED BLOOD CELLS AS COMPUTED TOMOGRAPHIC IMAGING AGENTS**

*Tuyen Duong Thanh Nguyen*

10:30 **COMPARISON OF AERIAL AND GROUND REMOTE SENSING TO QUANTIFY SUDDEN DEATH SYNDROME IN SOYBEAN**

*Nicholle Hatton*

10:45 **REAL TIME GAUGE WHEEL LOAD VARIABILITY ON PLANTER WITH DOWNFORCE CONTROL DURING FIELD OPERATION**

*Sylvester Badua*

11:00 **BIOFUELS PRODUCTION AND CLIMATE CHANGE: THE CASE OF SUGARCANE IN BRAZIL**

*Gabriel Granco*

11:15 **CORRELATED RISKS IN GLOBAL MAIZE MARKETS: HISTORICAL EVIDENCE AND FUTURE PROJECTIONS**

*Bowen Chen*

Social Sciences, Humanities, and Education  
Flinthills Room  
12:45PM-3:40PM

12:45 **CAPITALISM IN THE ART REALM**

*Rebecca Spruill*

1:00 **“THEY DON’T COME FOR A SOCIAL JUSTICE NARRATIVE, BUT IT IS SO IMPORTANT”: DRAG QUEENS OF CENTRAL KANSAS AS CIVIC LEADERS AND SOCIAL JUSTICE ADVOCATES**

*Jakki Forester*

1:15 **A BURKEAN AND FEMINIST CRITIQUE: WHY WE LOVE AND LOVE TO HATE FIRST LADIES AND WHAT THAT MEANS FOR FEMALE POLITICAL LEADERS**

*Emily M. Roth*

1:30 **OIL AND NATURAL GAS INDUSTRY IN KANSAS-POPULATION CHANGE AND IMPLICATIONS FOR SOCIAL FABRICS OF COMMUNITIES**

*Avantika Ramekar*

1:45 **WHAT IS AN IMPORTANT FACTOR FOR DEPRESSION**

*Kristen Huang*

**BREAK**

2:10 **PUBLICATION BIAS: EVIDENCE FROM THE MEN’S MARRIAGE PREMIUM**

*M.G. Nuwan Indika*

2:25 **HOW DO STUDENTS “LOOK AHEAD” WHEN SOLVING PROBLEMS IN ELECTROMAGNETIC FIELDS?**

*Bahar Modir*

2:40 **WHAT PHYSICISTS MEAN BY THE EQUALS SIGN IN UNDERGRADUATE EDUCATION**

*Dina Zohrabi Alae*

2:55 **USING CONCEPTUAL BLENDING TO INVESTIGATE STUDENT’S PROBLEM SOLVING PROCESS**

*Tra Huynh*

3:10 **STUDENTS’ PROBLEM SOLVING: TRANSLATION BETWEEN MULTIPLE REPRESENTATIONS**

*Nandana Weliveriya*

3:25 **BRIDGES FOR KANSAS FAMILIES: THE ROLE OF SOCIAL CONNECTION AND HARDINESS IN FAMILIES LIVING IN POVERTY**

*Adam Cless*

## **Biological Sciences 2**

Cottonwood Room

1:15PM – 3:40PM

**1:15 THE 5'-POLY(A) LEADER OF POXVIRUS mRNA CONFERS A TRANSLATIONAL ADVANTAGE THAT CAN BE ACHIEVED IN A CAP-INDEPENDENT MANNER**

*Pragyesh Dhungel*

**1:30 ROLE OF ASPARAGINE IN VACCINIA VIRUS DEPENDENCE OF GLUTAMINE FOR OPTIMAL VIRAL REPLICATION**

*Anil Pant*

**1:45 POST-MEAL TRIGLYCERIDE RESPONSES IN YOUNGER VERSUS OLDER ACTIVE ADULTS**

*Sam R. Emerson*

**2:00 ENGINEERING BIOMIMETIC LIPOSOME INSPIRED BY RED BLOOD CELLS**

*Colin Ferrel*

**2:15 INHIBITION OF MYELOPEROXIDASE BY STAPHYLOCOCCAL SPIN PROTEINS**

*Nicoleta T. Ploscariu*

### **BREAK**

**2:40 ASSOCIATIONS BETWEEN THE MICROBIOME AND WEIGHT GAIN IN PIGS AFTER VACCINATION WITH A PORCINE REPRODUCTIVE AND RESPIRATORY SYNDROME (PRRS) MODIFIED LIVE VIRUS (MLV) VACCINE FOLLOWED BY CHALLENGE WITH PRRSV AND PORCINE CIRCOVIRUS TYPE 2 (PCV2)**

*Laura A. Constance*

**2:55 WHOLE GENOME SEQUENCING-BASED IDENTIFICATION AND COMPARATIVE ANALYSIS OF MAJOR AND PUTATIVE VIRULENCE GENES OF ESCHERICHIA COLI O103 OF BOVINE FECAL ORIGIN**

*Lance W. Noll*

**3:10 BEETROOT JUICE SUPPLEMENTATION IMPROVES MUSCLE O<sub>2</sub> DELIVERY AND UTILIZATION MATCHING IN HEART FAILURE RATS**

*Jesse Craig*

**3:25 METABOLIC PHYSIOLOGY AND ITS SIGNIFICANCE FOR ADAPTATION TO EXTREME ENVIRONMENTS**

*Nick Barts*



**Agricultural Sciences**

Big 12 Room

2:30PM – 3:30PM

2:30 **EFFECTS OF MARBLING TEXTURE ON TRAINED PANEL RATINGS OF BEEF STRIP LOIN STEAKS**

*Kelly R. Vierck*

2:45 **EFFECTS OF FEEDING ANTIOXIDANTS TO STEERS FED MICROALGAE (AURANTIOCHYTRIUM LIMACINUM CCAP 4087/2) ON COLOR STABILITY AND PALATABILITY OF STRIP LOIN STEAKS**

*Kelsey J. Phelps*

3:00 **MILLET AND TEFF BASED GLUTEN FREE PASTA FORMULATED WITH CORN STARCH AND GLYCEROL MONO-STEARATE AS TEXTURE ENHANCERS**

*Rajesh Kumar*

## Poster Titles and Presenters

### **Agricultural Sciences**

Union Courtyard

On display: 9:30AM – 4:30PM

Judging: 10:00AM – 12:00PM

**1. NITROUS OXIDE EMISSIONS IN A TURFGRASS ENVIRONMENT**

*Ross Braun*

**2. ROVE BEETLE DALOTIA CORIARIA PREDATION ON WESTERN FLOWER THRIPS  
FRANKLINIELLA OCCIDENTALIS**

*Yinping Li*

**3. USING HANDHELD CROP SENSORS TO ENHANCE YIELD AND NITROGEN (N) USE  
EFFICIENCY IN WINTER WHEAT**

*Ashley Lorence*

**4. EFFECT OF BRAHMAN GENETICS ON MEAT TENDERNESS**

*Allison Hobson*

**5. CONSUMER EVALUATION OF 9 DIFFERENT BEEF CUTS FROM 3 USDA QUALITY GRADES**

*Lindsey N. Drey*

**Social Sciences, Humanities, and Education**

Union Courtyard

On display: 9:30AM – 4:30PM

Judging: 10:00AM – 12:00PM

- 6. THE FIRST TWENTY EXERCISE TRAINING PROGRAM AND FIRE ACADEMY RECRUITS' FITNESS AND HEALTH**  
*Brittany S. Hollerbach*
- 7. ZOOBOTIC DISEASE RISK AT THE 2016 KANSAS STATE FAIR**  
*Diane Larson*
- 8. IMPACT OF VIDEO-BASED WELLNESS TRAINING ON GIRL SCOUT LEADERS' WELLNESS PROMOTION SELF-EFFICACY, INTENTION, AND KNOWLEDGE**  
*Brooke J. Cull*
- 9. IS PHYSICAL ACTIVITY PROTECTIVE AGAINST POTENTIALLY HARMFUL PSYCHOLOGICAL EFFECTS OF IMPOSED SEDENTARY TIME IN YOUNG ADULTS?**  
*Kelsey Casey*
- 10. DATA EXPLORER -ASSESSMENT DATA INTEGRATION, ANALYTICS, AND VISUALIZATION FOR STEM EDUCATION RESEARCH**  
*Josh Weese*                      **\*\*WITHDREW\*\***
- 11. REDUCING FOOD WASTE IN A CAMPUS RESTAURNT: A SUSTAINABILITY INITIATIVE**  
*Ryan Irvin*
- 12. NURTURE THROUGH NATURE: A COMPARATIVE STUDY BETWEEN STANDARD AND NATURE-BASED PLAY IN OUTDOOR PRESCHOOL ENVIRONMENTS**  
*Abigail Fiala*
- 13. THE MIND, THE NARRATIVE, AND THE CITY: DRAWING NARRATIVES OF THE CITY**  
*Timothy Kellams*

**Engineering, Math, and Physical Sciences**

Union Courtyard

On display: 9:30AM – 4:30PM

Judging: 1:30PM – 3:30PM

**14. INTEGRATING STARCHY SUBSTRATE INTO CELLULOSIC ETHANOL PRODUCTION TO BOOST ETHANOL TITERS AND YIELDS**

*Youjie Xu*

**15. IMPACT OF SPEED LIMIT CHANGE ON FREE FLOW SPEED FOR KANSAS FREEWAYS**

*Reza S. Shirazinejad*

**16. SIGNIFICANCE OF WIDE BAND GAP DEVICES IN POWER ELECTRONICS APPLICATIONS**

*Chintan Raval*                      **\*\*WITHDREW\*\***

**17. OPTIMIZATION OF LIGNOCELLULOSIC BIOMASS-TO-BIOFUEL SUPPLY CHAINS WITH MOBILE PELLETING**

*Nibal Albashabsheh*

**18. EFFECT OF PH AND PH-SHIFTING ON LIGNIN-PROTEIN INTERACTIONS AND ADHESION PERFORMANCE OF LIGNIN-PROTEIN POLYMER**

*Sarocho Pradyawong*

**19. INVESTIGATION OF OIL-WATER FLOW PATTERNS AND PRESSURE DROPS IN MILLIMETER CHANNELS**

*Kevin Bultongez*                      **\*\*WITHDREW\*\***

**20. HOW TO IMPROVE CHEMICAL STABILITY OF ENERGETIC MATERIALS VIA CO-CRYSTALLIZATION**

*Manomi Perera*

**21. SPECTROSCOPIC SINGLE-MOLECULE TRACKING REVEALS THE ONE-DIMENSIONAL DIFFUSION PATHWAYS IN SURFACTANT-TEMPLATED MESOPOROUS SILICA**

*Ruwandi Kumarasinghe*

**22. ANALYSIS OF ANIMAL RELATED CRASHES IN THE STATE OF KANSAS**

*Mirza A. Sharif*

**23. POINT-OF-CARE MICROFLUIDIC DEVICE FABRICATION AIDED BY 3D PRINTING**

*John Sibbitt*

**Biological Sciences**

Union Courtyard

On display: 9:30AM – 4:30PM

Judging: 1:30PM – 3:30PM

**24. VARIATION IN NUTRITIONAL QUALITY OF SCHOOL LUNCHESES WITH IMPLEMENTATION OF NATIONAL SCHOOL LUNCH PROGRAM GUIDELINES**

*Jillian Joyce*

**25. OXYGEN UPTAKE DURING THREE VARYING DURATION HIGH-INTENSITY FUNCTIONAL TRAINING SESSIONS**

*Jesse A. Stein*

**26. NEWLY FORMULATED FORTIFIED BLENDED FOODS RESULT IN IMPROVED PROTEIN QUALITY AND IRON BIOAVAILABILITY IN BROILER CHICKENS**

*Nicole Fiorentino*

**27. NUCLEAR ACCUMULATION OF THE ASPERGILLUS NIDULANS GATA TRANSCRIPTION FACTOR AREA IS INDEPENDENT OF DNA BINDING**

*Cameron C. Hunter*

## Oral Presentation Abstracts

### Biological Sciences 1

#### **IMPACTS OF A ZOYSIAGRASS AND TALL FESCUE SEED MIXTURE ON BROWN PATCH DISEASE SEVERITY**

Mingying Xiang<sup>1</sup>, Jack Fry<sup>1</sup>, and Megan Kennelly<sup>2</sup>

<sup>1</sup>*Department of Horticulture and Natural Resources, College of Agriculture;* <sup>2</sup>*Department of Plant Pathology, College of Agriculture*

**BACKGROUND AND PURPOSE:** Brown patch caused by the fungus *Rhizoctonia solani* Kühn AG-2-2 IIIB is the main disease limiting the growth of tall fescue in summer, and brown patch resistance in tall fescue cultivars is limited. Earlier research has demonstrated that polystands of zoysiagrass and tall fescue can be established successfully, with the potential to provide a quality turfgrass stand with prolonged winter color and reduced inputs. Our objective was to determine whether mixing zoysiagrass with tall fescue will reduce brown patch severity while maintaining overall acceptable quality. **METHOD:** Studies were established at the Rocky Ford Turfgrass Research Center in Manhattan, KS and Olathe Research Center, Olathe, KS. In the split plot design, natural infection by *R. solani* or a fungicide-treated control was the whole plot treatment factor and species (tall fescue monostand and the polystand mixture) were subplots. During July and August 2016, when hot, humid weather triggers brown patch, excessive irrigation was applied to promote brown patch. Disease severity was measured by visual ratings and digital image analysis; number of leaves in each plot that were infected was recorded using a grid. **RESULTS AND CONCLUSION:** The disease severity determined by visual rating for the tall fescue monostands was 14% in Manhattan on Aug 4, 2016 and 25% in Olathe on Aug 11, 2016, while the zoysiagrass mixture was only 3% in both locations. The mixed stand showed less affected by brown patch disease compared to the monostand of tall fescue.

#### **ASSESSMENT OF HISTORICAL AND PROJECTED DROUGHT VARIABILITY IN THE GREAT PLAINS**

Zachary Zambreski and Xiaomao Lin

*Department of Agronomy, College of Agriculture*

**BACKGROUND:** Drought variability is projected to increase under climate change, which will increase the vulnerability of agricultural systems in the Great Plains. Identification of regions that share similar drought variability is important for resource consolidation and drought emergency management. **METHOD:** This study examined historical and projected changes in seasonal drought variability in the Great Plains from 1900 to 2100 using observational data from Prism and projected data from 12 General Circulation Models. The technique implemented to facilitate this analysis was rotated Empirical Orthogonal Functions (EOFs). Drought indices utilized were the Palmer Drought Severity Index (PDSI) and Standardized Precipitation-Evapotranspiration Index (SPEI). **RESULTS:** Regions were classified into homogeneous zones based on EOF analysis, which ranged from three to nine depending on the index and season for the historical period (1900-2015). Comparison among indices and seasons showed consistency in drought structures among zones identified in the southern plains, and more complex drought structures in the central plains. Agricultural drought frequency during the spring and summer has increased during the last century for the zone including the High Plains of Texas and New Mexico. Eastern zones have seen an overall decrease in frequency of multiple types of drought. Ensemble mean of GCM data from 2016-2100 showed an increase in the complexity of drought structures for hydrologic drought during the fall, winter, and summer but a decrease during the spring. **CONCLUSION:** Overall most zones show a peak wetness by the mid-2030s and drying thereafter across indices and seasons.

# GENETIC AND PHENOTYPIC VARIATION OF THE DOMINANT PRAIRIE GRASS *ANDROPOGON GERARDII* AND ITS ASSOCIATION WITH CLIMATE ACROSS CENTRAL GRASSLANDS

Jacob Alsdurf<sup>1</sup>, Loretta Johnson<sup>1</sup>, Mary Knapp<sup>2</sup>, Paul St. Amand<sup>3</sup>, and Jesse Poland<sup>4</sup>

<sup>1</sup>*Division of Biology, College of Arts and Sciences;* <sup>2</sup>*Department of Agronomy, College of Agriculture;*

<sup>3</sup>*USDA/ARS/GCAHR, College of Agriculture;* <sup>4</sup>*Department of Plant Pathology, College of Agriculture*

**BACKGROUND AND PURPOSE:** *Andropogon gerardii* is an ecologically dominant grass, major forage grass for cattle, and widely used in grassland restoration. With wide distribution across the climate gradient of the Great Plains, we expect genetic and phenotypic variation to be associated with precipitation and temperature gradients. Understanding genetic and phenotypic variation and its relationship to climate will help predict how a dominant prairie grass may respond to future climate change. **METHODS:** Our study characterizes genetic and phenotypic variation of 26 geographically distributed populations across the central grasslands covering five climate regions. We grew plants from seed, measured phenotypes and genotyped populations using “genotyping by sequencing”. Single nucleotide polymorphisms (SNPs) were identified and aligned to *Sorghum bicolor* for SNP annotation and population admixture was identified. SNP outlier analysis was done followed by association analysis between SNPs, climate regions and climate variables. **RESULTS AND CONCLUSION:** Preliminary analysis shows a significant main effect among phenotypes (height, leaf width, and biomass all  $p < 0.001$ ). Population admixture distinguished four genetic groups with high admixture in the core range of *A. gerardii*. Outlier analysis reveals 207 SNPs, 30 of which were associated with climate regions, precipitation, and temperature. Of those SNPs, two are near detoxification and root hair development genes in *S. bicolor*. Genetic and phenotypic variation and their association with climate variables is vital information for rangeland and prairie restoration managers to choose climate-matched plant material for restoration projects. Understanding genetic and phenotypic variation and their relationship to current climate variation may predict how *A. gerardii* will respond to future climate change.

# RAPID EVOLUTION IN A DISTURBED ENVIRONMENT: EVOLUTIONARY RESPONSE OF NATIVE GRASS *ANDROPOGON VIRGINICUS* TO HEAVY METALS IN AN ABANDONED MINE SITE

Samantha Sharpe<sup>1</sup>, Loretta Johnson<sup>1</sup>, Nora Bella<sup>2</sup>, Olivia Parrish<sup>1</sup>, and Matthew Galliard<sup>1</sup>

<sup>1</sup>*Division of Biology, College of Arts and Sciences;* <sup>2</sup>*Department of Statistics, College of Arts and Sciences*

**BACKGROUND AND PURPOSE:** Anthropogenic activities have severely altered the earth’s ecosystems, driving many species to undergo rapid evolution in response to extreme and changing conditions. My research investigates genotypic and phenotypic components of adaptive variation in heavy metal exposed populations of *Andropogon virginicus*, a common perennial grass that often grows in contaminated mine soil. **METHOD:** Using a reciprocal transplant, I am comparing populations of *A. virginicus* collected from the Tar Creek EPA Superfund Site, an abandoned Lead and Zinc mine, with those collected from nearby non-mine sites to determine if ecotypic adaptation to contaminated soils has occurred in Tar Creek populations. To assess phenotypic adaptation, I have measured vegetative morphology (height, biomass), fitness (seed production), and physiology (photosynthesis, SPAD, tissue levels of lead and zinc, relevant metabolites). Plants from 20 populations have been genotyped with GBS to analyze differentiation on the genetic level. **RESULTS/FINDINGS:** We found 47 genetic outlier SNPs under divergent selection between mine and non-mine populations, two of which are related to Zinc binding, indicating functional genetic differences among populations. For both these SNPs, a single allele is fixed in the mine population while both alleles are present in equal frequency in non-mine populations, indicating greater selection for one allele variant in the mine site. Preliminary evidence based on descriptive statistics also supports phenotypic differences between mine and non-mine populations. **CONCLUSIONS:** Preliminary results indicate genotypic and phenotypic divergence between mine and non-mine populations linked to metal tolerance.

## MORPHOLOGICAL AND ANATOMICAL ADAPTABILITY OF SORGHUM ROOTS EXPOSED TO WATER-DEFICIT STRESS DURING THE VEGETATIVE STAGE

Regina Enniful, John V. S. Sunoj, Impa Somayanda, Vara P. V. Prasad, and Krishna S.V. Jagadish  
*Department of Agronomy, College of Agriculture*

**BACKGROUND AND PURPOSE:** Changing climate presents new challenges to agricultural production and global climate models project increased intensity and magnitude in water-deficit stress conditions in the future. Understanding the role of root system's adaptation under water-deficit conditions is crucial for sorghum which is often grown in water-limiting environments. **METHOD:** Experiments were conducted in the greenhouse on a set of 11 sorghum parental genotypes using 1m lysimeter columns filled with surface. Water-deficit stress (55% to 60% water-holding capacity) was imposed lasting for 15-days, starting from 35-days after emergence. Roots were carefully removed and washed at the end of stress period. To investigate the root anatomical complexity, root sections (3-4 cm) were taken from three different positions along the root length (7 cm from the root-shoot junction, the middle section and 7 cm from the root apex) and section images were obtained using a compound microscope. Morphological root features were determined by analyzing scanned images with WinRHIZO. **RESULTS:** The rooting depths recorded for stressed and well-watered plants ranged from 138 - 53 cm and 144 - 83 cm, respectively. Meta-Xylem number and size, xylem and stele diameter varied both by tissue position and by treatment. **CONCLUSION:** Findings were validated using contrasting lines and differential rooting morphological and anatomical characteristics identified will help complement efforts currently ongoing to enhance drought resilience in sorghum.

## HESSIAN FLY, *MAYETIOLA DESTRUCTOR* (DIPTERA: CECIDOMYIIDAE), ATTRACTION TO LEDS UNDER FIELD CONDITIONS

Ryan B. Schmid<sup>1,2</sup> and Brian P. McCornack<sup>1,2</sup>

<sup>1</sup>*Department of Entomology, College of Agriculture;* <sup>2</sup>*Plant Biosecurity Cooperative Research Centre, Bruce, ACT, AU*

**BACKGROUND AND PURPOSE:** The Hessian fly, *Mayetiola destructor* (Say) (Diptera: Cecidomyiidae), is a significant global pest of wheat. As such, an integrated pest management (IPM) regiment was developed to mitigate damage caused by this pest. Monitoring is a key aspect to the implementation of IPM programs; however, a reliable monitoring method has not been developed for the Hessian fly. Recent research conducted under laboratory conditions has shown that light emitting diodes (LEDs) of specific wavelength (525 nm) and intensity (16 W/m<sup>2</sup>) are highly attractive to Hessian flies, but fly attraction is affected by factors commonly found under field conditions, e.g. ambient light. Therefore the purpose of this experiment was to assess Hessian fly attraction to LEDs under field conditions. **METHOD:** Hessian fly attraction to LEDs was tested in a commercial wheat field using LED traps centrally positioned within plots. Treatments were randomly assigned to each plot for each replicate (n = 9) and consisted of green, white (positive control), and blank (negative control) LEDs. Flies were differentially protein marked and released 1, 5, and 10 m (n = 16 flies/release point) from traps to assess attraction from increasing distances. **RESULTS/FINDINGS:** Trap captures showed no significant differences between LED treatments. Consequently, results were unable to determine distance Hessian flies were attracted to LEDs. **CONCLUSION:** The results indicate that aspects of the environment reduce Hessian fly response to LEDs more than previously thought. Further research is needed to understand Hessian fly behavioral response to LEDs under field conditions before LEDs can be utilized as an effective monitoring strategy.



**\*\*WITHDREW\*\***

## **EVALUATION OF MSNDS FOR FAST-NEUTRON DETECTION AND THE TREAT HODOSCOPE**

**Priyarshini Ghosh, Wenkai Fu, Ryan Fronk, Douglas S. McGregor, and Jeremy A. Roberts**

*Department of Mechanical and Nuclear Engineering, College of Engineering*

**BACKGROUND AND PURPOSE:** The Transient Reactor Test Facility (TREAT) at Idaho National Laboratory was built to conduct reactor tests for simulating accidents and mild disruption scenarios in nuclear reactors. The need for accident-tolerant fuels has generated significant interest, and current work at K-State aims to improve detection systems at TREAT. **METHOD:** To detect fast neutrons (with energies  $> 1$  MeV) emitted from fission of the test specimen, two approaches were employed: 1) using hydrogenous material like High Density Polyethylene to thermalize (slow down) fast neutrons and subsequent detection via existing thermal neutron-sensitive Micro Structured Semiconductor Neutron Detectors (MSNDS), and 2) substituting the thermal reactant  $^6\text{Li}$  in MSNDS for a fast-sensitive reactant,  $^{235}\text{U}$ . The hydrogenous material constitutes a block having a large array of channels each housing a detector connected to appropriate electronics to register count from each reaction between neutrons and the neutron-reactive material.  $^{252}\text{Cf}$  was used as a fast neutron source. **RESULTS:** 1st approach: Individual channels registered counts for detection events from surrounding channels thus indicating cross-talk. 2nd approach: Attempts to fill the MSNDS with  $^{235}\text{U}$  proved unsuccessful due to the  $^{235}\text{U}$  particles being too large to fit in. **CONCLUSION:** Although simulations indicate that the 2nd approach should not generate cross-talk, both approaches are deemed unfit for accurate detection. Ongoing research explores scintillation for fast neutron detection.

## **MAXIMIZING DC-BUS UTILIZATION IN THREE-PHASE DC-AC CONVERTERS**

**Jacob Lamb and Behrooz Mirafzal**

*Department of Electrical and Computer Engineering, College of Engineering*

**BACKGROUND AND PURPOSE:** A diverse range of products, from variable speed drives used in electric transportation to interfaces between renewable energy sources and electricity consumers, rely upon three-phase dc-ac power converters. Depending on the application, these converters may be expected to provide auxiliary services, such as negative-sequence current compensation. Furthermore, since converter failures can be hazardous and often necessitate costly repairs, converters are typically expected to be fault tolerant. Under all circumstances, effective dc-bus utilization is essential to avoid unnecessary dc-bus oversizing. While techniques exist for maximizing dc-bus utilization, these techniques typically assume healthy converter operation or assume no auxiliary services are provided. Accordingly, there is a need for techniques which maximize dc-bus utilization, are fault tolerant, and are compatible with auxiliary services. **METHOD:** An algorithm for adjusting converter behavior was developed and verified using MATLAB/Simulink software. This technique is simple to implement and is adaptable to a wide range of operating conditions. **RESULTS/FINDINGS:** The proposed algorithm has been evaluated under several operating conditions for two different converter topologies, the two-level voltage source inverter and a four-cell-per-phase cascaded H-bridge multilevel converter. This technique enables the maximum line-to-line voltages to be obtained under all operating conditions, thereby maximizing dc-bus utilization. Accordingly, in all cases investigated, dc-bus utilization increased when compared to the case where no adjustments were made. **CONCLUSION:** Using the developed algorithm, dc-ac converters can be used more effectively under varying operating conditions. This improved versatility allows for improved performance, enabling more power to be delivered without requiring hardware reconfigurations.

## **DESIGN OF THREE-PHASE GRID-CONNECTED VOLTAGE SOURCE INVERTERS IN WEAK GRIDS**

**Aswad Adib** and Behrooz Mirafzal

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**BACKGROUND AND PURPOSE:** Voltage Source Inverters (VSIs) are a key technology for connecting renewable energy resources to the electric grid. A complete VSI system consists of necessary solid-state switches, filters for eliminating electrical noise, and controllers for providing voltage at the level expected by the electric utilities and consumer loads. Traditionally, VSI systems are designed assuming an ideal grid comprised of an ideal three-phase source of voltage. In reality, all grid connection has some negligible impedance associated with them, with the exception being the weak grids that have impedance that can't be neglected. High impedance associated with a grid causes distortion in grid voltages. As a result, the traditional approach to modeling VSIs fails in the presence of weak grids, sometimes with disastrous results. **METHOD:** A detailed mathematical model of the grid-connected VSI system was developed to facilitate the evaluation of the whole system performance to every system parameters as well as different levels of weak grid. **RESULTS AND CONCLUSION:** Analysis of the model suggests that VSI systems can be operated properly even under weak grid conditions by effectively designing filter and controller parameters based on the grid impedance. The analysis was verified through both simulation and experimental setups.

## **A NEW TECHNOLOGY TO IMPROVE THE SOLUBILITY AND STABILITY OF A COMMON FERTILIZER**

**Bhupinder Sandhu**, Christer B. Aakeröy, and John Desper

*Department of Chemistry, College of Arts and Sciences*

**BACKGROUND AND PURPOSE:** Urea is an inexpensive fertilizer with the highest nitrogen content among commonly used solid fertilizers. However, the high solubility of urea in water, and rapid moisture intake after application, can increase unwanted mobility and/or runoff from treated areas. Consequently, excessive quantities of urea are oftentimes applied to seeds and plants to ensure that a sufficient amount of active ingredient is available to the plant. The high moisture content of urea at relative humidity of 40-50% also causes “stickiness”, leading to storage and stability issues. Therefore, it would be highly advantageous if it was possible to alter/control the aqueous solubility and stability in a predetermined manner. **METHOD:** A new technology, which is both scalable and cost-effective, is being developed as a way of generating new solid forms of urea in order to alter its stability, solubility and performance. **RESULTS/FINDINGS:** The initial results suggest that the new solid forms of urea that have been prepared are in fact less soluble and more stable (for several months) than urea by itself under normal environmental conditions. **CONCLUSION:** This new technology may offer unique opportunities for developing solid forms of urea in which a variety of desired physical properties such as solubility, stability and dissolution rate can be tuned in a predictable and desired manner. This, in turn, can optimize the performance of urea as a plant nutrient and it may also be possible to extend this technology to other agrochemicals such as herbicides and pesticides, with a view to limiting negative environmental impacts without loss of performance.

## A NEW TECHNOLOGY FOR STABILIZING EXPLOSIVES AND ENERGETIC MATERIALS

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**BACKGROUND AND PURPOSE:** Explosives, propellants and pyrotechnics are capable of delivering large amounts of energy very rapidly. Unfortunately, these substances are often sensitive to environmental conditions, such as heat, shock or friction which in turn, leads to considerable challenges when it comes to handling, storage and transportation. Rather than making completely new explosives (which is costly), and simply hoping that they will be more stable and safe to use, it is essential that we develop new technologies that are cost effective, scalable, easily implemented, and fast. We are currently exploring a new approach for improving the stability of a family of explosives that are inherently acidic and impact sensitive. **METHOD:** The hydrogen bond is specific example of a chemical bond that may be used as a way of combining the energetic molecule with a stabilizing molecule in a new solid form in such a way that acidity and impact sensitivity. With this in mind, we have prepared several “co-crystals” containing an energetic substance combined with a stabilizing molecule. This co-crystallization technology has produced numerous new solids and we have compared their thermal/impact sensitivity and chemical stability with the properties of the parent explosive. **RESULTS/FINDINGS :** We have found that the new co-crystals display favorable impact and thermal sensitivity as compared to the original explosives, and the corrosiveness has been dramatically reduced. **CONCLUSION:** Co-crystallizations provide the basis for a new technology that can be employed as a way of altering and improving many of the unfavorable properties that are associated with the behavior of current energetic materials.

## POLAR SOLVENTS-SOLUBLE EMISSIVE INDIUM PHOSPHIDE NANOCRYSTALS BY IN-SITU LIGAND EXCHANGE SYNTHESIS

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**BACKGROUND AND PURPOSE:** Indium phosphide (InP) semiconductor nanocrystals (NCs) have important applications in optoelectronics and bio-medical applications. Synthesis of InP NCs which are soluble in polar solvents, involves multi-step synthesis like shell growth and ligand exchange on surface of the nanocrystals. In our synthesis, we report a single-step reaction avoiding multi-steps of synthesis. **METHOD:** Indium acetate is heated with palmitic acid at 150 °C to get indium palmitate, which is then treated with tris(trimethylsilyl)phosphine to get InP precursor. The obtained precursor is heated in a microwave reactor at 280 °C with 800 W with 1-butyl-3-methylimidazolium hexafluorophosphate (BMIM PF<sub>6</sub>) ionic liquid for 15 minutes. **RESULTS:** As amount of BMIM PF<sub>6</sub> increases in reaction mixture, InP NCs solubility changes from non-polar solvent (toluene) to polar solvent (dimethyl sulfoxide). In dimethyl sulfoxide solvent emission quantum yield of the NCs is around 30%. When different PF<sub>6</sub> based ionic liquids are used, it indicates that acidic proton is important for producing polar InP NCs. The average size of the NCs is calculated as around 2.3 nm by using TEM microscopy. **CONCLUSION:** By in-situ etching of InP NCs, polar InP NCs are synthesized with emission in the visible region. Solubility of the NCs can be tuned from non-polar to polar solvents implying potential uses in bio-medical applications. In addition, polar NCs can enhance charge transport in optoelectronic devices.

# DOMAIN ADAPTATION FOR CLASSIFYING DISASTER-RELATED TWITTER DATA

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**INTRODUCTION:** Supervised Machine Learning is focused on building predictive models given labeled "training data". Data may come from a variety of sources, for instance, social media networks. In our research, we use Twitter data, specifically, user-generated tweets about disasters such as floods, hurricanes, terrorist attacks, etc., to build classifiers that could help disaster management teams identify useful information.

**BACKGROUND:** A supervised classifier trained on data from a particular domain is expected to give accurate predictions on unseen data ("testing data") from the same domain, assuming that the training and test data have similar characteristics.

**MOTIVATION:** Labeled data is not easily available for a current "target" disaster. However, labeled data from a prior "source" disaster is presumably available, and can be used to learn a supervised classifier for the target disaster. Unfortunately, the source disaster data and the target disaster data may not share the same characteristics, and the classifier learned from the source may not perform well on the target. Domain adaptation techniques, which use unlabeled target data in addition to labeled source data, can be used to address this problem.

**METHOD:** We study single-source and multi-source domain adaptation techniques, using Naïve Bayes and extreme gradient boosting classifiers.

**FINDINGS:** Experimental results on Twitter datasets corresponding to six disasters show that domain adaptation techniques improve the overall performance as compared to basic supervised learning classifiers.

**CONCLUSION:** Domain adaptation is crucial for many machine learning applications, as it enables the use of unlabeled data in domains where labeled data is not available.

**ONLINE CONSUMER REVIEWS BY QUALITY LEVEL:  
WHAT ATTRIBUTES BY HOTEL CLASS AFFECT CONSUMER EVALUATION?**

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**BACKGROUND AND PURPOSE:** Many studies have examined the effects of online consumer reviews on consumer purchase behaviors. However, they mainly look into the same type of products. As firms differentiate their products by quality, consumers who use products of different quality levels value product attributes and evaluate products differently. The purpose of this study is to examine what attributes by quality level consumers talk about and how those attributes affect consumer evaluation. This study contributes to our better understanding of the way consumers evaluate products of different quality. **METHOD:** We collect online hotel reviews from 2-star (low quality) hotels to 5-star (high quality) hotels in Chicago, IL from an American travel website. Utilizing text mining analysis, we identify different attributes by hotel class and quantify the tones of reviews. Then, we examine the relationships between these attributes and consumer evaluation, measured by review tones/ratings, by hotel class. **FINDINGS:** We find that, regarding low-quality hotels, if consumers mentioned core service-related attributes such as kind staff and clean rooms, they positively evaluated the hotels they stayed at. In contrast, regarding high-quality hotels, if consumers mentioned supplementary service-related attributes such as pools and amenities, they positively evaluated the hotels they stayed at. **CONCLUSION:** Our findings provide managerial implications that managers need to focus on attributes of their own and competitors' products at the same quality level rather than those at different levels and improve those relevant attributes for better consumer evaluation.

**RE-ENGINEERED RED BLOOD CELLS AS COMPUTED TOMOGRAPHIC IMAGING AGENTS**  
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**BACKGROUND AND PURPOSE:** Computed tomographic (CT) angiography with iodinated contrast agents is one of the most commonly used clinical modality for vascular imaging. However, small molecular iodinated agent is quickly eliminated from the body thereby narrowing its acquisition window in CT imaging. Herein, we re-engineered red blood cell (RBC) to design a unique system capable of delivering CT contrast agent, gold nanoparticles (AuNPs). **METHOD:** Bio-engineering of RBC was mediated by the fusion of thiol-liposome onto the surface of RBC and characterized using fluorescence spectroscopy and confocal microscope for molecular distribution of liposomal building blocks throughout RBC. These engineered RBCs were further incubated with AuNPs to form Au-RBC, where AuNP were bound with RBC's surface thiol via Au-thiol interaction. Au-RBC was characterized for its size, surface charge, proteins retention, surface distribution, amount of AuNPs on Au-RBC, and CT imaging contrast enhancement. **RESULTS/FINDINGS:** The size and surface charge of the Au-RBCs were found to be  $8\pm 2 \mu\text{m}$  and  $-28\pm 3 \text{ mV}$ , respectively. The intactness of RBC was evident by the presence of major characteristic proteins such as spectrin, protein 4.1, and actin. Moreover, 20% of AuNPs were successfully plated onto the RBCs without disturbing its stability and was capable of enhancing darker contrast than that of free RBC with the X-ray attenuation of  $30\pm 5 \text{ HU}$ . **CONCLUSION:** This study illustrates the unique engineering strategies for the gold nanoplating of RBCs for CT imaging, which could also open a door for the surface functionalization of RBC for different clinical applications including diagnosis and therapy.

## COMPARISON OF AERIAL AND GROUND REMOTE SENSING TO QUANTIFY SUDDEN DEATH SYNDROME IN SOYBEAN

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**BACKGROUND AND PURPOSE:** Sudden death syndrome (SDS), caused by *Fusarium virguliforme*, has spread from the US to infect plants all over the world. SDS causes yield loss of 10-70%. Typically, plants infected with SDS are scored by hand based of severity and percent of crop infected. The manual process typically takes 3-4 hours on a 3-5 acre field. The quality of data collected is impacted because of the changing environmental conditions over the collection period. Therefore, the purpose of this study is to compare ground and aerial remote sensing methods for scoring of SDS to quantify if aerial remote sensing methods can be implemented to decrease time commitment and increase accuracy of scoring SDS. **METHOD:** Plots were flown twice using unmanned aerial systems (UASs); first late in the growing season and second at maturity to ensure a closed crop canopy and SDS emergence. Ground data was taken close to the time of flight. The images from the flights were then stitched and compiled into orthomosaics maps. Image processing was conducted to produce pigment index (PI) maps from the orthomosaics. PI values were compared to ground data. **RESULTS/FINDINGS:** Preliminary results show a strong inverse correlation of SDS scores and pigment index values. The aerial data collection using UASs also indicated an increase data collection efficiency, thereby, indicating that an accurate data can be collected over plot of 3-5 acres within 30-45 minutes. The results suggest that aerial data could be used for developing accurate and efficient spatial maps to score SDS impact in soybean.

## REAL TIME GAUGE WHEEL LOAD VARIABILITY DURING FIELD OPERATION ON PLANTER WITH HYDRAULIC DOWNFORCE CONTROL

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**BACKGROUND AND PURPOSE:** Maintaining target seeding depth and uniform plant spacing are key elements in maximizing the potential yield of corn. Modern planters are equipped with downforce control to allow planters set a certain load on its gauge wheel in order to maintain the desired seeding depth. However, no studies have been reported to evaluate the variability in gauge wheel load observed during actual planting operations. Therefore this research aims to understand real-time gauge wheel load variability across planter row units and determine the impact of changing field conditions on changes in the gauge wheel loading. **METHOD:** A 12-row planter equipped with hydraulic downforce control was used in planting corn on three fields. A fixed downforce setting was applied and set to plant at 2 inches seeding depth. Soil EC map was generated to determine soil textural variability across the fields. Average gauge wheel load distribution across row units was analyzed as well as the loading differences between them. Significant differences on gauge wheel load at varying soil texture and soil compaction were also evaluated. **RESULTS AND CONCLUSION:** Results showed that only 40% of the time the field was planted within 50-100 lbf gauge wheel load. Analysis on the gauge wheel load difference between two row units showed that 70% of the time it was above 200 lbf. Results also indicated that variation in average gauge wheel load across the fields was affected by the soil texture and soil compaction. It is suggested that active downforce control system is needed to apply the required downforce as field-to-field conditions frequently vary.

## **BIOFUELS PRODUCTION AND CLIMATE CHANGE: THE CASE OF SUGARCANE IN BRAZIL**

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**BACKGROUND AND PURPOSE:** In recent years, governments and society have adopted alternative fuels such as bioethanol and biodiesel to reduce impacts of fossil fuels on climate change. Brazil is the largest producer of sugarcane ethanol and the second main producer of biofuels in the world and the rise in ethanol demand resulted in a fast expansion of sugarcane producing area in this country. The Brazilian government promoted the Sugarcane Agroecological Zoning (SAZ) which is a land use policy defining areas as suitable or non-suitable for sugarcane expansion regarding climate, soil, previous land use criteria and ruling-out deforestation. The SAZ establishes three suitability classes, an optimal, a regular, and a sub-regular. The total area under the SAZ is enough to meet the present and future demand for ethanol. The purpose of the present paper is to estimate the impact of climate change on the spatial distribution of suitable areas for sugarcane production in Brazil. **METHOD:** To accomplish this task, we developed ecological niche models for each suitability class under SAZ. Later, we projected the future distribution of SAZ areas under 34 climate scenarios for 2050 using our ecological niche models. Data for this model consisted of bioclimatic, soil, and DEM. **RESULTS:** Preliminary results have identified that most of the current SAZ areas are not resilient to climate change. The regular level is more resilient than the other classes, retaining from 12 – 60% of its total area. **CONCLUSION:** There is a need to incorporate climate change scenarios when planning land use policies.

## **CORRELATED RISKS IN GLOBAL MAIZE MARKETS: HISTORICAL EVIDENCE AND FUTURE PROJECTIONS**

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**INTRODUCTION:** Climate teleconnections (linkages in climate across large geographic distances) and more frequent weather extremes may lead to correlated negative supply shocks in different parts of the world, causing food prices to increase and threatening the food security status of vulnerable communities. The likelihood of correlated supply shocks is a concern shared by researchers and private agencies such as insurance companies. Yet, while most of the existing analysis are based on case studies of ENSO effects, the extent to which cross-country correlations are pervasive and may be associated with systemic risks remains relatively unexplored. **METHOD:** In this study, we assess the usefulness of the existing data records on projections of future climate and maize yields by quantifying patterns of correlation, volatility, and changes in the likelihood of extremes of growing season temperature and precipitation as well as maize yields in eight major food producing and exporting countries around the world. **RESULTS:** We find that, historically, correlations in climate do not translate into correlations in maize yields. Moreover, we find weak evidence of stronger correlations in the future. We also find that the climate and maize yields volatility will increase in the US, Canada and France. Finally, we find increasing likelihood of extreme maize yield losses in all the selected countries. We conclude by highlighting some of the limitations of the available future climate and crop yield projections to the study of systemic risks in the global food system.

**CAPITALISM IN THE ART REALM**

**Rebecca Spruill**

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**BACKGROUND AND PURPOSE:** With the contemporary explosion of artistic categories such as "outsider art", "folk art", "low-brow art", the distinctions of "fine art" have become more difficult to address. My research analyzes the relationships between craft, or art for the sake of decoration and utilization, and fine art, defined as art intended as decoration that served a social function at most. Viewing these concepts through a lens informed by Marx's *Capital* and Bourdieu's elaboration on cultural capital, this research attempts to determine who is creating fine art, who they create it for, and how these processes differ from the production and consumption of "crafts" such as commercially produced pottery. **CONCLUSION:** When addressed through this specific lens, the categories of fine art and craft appear to delineate a capitalist museum and gallery industry trading in cultural capital and alienating those members of society for whom craft has become their only access point into the artistic world. The tools utilized by the capitalists to guard fine art from the profane often involve higher education, terminology, and increasingly an emphasis on concept. In short, while individual members of the proletariat may produce craft and develop an artistic skill set, they do not see themselves as artists due to their self-perceived dearth in any one of the above categories.

**“THEY DON’T COME FOR A SOCIAL JUSTICE NARRATIVE, BUT IT IS SO IMPORTANT”:  
DRAG QUEENS OF CENTRAL KANSAS AS CIVIC LEADERS AND SOCIAL JUSTICE**

**ADVOCATES**

**Jakki Forester**

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**BACKGROUND AND PURPOSE:** Drag queens of central Kansas use their positionality as civic leaders to promote and advocate for social justice and long-term, positive social change within their own communities and surrounding areas. The communities these drag performers are a part of are predominantly located within rural areas of Kansas, as well as juxtaposed next to a socio-political climate that is increasingly more hostile and violent toward them. The drag performers a part of this research use their notoriety to gather large audiences to raise awareness about social inequities the queer community experiences, as well as raise money for local queer organizations within these communities. **METHOD:** Over the past more than four years researching the drag community in central Kansas, which is defined as the cities of Junction City, Manhattan, Topeka, and Lawrence, I have used multiple qualitative research methods, including participant action research, photography, and multiple interviewing techniques, that strive to decolonize the research process. **RESULTS/FINDINGS:** These drag performers have facilitated the creation and sustainment of temporary safe spaces for the queer community within the larger communities. They have also used their positionality as civic leaders to have also created long-term, positive social change through fundraisers and advocacy about issues affecting the queer community including awareness of HIV/AIDS, same-sex marriage, and inclusive city ordinances. **CONCLUSION:** Although these performers are not “typical” civic leaders, they all strive to and have created long-term, positive social change within their own communities and the larger society.



## **A BURKEAN AND FEMINIST CRITIQUE: WHY WE LOVE AND LOVE TO HATE FIRST LADIES AND WHAT THAT MEANS FOR FEMALE POLITICAL LEADERS**

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**BACKGROUND AND PURPOSE:** The purpose of this study is to reveal how the rhetors through two popular culture First Lady representations invite audiences to see First Ladies and by extension female political leaders. For this study, I focus on two popular culture representations of a powerful First Lady role Mellie Grant from *Scandal* and Claire Underwood from *House of Cards*. **METHOD:** The present study analyzed 29 episodes of *Scandal* and 16 episodes of *House of Cards* chosen because of the content based around the specified characters. The analysis focused on the interactions and dialogue with and about the First Lady and political influence and identification. **RESULTS/FINDINGS:** Through this analysis, we can conclude that the masculine political scene is the dominant factor that must be considered when discussing female political leaders. Specifically regarding First Ladies, when they play their part as defined by the patriarchy society, they are loved, but when First Ladies deviate from their husband they are hated. The female political leaders are therefore to act within the limits of their influence that confines them to only what is considered feminine issues. **CONCLUSION:** With an uproar of powerful female representations in popular culture (i.e. Beyoncé), we should look deeper than the surface to understand what these messages really reveal about our society before upholding them as the standard of progressive feminism. It is important that we understand although progressive females are becoming popular we do not live in a postfeminist society.

## **OIL AND NATURAL GAS INDUSTRY IN KANSAS- POPULATION CHANGE AND IMPLICATIONS FOR SOCIAL FABRIC OF COMMUNITIES**

**Avantika Ramekar**

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**INTRODUCTION:** The establishment of a new industry alters the physical piece of land and affects the life of individuals and community that resides in its proximity. Studies have shown that there is an impact on the socio-demography of the place, economic status and environmental quality related issues. Rural communities such as in Kansas, where the population base is small and subjected to depopulation for decades; any impacts of industrial development can have a lasting impact. Moreover, resistance to change because of strong social capital is a trait often seen in small places. The aim of this study is to understand the effect of oil and gas industry in terms of migration trends in Kansas. We discuss the implications on the social fabric of such communities. **METHOD:** Population data for selected counties of Kansas was acquired from US Census Bureau while net migration rate data was gathered from University of Wisconsin-Madison. Data for oil and natural gas production was downloaded from Kansas Geological Survey. We analyzed net migration trend from 1950 to 2010. The analysis is supplemented with qualitative data collected during site visits. **RESULTS AND CONCLUSION:** An attempt was made in this study to understand the effects of oil and gas industry in terms of population change using migration trends. Our results show although Kansas continues to lose its population. The rate of loss is lower. However, conclusions on causal relationship between growth of oil and natural gas industry and reduced population loss, is difficult to ascertain at this point as we are using secondary data.

## WHAT IS AN IMPORTANT FACTOR FOR DEPRESSION

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Depression is a severe illness in developing countries such as Indonesia and Pakistan. **BACKGROUND AND PURPOSE:** This paper investigates environmental and biological factors to determine whether biological factors are more important than environmental factors. **METHOD:** In this paper, data was downloaded from the Centers for Disease Control and Prevention and missing data were eliminated. Linear regression models were estimated to investigate the relationship between environmental factors and the score from the depression screener. Logistic regression models were estimated to investigate the relationship between biological factors and no recurrence/recurrence of depression. The purpose of analysis is to know the sign of coefficients, significance, and accuracy of three models (environmental, biological and comparative models). **RESULTS:** Gender, age, race, military status, country of birth, marital status, number of households, language, and exam weight have positive relationship with depression, but other factors such as time of clinical study have negative relationship with depression. With multicollinearity, gender, language, interview weight, and exam weight are significant, but without multicollinearity, gender and language are important in environmental models. Time of clinical study is significant in biological model and comparative model. The environmental model has multicollinearity without heteroscedasticity, but biological and comparative models are well-defined. Compared to environmental models, only biological models are sufficient for depression. **CONCLUSION:** Environmental factors are less important than biological factors although some factors are significant. Thus, treatment is more important than other factors because biological factors or brain simulation/activities have impacts on depression.

## PUBLICATION BIAS: EVIDENCE FROM THE MEN'S MARRIAGE PREMIUM

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**BACKGROUND AND PURPOSE:** There is an empirically identified phenomenon that married men have higher wages than unmarried men, and a number of explanations are associated with this. A large amount of research literature discusses this estimated wage effect for marriage men. Thus, it is possible that this marriage premium was not fully captured or estimated by these dozens of studies. Because some researchers are not concerned about the statistical behavior, but they are concerned with how their papers get published. Thus, both the magnitude and causes of this marriage premium remain unclear and lead to the importance of explaining this phenomenon. This research is conducted to find better ways to understand the marriage premium and minimize the conflicting results. **METHOD:** These phenomena can be identified by using the meta-regression analysis (MRA) and used to correct the magnitude of reported marriage premium for their publication biases. **RESULTS/FINDINGS:** Our meta-analysis of 19 studies and 120 estimates finds that there exists a meaningful impact on wage after control for the publication bias with heterogeneity. Marriage premium accounts as 6.8 percent with the evidence of publication bias. Also, this analysis identifies omitted variable bias as another important aspect for explaining this widespread empirical literature. **CONCLUSION:** However, it is much harder to control this publication bias, which is a result of the nature of empirical research in social science. Thus, it is important to clarify and filter the publication bias from any summary of empirical findings to provide clear evidence of research results.

## HOW DO STUDENTS “LOOK AHEAD” WHEN SOLVING PROBLEMS IN ELECTROMAGNETIC FIELDS?

Bahar Modir and Eleanor C. Sayre

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**BACKGROUND AND PURPOSE:** Coordination class theory is used to explain how students understand a concept by reading out information and providing a causal net. We have expanded the theory by defining a mechanism called *looking ahead*. Students *looking ahead* can determine the relevant information and make sense of the information that is available to them. **METHOD:** We collected video data from two classes, in Fall 2013 and Fall 2015, of an upper-level undergraduate Electromagnetic Fields 1 course. Careful observation of students' discourse of in-class group problem solving can provide clues for determining students' moment of *looking ahead*. **RESULTS/FINDINGS:** We have characterized the mechanism of *looking ahead*, and discuss when does it happen during problem solving procedure. *Looking ahead* into the problem helps student to better understand the structure of a concept and relate it to the physical system of the problem. *Looking ahead* can convert the remainder of the problem into easier algebraic procedures instead of time consuming calculations. **CONCLUSION:** We have expanded the use of coordination class theory beyond the contexts of high school classes and introductory-level courses, and have used the theory in the upper-level division courses. Our results can help the instructors to encourage students to *look ahead* into the problem. This lessens students' algebraic calculations, and provides more sense making opportunities to students' discussions. We believe that the result of this study can also be used across other theory coursework in physics.

## WHAT PHYSICISTS MEAN BY THE EQUALS SIGN IN UNDERGRADUATE EDUCATION

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**BACKGROUND AND PURPOSE:** Mathematical concepts and tools have an important role in physics. Faculties want students to think critically about mathematics and the underlying fundamental concepts, rather than simply memorizing a series of equations and answers. The equals sign -- ubiquitous in problem solving -- carries different conceptual meaning depending on how it is used; this meaning is deeply tied to cultural practices in problem solving in physics. **METHOD:** We use symbolic forms to investigate the conceptual and cultural meanings of the equals sign across physics contexts. We built and validated a rubric to classify the ways that physics students use the equals sign in their written work. Our categories are causality, assignments, definitional, balancing, and just math. We analyze students' use of the equals sign in their written homework and exam solutions in an upper-division electrostatics course. **RESULTS/FINDINGS:** We correlate the kinds of equal signs within problem solutions with the difficulty of the problem. We compare the ways students use the equals sign to their course lectures and textbook. **CONCLUSION:** Teaching students how to write, manipulate, and apply symbolic expressions allows them to approach greater understanding of concepts instead of simply memorizing expressions and their typical applications.

## USING CONCEPTUAL BLENDING TO INVESTIGATE STUDENT'S PROBLEM SOLVING PROCESS

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**BACKGROUND AND PURPOSE:** Solving problems in Physics classroom is one of the most important skills as it can be viewed as a primary outcome of learning process. Understanding how students reason and come up with particular ideas while solving problem can help teachers improve instruction as well as guide students toward success more effectively. Conceptual blending is a powerful theory which allows us to investigate students' reasoning process meticulously move by move. According to blending theory, there are two or more input spaces containing information from discrete domains but having some common structures. By running the blend, emergent information arises in another mental space called blended space. **METHOD:** We analyze video data from an upper division Electromagnetic Field 1 course as students solve problems during class in groups and during oral exam individually. We construct blending diagrams for each student and interpret their moves along the problem. **RESULTS/FINDINGS:** We found that students usually blend the inputs across different representations such as math, diagram, and kinesthetic. Furthermore, when students encounter difficulties and mistakes, they either re-run the blends, change some input elements, or bring up more representation to help them reason and do computation. **CONCLUSION:** Our work is at the early stage but it shows the explanatory power of blending theory in understanding students' problem solving process.

## STUDENTS' PROBLEM SOLVING: TRANSLATION BETWEEN MULTIPLE REPRESENTATIONS

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**BACKGROUND AND PURPOSE:** To best educate STEM students on how to solve problems correctly, first we must study their problem-solving behaviors in STEM classes. To start the solving process, students must make sense of a physics word problem, interpreting and converting it to different representations. Using multiple representations when solving problems help students to understand physics ideas and solve problems efficiently. As a part of the Mathematization project we investigate how upper division Electromagnetism I students translate between representations while solving problems. **METHOD:** The data for this study is drawn from the Electromagnetism I courses, where students engage in problem solving in both group settings and individual oral exams. We do moment-by-moment analysis of classroom video to see what representations students use, how they use them and how students switch between them. **RESULTS/FINDINGS:** We found students frequently use multiple representations: Diagram, Kinesthetic (gestures), Mathematics and Word. They use these representations for Recording, Sense making and Communicating purposes. In this talk we present our preliminary findings of how students translate between representations. **CONCLUSION:** Our work shows that it is both possible and fruitful to model students' problem solving in terms of representational switches, pushing theoretical and methodological developments in understanding students' problem solving in physics.

# **BRIDGES FOR KANSAS FAMILIES: THE ROLE OF SOCIAL CONNECTION AND HARDINESS IN FAMILIES LIVING IN POVERTY**

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**BACKGROUND AND PURPOSE:** For the past decade, family poverty has been growing steadily by 24.3% within the state of Kansas partly due to cuts in social safety net programs and the lack of living wage work. The increase in poverty has inspired community-based efforts and volunteer-driven initiatives to grow to support families and to increase social connection and access to resources. Prior research has found that families in chronic poverty experience higher stress, higher conflict, and lower means of social connection. The present study explores the "lived experiences" of those in poverty by examining the role of social connection and hardiness as a way to cope with stresses associated with living in poverty. **METHOD:** Through a community-based participatory approach, a series of semi-structured interviews were conducted separately with adolescents and adult family members from three communities across Kansas. The research team compiled the data from the interviews and thematic and consensus coding was used to determine themes. **RESULTS/FINDINGS:** The findings from the research reveal that adversity is necessary for hardiness to develop in individuals, social connection is built upon the support and trust of others, and community-engaged work is difficult, but rewarding. **CONCLUSION:** This research has future implications on the best practices to address poverty at a community level. Furthermore, this research will inform future public policy that centers on the needs of families living in poverty.

**THE 5'-POLY(A) LEADER OF POXVIRUS mRNA CONFERS A TRANSLATIONAL ADVANTAGE THAT CAN BE ACHIEVED IN A CAP-INDEPENDENT MANNER**

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**BACKGROUND:** The 5'-poly(A) leader at the 5'-untranslated region (5'-UTR) is an unusually striking feature of all poxvirus mRNAs transcribed after viral DNA replication (post-replicative mRNAs). These poly(A) leaders are non-templated and of heterogeneous lengths; and their function during VACV infection remains a long-standing question. **METHOD:** We used an RNA-based luciferase reporter assay to determine the function of poly(A) leader during VACV infection. **FINDINGS:** Here, we discovered that a 5'-poly(A) leader conferred a selective translational advantage to mRNA in poxvirus-infected cells. A constitutive and uninterrupted 5'-poly(A) leader with 12 residues was optimal. The 5'-UTR A-tract also could increase protein production in the bacteriophage T7 promoter-based vaccinia virus expression system, the prototypic member of poxviruses. Interestingly, although vaccinia virus post-replicative mRNAs do have 5'-methylated guanosine caps and can use cap-dependent translation, in vaccinia virus-infected cells, the 5'-poly(A)-mediated translational advantage could be achieved through cap-independent translation. Moreover, the cap-independent translation was not mediated through an internal ribosome entry site (IRES). **CONCLUSION:** These results point to a fundamental mechanism poxvirus uses to efficiently translate its post-replicative mRNAs.

**ROLE OF ASPARAGINE IN VACCINIA VIRUS DEPENDENCE OF GLUTAMINE FOR OPTIMAL VIRAL REPLICATION**

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**BACKGROUND AND PURPOSE:** Although smallpox, the deadliest infectious disease in human history, is eradicated, other poxvirus infections continue to occur throughout the world resulting in mortality and morbidity in human and animals. Vaccinia virus (VACV), the prototype of poxviridae used as a vaccine to eradicate smallpox, is a complex, enveloped, large, linear double-stranded DNA virus. Mammalian cells utilize glucose as the major source of energy and metabolism. However, VACV infection alters cellular metabolism such that VACV prefers to use glutamine over glucose for optimal viral replication. Our study aims to identify specific glutamine metabolic requirements for optimal VACV replication and elucidate the underlying mechanisms. **METHOD:** Plaque assay was performed in growth media containing different amino acids as supplement to quantify the virus replication. **RESULTS:** We found that asparagine can rescue VACV replication in glutamine-depleted media. This rescue of VACV replication from glutamine depletion is specific to asparagine as compared to other non-essential amino acids. Moreover, inhibition of asparagine synthetase, a gene catalyzing biosynthesis of asparagine, by chemical or genetic approach severely impairs VACV replication. **CONCLUSIONS:** This study identified asparagine as an important metabolite required for efficient VACV replication and also lays foundation for the study of mechanisms underlying the rescue from glutamine dependence. Likewise, the outcome of this research will also initiate research on role of asparagine in the life cycles of other viruses that also require glutamine for efficient replication.

## POST-MEAL TRIGLYCERIDE RESPONSES IN YOUNGER VERSUS OLDER ACTIVE ADULTS

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**BACKGROUND:** A large post-meal triglyceride response is linked to increased cardiovascular disease risk. Studies have reported an age-related increase in post-meal triglycerides, but it is unknown whether this is a result of aging or reduced physical activity. The purpose of this study was to compare older active adults (OA) to younger active adults (YA) with regard to post-meal triglycerides. **METHODS:** Sixteen adults (8 OA adults, 67 ± 5 yr; 8 YA adults, 25 ± 5 yr; each group: 4M/4W) were tested following an overnight fast and having abstained from exercise for two days. A catheter was inserted into a forearm vein and a blood sample was taken to assess fasting triglycerides. Participants then consumed a high-fat meal (60% fat; 12 kcal/kg; 921 ± 164 kcal). Blood draws were performed hourly for 6 hours to characterize the post-meal triglyceride response. **RESULTS:** There was no difference ( $p = 0.20$ ) in fasting triglycerides between groups (OA: 52.3 ± 9.0 mg/dL; YA: 47.4 ± 4.6 mg/dL). Total area under the curve (AUC) triglyceride response was significantly greater ( $p = 0.003$ ) in the OA group (625.6 ± 169.0 mg/dL x 6 hr) compared to the YA group (407.9 ± 115.1 mg/dL x 6 hr). The peak triglyceride value was significantly higher ( $p = 0.007$ ) in the OA adults (144.0 ± 42.2 mg/dL) compared to the YA adults (90.5 ± 27.0 mg/dL). **CONCLUSION:** Despite being chronically active, OA adults displayed a higher triglyceride response than YA adults, agreeing with previous findings of an age-related increase in post-meal triglycerides.

## ENGINEERING BIOMIMETIC LIPOSOME INSPIRED BY RED BLOOD CELLS

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**BACKGROUND AND PURPOSE:** Red blood cell (RBC) is the natural resident of the vascular system and therefore the delivery of any class of therapeutic agent that must stay in the circulatory system may benefit from the carriage by RBC. Towards this direction, an engineered hybrid liposomal system that has unique properties derived from RBC is presented. We have hybridized synthetic lipids with RBC membranes and incorporated with magnetic resonance imaging contrast agent along with chemotherapeutic drug doxorubicin to form a biomimetic liposome (BML). **METHODS:** BMLs proposed herein consist of biocompatible/biodegradable synthetic phospholipids include 1,2-Distearoyl-sn-glycero-3-phosphoglycerol, 1,2-Distearoyl-sn-glycero-3-phosphoethanolamine, and Gadolinium-based contrast agent conjugated lipid. These synthetic phospholipids were fused with natural RBC membrane and loaded with doxorubicin using extrusion technique. Thus formed BML was characterized for their: physicochemical, stability, fusogenic, magnetic, drug loading, biocompatibility, and cytotoxicity properties. **RESULTS/FINDINGS:** The BMLs showed the hydrodynamic diameter of 200±15 nm with a negative surface charge. The translocation of surface properties from RBC into the BML was confirmed by SDS-PAGE analysis. In which all, major proteins of RBC were successfully hybridized into the BML. The drug loading efficiency was found to be 6% (w/w) with the capability to induce cell death. Furthermore, the magnetic relaxometric analysis of the BMLs demonstrates an enhanced  $r_1$  of 9mM<sup>-1</sup>.s<sup>-1</sup> at 14T, which is higher than that of commercial available, such as Magnevist® ( $r_1=3.0$ mM<sup>-1</sup>.s<sup>-1</sup>). **CONCLUSION:** Given a higher magnetic and biomimetic properties, these BML holds great promise as an enhanced drug delivery mechanism in the diagnosis and treatment of cancer.

## INHIBITION OF MYELOPEROXIDASE BY STAPHYLOCOCCAL SPIN PROTEINS

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**BACKGROUND AND PURPOSE:** Neutrophils are the most abundant type of white blood cells in humans and the most prominent cellular component of the innate immune system. Neutrophils contain subcellular granules that are replete with vital anti-bacterial enzymes, including Neutrophil Serine Proteases (NSPs) and Myeloperoxidase (MPO). Previous work has demonstrated that the pathogenic bacterium *Staphylococcus aureus* produces an array of virulence proteins that disrupt normal function of the human innate immune system. The combined activities of these proteins are believed to prolong bacterial survival within the host, allowing for infections to take hold. **RESULTS/FINDINGS:** We recently identified two novel classes of *S. aureus* secreted proteins, EAP domain proteins and SPIN, which act as inhibitors of NSPs and MPO, respectively. SPIN potently inhibits MPO activity in a number of functional assays by forming a nanomolar affinity complex with MPO. To gain insight into the structure/function relationships of SPIN, we determined its structure bound to MPO by X-ray crystallography. The structure of this complex implicates the N-terminal ~10 amino acids as essential for SPIN function. We examined three types of SPIN proteins using structural methods, direct binding assays, and functional assays for MPO activity: (i) deletion mutants, (ii) SPIN proteins originating from divergent staphylococcal species, and (iii) a synthetically-designed SPIN protein. **CONCLUSION:** The differences in binding and inhibition of MPO by these proteins not only provide a route for identifying the structure/function relationships in SPIN, they also constitute a template for the design of high-affinity, synthetic MPO inhibitors based upon the properties of this unique immune evasion protein.

## ASSOCIATIONS BETWEEN THE MICROBIOME AND WEIGHT GAIN IN PIGS AFTER VACCINATION WITH A PORCINE REPRODUCTIVE AND RESPIRATORY SYNDROME (PRRS) MODIFIED LIVE VIRUS (MLV) VACCINE FOLLOWED BY CHALLENGE WITH PRRSV AND PORCINE CIRCOVIRUS TYPE 2 (PCV2)

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**BACKGROUND:** PRRSV and PCV2 are two of the most significant swine pathogens worldwide, causing respiratory disease and reduced weight gain in pigs. PRRS MLV vaccines are widely used to reduce PRRS-associated losses; however, vaccination does not provide sterilizing immunity or prevent weight gain variation after PRRSV challenge. **OBJECTIVE:** Determine microbiome profiles of pigs after PRRS MLV vaccination that may predict or predispose weight gain after co-infection with PRRSV and PCV2. **METHODS:** Four-weeks after vaccination with a PRRS MLV vaccine and at the time of PRRSV/PCV2 challenge, fecal samples were collected from an experimental population of 50 nursery pigs. At 42 days post-infection, 20 pigs were retrospectively identified as having high or low growth rates after co-infection. Using the Lawrence Livermore Microbial Detection Array (LLMDA), the microbiomes of the two growth rate groups were determined. **RESULTS:** Average daily gain post-challenge was 0.97 and 0.72 kg in high and low growers ( $p < 0.001$ , unpaired t-test). PRRSV and PCV2 virus replication were similar between the two groups. At the level of the fecal microbiome, the number of families detected were similar in both groups; however, the mean number of species was significantly greater in the high growing pigs (60 and 47 species in high and low growers, respectively,  $p = 0.03$ , Mann-Whitney U test). Within the families Streptococcaceae, Veillonellaceae, and Clostridiaceae, high growers had significantly greater species diversity ( $p = 0.03$ ,  $p = 0.02$ , and  $p = 0.04$ , respectively, Mann-Whitney U test). **CONCLUSION:** The results suggest that microbiome species diversity plays a role in weight gain after vaccination and subsequent co-infection with PRRSV and PCV2.



## WHOLE GENOME SEQUENCING-BASED IDENTIFICATION AND COMPARATIVE ANALYSIS OF MAJOR AND PUTATIVE VIRULENCE GENES OF ESCHERICHIA COLI O103 OF BOVINE FECAL ORIGIN

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**BACKGROUND AND PURPOSE:** *Escherichia coli* serogroup O103, a major foodborne pathogen shed in the feces of cattle, can present as both potentially deadly enterohemorrhagic *E. coli* (EHEC) and, less severely, enteropathogenic *E. coli* (EPEC). Potential differences in disease outcomes, particularly serious complications, can be attributed to the diverse make-up of major and putative *E. coli* O103 virulence factors. Whole genome sequencing (WGS) has been used to characterize virulence gene profiles of *E. coli* O157:H7; however, genome variations including those that encode for virulence genes of O103 serogroup are less characterized. Our objective was to utilize WGS to identify and compare major and putative virulence genes of EHEC and EPEC O103 isolates of bovine fecal origin. **METHOD:** A total of 69 O103 strains comprised of bovine EHEC (n=43), bovine EPEC (n=13) and bovine putative non-pathotype (n=13) were sequenced using WGS (Illumina MiSeq). Six strains of EHEC O103 of human clinical cases were also included in the study for comparison. Virulence genes of all strains were identified using Virulence Finder 1.5. **RESULTS/FINDINGS:** Both bovine and human EHEC strains had larger average genome sizes and were positive for a higher number of adherence and toxin-based virulence genes and genes on mobile elements than EPEC or putative non-pathotype strains. **CONCLUSION:** The WGS data indicate that bovine strains of O103 are diverse, and the three groups of strains examined differ in several key genes. However, a number of major and putative virulence genes were common among bovine and human EHEC strains, indicating potential of bovine strains to cause human infections.

## BEETROOT JUICE SUPPLEMENTATION IMPROVES MUSCLE O<sub>2</sub> DELIVERY AND UTILIZATION MATCHING IN HEART FAILURE RATS

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**BACKGROUND AND PURPOSE:** There are 27.6 million adults in the United States with diagnosed heart disease costing \$200 billion annually in healthcare costs. Chronic heart failure (CHF) is a major contributor to these numbers and reduces the quality-of-life (QOL) and physical capacity in patients due, in large part, to oxygen (O<sub>2</sub>) delivery and utilization dysfunction. Beetroot (BR) juice has emerged as a potentially powerful non-pharmaceutical therapeutic for CHF patients and we tested the hypothesis that BR supplementation would enhance the muscle O<sub>2</sub> delivery-to-utilization ratio in CHF rats, particularly at the onset of muscle contractions. **METHODS:** CHF was induced in adult Sprague-Dawley rats by surgically-induced myocardial infarction. Following 3 weeks of recovery, rats were given either placebo (CHF) or BR (CHF+BR) for 5 days. Phosphorescence quenching was used to determine the temporal profile of muscle O<sub>2</sub> partial pressure (P<sub>musO<sub>2</sub></sub>, determined by O<sub>2</sub> delivery-to-utilization ratio) in the spinotrapezius muscle during 180 s of contractions. **RESULTS:** Mean arterial pressure was reduced with BR (CHF 102±5, CHF+BR 89±5 mmHg), while preserving resting P<sub>musO<sub>2</sub></sub> (CHF 15±3, CHF+BR 16±1 mmHg). P<sub>musO<sub>2</sub></sub> was elevated during contractions for CHF+BR such that the P<sub>musO<sub>2</sub></sub> undershoot during contractions was reduced with BR (CHF 9±2, CHF+BR 5±1 mmHg). **CONCLUSION:** In support of our hypothesis, BR supplementation improved muscle O<sub>2</sub> delivery-to-utilization matching in CHF rats during the vital period at the onset of contractions, likely reducing the stress induced by the activity. These results support the utility of BR supplementation as a non-pharmaceutical alternative treatment for CHF to improve QOL and reduce morbidity and mortality.

# METABOLIC PHYSIOLOGY AND ITS SIGNIFICANCE FOR ADAPTATION TO EXTREME ENVIRONMENTS

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**BACKGROUND AND PURPOSE:** Extreme environments are characterized by harsh abiotic conditions, resulting in modifications of various mechanisms of organismal function in individuals exposed to them. Metabolic physiology is critically important for an organism's ability to respond to environmental stress, as it is directly tied to maintenance costs that are critical for basic survival. This may be especially important for organisms that inhabit hydrogen sulfide (H<sub>2</sub>S) rich environments. H<sub>2</sub>S is a natural toxicant that inhibits biological energy production, which is lethal to most animals. Theory suggests that this effect should result in modifications to energetic capacity (aerobic scope) in sulfide populations of organisms. To explore whether variation in metabolic physiology exists between sulfidic and non-sulfidic environments, we measured the aerobic scope of two population pairs of the Atlantic molly, a livebearing fish, under freshwater conditions. This species has successfully colonized H<sub>2</sub>S springs in Southern Mexico. Interestingly, some population have evolved the ability to maintain energy production under sulfide conditions, while one has not. This allows for the comparison of how different mechanisms used to cope with extreme environmental conditions impact metabolic physiology.

**METHOD:** Using respirometry and chase trials, we compared aerobic scope between closely related sulfidic and nonsulfidic populations. **RESULTS/FINDINGS:** We find that the sulfur population capable of energy production under H<sub>2</sub>S has higher standard metabolic rates, suggesting they require more energy for basic functions. Additionally, females have higher aerobic scope than males in all populations. **CONCLUSION:** The results of this study reflect how adaptation to metabolic physiology in extreme may come with trade-offs to ancestral conditions.

## EFFECTS OF MARBLING TEXTURE ON PALATABILITY TRAITS OF BEEF STRIP LOIN STEAKS

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**BACKGROUND AND PURPOSE:** In 80% of branded beef programs supervised by the USDA-Agricultural Marketing Service, there is a specification for fine or medium textured marbling. Carcasses that exhibit coarse marbling in the ribeye are discriminated against at the packer and retailer levels and are not eligible for many premiums. There has only been one study on evaluating the effects of marbling texture on beef palatability, which produced mixed results. The objective of this study was to determine the effects of marbling texture on trained sensory panel ratings of beef strip loin steaks from differing USDA quality grades and marbling texture groups. **METHODS:** Beef strip loins (n=117) from three quality grades: Top Choice (Modest00 – Moderate100 marbling), Low Choice, and Select were chosen based on visual appraisal of marbling texture of three texture groups: fine, medium, and coarse. Strip loins were fabricated into 2.54 cm steaks. For trained panel evaluation, panelists were trained using the AMSA Sensory Guidelines. Steaks were cooked to a medium degree of doneness (71°C). Panelists evaluated steaks for initial and sustained juiciness, myofibrillar tenderness, connective tissue amount, overall tenderness, beef flavor intensity, and off-flavor intensity on continuous line scales. **RESULTS:** Panelists rated coarse marbled steaks higher ( $P < 0.05$ ) for beef flavor intensity and sustained juiciness. For myofibrillar tenderness, connective tissue amount, and off-flavor intensity, all marbling texture treatments were rated similar ( $P > 0.05$ ). **CONCLUSION:** These results indicate coarse marbled beef was more flavorful and juicy compared to both fine and medium marbled beef and should be eligible for current branded beef programs.

## EFFECTS OF FEEDING ANTIOXIDANTS TO STEERS FED MICROALGAE (AURANTIOCHYTRIUM LIMACINUM CCAP 4087/2) ON COLOR STABILITY AND PALATABILITY OF STRIP LOIN STEAKS

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**BACKGROUND AND PURPOSE:** Previously, feeding microalgae (MA) to beef heifers increased concentrations of 20:5n-3 and 22:6n-3 fatty acids, but steak color stability was reduced and sensory panelists detected off-flavors. A follow up study was conducted to evaluate effects of feeding antioxidants to steers fed MA on color stability and palatability of strip loin steaks. **METHODS:** Steers (n=40) were fed a 10% flaxseed diet (FLAX), FLAX diet plus 100 g·steer<sup>-1</sup>·day<sup>-1</sup> MA (ALGAE), 100 g·steer<sup>-1</sup>·day<sup>-1</sup> MA plus antioxidants (103 IU/day vitamin E and Sel-Plex; Alltech Inc.) fed throughout feeding (AOX), or 100 g·steer<sup>-1</sup>·day<sup>-1</sup> MA plus antioxidants fed for the final 10 day of feeding (LATE). On day-45 steers were harvested, loins were collected, and aged 14 days. Each loin was fabricated into steaks for retail display and sensory panel analyses. **RESULTS/FINDINGS:** Treatment impacted off-flavor intensity of steaks, but did not affect other palatability traits. There were treatment×day interactions for objective and subjective discoloration. Days 0-5, there were no treatment differences for discoloration measures. On day-6, steaks from ALGAE steers had greater objective and subjective discoloration than steaks from AOX and LATE steers, but were similar to FLAX steaks. From day 7-10, steaks from ALGAE steers had greater objective and subjective discoloration compared to steaks from other treatments. Also, from day 7-9, objective and subjective discoloration of steaks from AOX steers were similar to steaks from LATE steers, but AOX steaks had reduced objective and subjective discoloration compared to steaks from FLAX steers. **CONCLUSION:** Supplementing antioxidants in diets containing microalgae improves steak color stability, but off-flavors are still detectable.

## **MILLET AND TEFF BASED GLUTEN FREE PASTA FORMULATED WITH CORN STARCH AND GLYCEROL MONO-STEARATE AS TEXTURE ENHANCERS**

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**BACKGROUND AND PURPOSE:** The growth in gluten free (GF) processed food market has brought a variety of gluten-free whole grains available, each with its own unique nutrition, texture and flavor. Teff and millets are among such grains rich in minerals, iron, dietary fibers, antioxidants, phytochemicals and polyphenols that remained unexplored. **METHOD:** Cornstarch (25% AM), high amylose cornstarch (55%AM) and mono-glycerides (MG) were utilized as texture and structure enhancers at different levels to produce precooked pasta using extrusion technology. The resulting products were characterized regarding firmness, stickiness, cooking loss, water absorption (WA), gelatinization and viscoelastic properties. **RESULTS AND FINDINGS:** Wheat pasta was of superior characteristics such as firmness, higher cooked weight and low cooking loss followed by rice (control), teff and millet pasta. Gelatinization temperature for teff blend was in the range of  $79 \pm 4.7^\circ\text{C}$ , and for millet it was  $77 \pm 3.4^\circ\text{C}$ . Three-point bend test results showed dried teff pasta was naturally harder and stickier than millets. The addition of 20% corn starch reduced cooking loss of teff 23.01% in teff and 37.18% in millet. Teff absorbed more water than millet at the same level of corn starch. Cold paste viscosity development, drop and shift in peak viscosity has been observed in extruded pasta. **CONCLUSION:** The results have shown enormous potential and possibilities to develop food products with alternate grains whereas pasta is just one of such form. The inclusion of teff and millets in food chain can open the doors of alternate food choices for celiac patients, surge economies, and fight global hunger and malnutrition.

## Poster Abstracts

### Agricultural Sciences

#### **NITROUS OXIDE EMISSIONS IN A TURFGRASS ENVIRONMENT**

**Ross Braun** and Dale Bremer

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**BACKGROUND AND PURPOSE:** Nitrous oxide (N<sub>2</sub>O) is important greenhouse gases that has been implicated in global climate change and is the most important ozone-depleting substance in the atmosphere. Turfgrass systems, similar to agricultural systems are typically fertilized with nitrogen (N) and irrigated, which may result in significant N<sub>2</sub>O emissions. The development of management practices such as controlled (slow-release) N fertilizer and/or deficit irrigation may mitigate N<sub>2</sub>O emissions. Our objective was to quantify the magnitude and patterns of N<sub>2</sub>O emissions in turfgrass and determine how irrigation and N fertilization may be managed to reduce N<sub>2</sub>O emissions in turfgrass. **METHOD:** A field study under a automated rainout shelter was conducted in Manhattan, KS from October 2014 to October 2016 on 'Meyer' zoysiagrass (*Zoysia japonica* Steud.) maintained at 2.54 cm height. Two irrigation levels were implemented, a medium (66% reference evapotranspiration [ET<sub>o</sub>] replacement) and a low (33% ET<sub>o</sub> replacement). Three N-fertilization levels included a quick release (urea), a controlled-release (polymer-coated urea), and untreated "control" (no-N), total application was 98 kg N ha<sup>-1</sup> yr<sup>-1</sup>. N<sub>2</sub>O emissions were measured periodically by static chambers and gas chromatography. Other measurements included soil-moisture, soil-temperature, soil-ammonium, and soil-nitrate, turf visual quality, percent green cover. **RESULTS/FINDINGS:** Urea had higher peak N<sub>2</sub>O-N fluxes (ug N m<sup>-2</sup> h<sup>-1</sup>) after fertilization, which contributed to greater overall emissions than polymer-coated N-fertilizer and the untreated control. Differences were negligible due to irrigation treatment. Polymer-coated urea resulted in more consistent percent green cover than urea and untreated. **CONCLUSION:** Controlled-released N fertilizers in turfgrass systems could potentially help mitigate N<sub>2</sub>O emissions.

#### **ROVE BEETLE *dalotia coriaria* PREDATION ON WESTERN FLOWER**

**THRIPS *frankliniella occidentalis***

**Yinping Li** and Raymond Cloyd

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**BACKGROUND AND PURPOSE:** The rove beetle *Dalotia coriaria* (RB), a soil-dwelling predator, has been reported to attack greenhouse pests including the western flower thrips *Frankliniella occidentalis* (WFT). However, minimal information is available on efficacy of RB associated with WFT. **PURPOSE:** A study was conducted to assess the predation efficiency of RB adults on WFT prepupae and pupae residing in growing medium. **METHOD:** Experiment was set-up as a randomized complete block design, with day as a blocking factor. The predation efficiency of RB adults was evaluated using six numbers (0, 1, 2, 3, 4 and 5) of RB adults along with four initial numbers of WFT prepupae (15, 20, 25 and 30), or pupae (15, 20, 25 and 30). The number of WFT adults captured on the yellow sticky card was counted at 17 days for prepupae and 15 days for pupae. **RESULTS/FINDINGS:** Rove beetle predation was 85% for prepupae and 99% for pupae. However, there was no significant difference regarding predation among the different numbers of RB adults corresponding to each initial number of WFT prepupae or pupae. Per capita prey consumption for both prepupae and pupae was highest when only one RB adult was released. When the number of RB adults and WFT prepupae increased two-fold, predation also increased two-fold at the predator-prey ratio of 1:15. **CONCLUSION:** Results indicate that *D. coriaria* may be a viable biological control agent of western flower thrips in greenhouse production systems.

## USING HANDHELD CROP SENSORS TO ENHANCE YIELD AND NITROGEN (N) USE EFFICIENCY IN WINTER WHEAT

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**BACKGROUND:** Nitrogen (N) in Kansas soils can vary dramatically over the course of a year, and from year to year. Hand held optical sensors have the potential to assess the N status of winter wheat and optimize N recommendations. The objective was to evaluate the effectiveness of KSU handheld optical sensor-based N recommendation algorithms against the KSU soil test based N recommendation system and KSU small unmanned aircraft systems (sUAS) based N recommendation algorithms. **METHODS:** Five field trials were established across Kansas during the 2015-2016 crop year in cooperation with County Ag Agents and farmers. Treatments consisted of 0, 25, 50, 75, 100, 125 pounds of N, 1<sup>st</sup> and 2<sup>nd</sup> generation KSU N recommendation algorithms with handheld optical sensors, KSU sUAS based N recommendation algorithms, and KSU soil test based N recommendations. Treatments were applied in the spring. The 1<sup>st</sup> generation KSU N recommendation algorithms utilized an N reference strip to determine N sufficiency, while 2<sup>nd</sup> generation KSU algorithms does not require a N reference strip. **RESULTS AND CONCLUSION:** The 2<sup>nd</sup> generation N recommendation algorithm using handheld optical sensor compared to the soil test had a performance advantage over soil test, due to recommending less N while achieving the same grain yield as the soil test N recommendation. The comparison between both handheld optical sensor and sUAS based recommendations showed equivalent performance in small plot trials. Both sensor technologies have the potential to increase grain yield and lower N fertilizer inputs equal to or better than traditional soil testing.

## EFFECT OF BRAHMAN GENETICS ON MEAT TENDERNESS

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**BACKGROUND:** Beef tenderness one of the most important characteristics that contribute to consumer eating satisfaction. Multiple studies have concluded steaks from cattle with a greater percentage of Brahman genetics are tougher than cattle of other breeds. Cattle from the Southern regions of the United States can be largely influenced by Brahman genetics. **OBJECTIVE:** To examine the effect of Brahman genetic percentage on meat tenderness of *Longissimus lumborum* (LL) steaks. **METHODS:** Over 2 years, 72 steers were sorted into 4 categories based on percentage of Angus and Brahman breeding (100% Angus/0% Brahman, 62.5% Angus/37.5% Brahman, 50% Angus/50% Brahman, 0% Angus/100% Brahman). All steers were harvested at 1.0–1.5 cm of back fat. The LL roast was collected, then aged 14 days. After aging each roast was fabricated into steaks (2.54 cm) for Warner-Bratzler shear force (WBSF) and trained sensory panel evaluation. **RESULTS:** As Brahman genetics increased, LL steak thaw loss percent and WBSF increased, while cook loss was not affected. Additionally, with increased Brahman genetic percentage, panelist scores decreased for tenderness, connective tissue content, and juiciness. Finally, Brahman genetics had no effect on beef flavor or off-flavor panel scores. **CONCLUSION:** Steaks with a greater percentage of Brahman influence have reduced tenderness, a greater amount of detected connective tissue, and decreased juiciness. Brahman genetics can negatively impact beef tenderness; therefore, decreasing consumer eating satisfaction.

**CONSUMER EVALUATION OF 9 DIFFERENT BEEF CUTS FROM 3 USDA QUALITY GRADES**  
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**BACKGROUND:** Strip loins are marketed at the 4<sup>th</sup> highest premium of all beef cuts. Therefore, an opportunity exists to identify lower value cuts that have a similar or better eating quality than strip steaks. **OBJECTIVE:** The purpose of this study was to determine consumer perceptions of strip loin steaks compared to eight different NCBA beef innovation cuts at varying quality grades. **MATERIALS AND METHODS:** Sub-primals were selected from 3 USDA quality grades (Prime, Low Choice, Select) and were fabricated into 2.54 cm steaks to represent eight NCBA Innovation cuts (San Antonio, Western Griller, Delmonico, Flat Iron, Tucson, Denver, Ranch, and Shoulder Petite Tender steaks) and strip loin steaks. Consumers (n = 210) evaluated steaks for juiciness, tenderness, flavor, and overall liking on continuous line scales. **RESULTS:** The Delmonico, Flat Iron and Denver steaks were rated the highest for juiciness and overall like ( $P < 0.05$ ) compared to all other muscles. The San Antonio, Western Griller and Tucson had the lowest overall ratings ( $P < 0.05$ ). The Delmonico and Flat Iron were rated more tender ( $P < 0.05$ ) than the Denver steak, which was more tender than all other cuts. The Western Griller was the toughest ( $P < 0.05$ ) when compared to all other muscles, except the Tucson steak. **CONCLUSION:** The Delmonico, Flat Iron and Denver steaks had a better eating quality than strip steaks. This represents an opportunity for retailers and foodservice to market these more affordable cuts and still deliver a high level of eating satisfaction to customers.

**THE FIRST TWENTY EXERCISE TRAINING PROGRAM AND FIRE ACADEMY RECRUITS' FITNESS AND HEALTH**

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Firefighters struggle with poor health/fitness, including high rates of overweight/obesity (>80%). Limited resources exist sensitive to the culture and work requirements of firefighters. **PURPOSE:** To examine the effects of a novel training program on fire academy recruits' exercise initiation, enjoyment, motivation, and adherence. **METHODS:** Thirteen participants were randomly assigned to control (CG, n=6) or intervention (TF20, n=7). The CG continued current exercise habits. TF20 was provided a 10-week online training program (The First Twenty) including periodized workouts, nutritional information, and mental readiness education. Participants completed physical activity, enjoyment, motivation, and exercise barriers assessments at baseline and post-intervention. Feasibility was assessed for TF20 group. **RESULTS:** Ten males (23±2.7 years) completed the study (CG, n=3, 50%; TF20, n=7, 100%). At baseline, all participants reported strong exercise motivation and enjoyment, and 67% of the CG and 80% of TF20 group reported meeting moderate/vigorous Physical Activity Guidelines (PAG). Post-intervention, all participants reported meeting (some exceeding) PAG, including strength training. Post-intervention, all participants noted they enjoyed exercising and were motivated to continue. Time was the largest barrier to exercise (67% of respondents), followed by school/work (45%), and family obligations (33%). TF20 participants completed 75% of workouts. Participants noted desiring group workouts led by a certified coach/trainer as opposed to individual workouts. **CONCLUSION:** Participants were able to maintain their motivation and enjoyment for exercise and planned to continue. Intervention adherence and compliance were high and facilitated meeting PAG. Developed by firefighters for firefighters, TF20 offers a promising method of fitness training although intervention delivery is crucial for success.

**ZOONOTIC DISEASE RISK AT THE 2016 KANSAS STATE FAIR**

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**BACKGROUND AND PURPOSE:** The Kansas State Fair has the largest visitor attendance of any event in Kansas. One of the purposes of the fair is to celebrate and promote the state's animal agriculture industry. Fairgoers are able, and even encouraged, to interact with livestock, horses, and other animals. This inherently increases the risk for the contraction of zoonotic diseases. The purpose of this study was to describe the extent of zoonotic disease risk at the Kansas State Fair by observing visitors' behaviors in the animal buildings on the fairgrounds. **METHOD:** Visitor behavior was monitored in up to nine of the animal buildings on the Kansas State Fairgrounds each day during the first nine days of the fair. Hand hygiene and other high-risk behaviors performed by fair attendees were observed and recorded for thirty minutes per building per day. **RESULTS:** In adults, the hand hygiene rate in the animal barns throughout the nine days of observation ranged from 2.3% to 53.9%. In children, the hand hygiene rate ranged from 1.0% to 45.6%. Hundreds of high-risk behaviors by both adults and children were observed on a daily basis in most of the animal barns. **CONCLUSION:** The majority of Kansas State Fair visitors practice behaviors that put them at increased risk for contracting a zoonotic disease while at the fair. The Kansas State Fair administration, therefore, should improve their mitigation strategies by providing better zoonotic disease education and hand hygiene supplies for fairgoers.



## **IMPACT OF VIDEO-BASED WELLNESS TRAINING ON GIRL SCOUT LEADERS' WELLNESS PROMOTION SELF-EFFICACY, INTENTION, AND KNOWLEDGE**

**Brooke J. Cull, Sara K. Rosenkranz, Richard R. Rosenkranz**

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**BACKGROUND AND PURPOSE:** Implementation of wellness-promoting practices, such as increasing opportunities for physical activity (PA) and fruits and vegetables (FV) can be improved in Girl Scouts (GS) through leader wellness training. This study evaluated the effectiveness of tailored video-based training on leaders' self-efficacy, intention, and knowledge regarding PA and FV offerings during troop meetings. **METHODS:** Thirty GS leaders were randomly assigned to control (n=16) or intervention (n=14) conditions. The intervention group received six weekly training videos on implementation of PA and FV wellness practices for troop meetings. Training videos addressed leader-identified improvement areas and strategies to overcome barriers. Leaders set goals for upcoming meetings, and self-monitored progress each week. Questionnaires were completed at baseline and post-intervention on leaders' task and barrier self-efficacy, intention, and knowledge regarding PA opportunities, and fruit and vegetable availability during troop meetings. **RESULTS:** From baseline to post-intervention, leaders in the intervention group improved their PA barrier self-efficacy, when compared to those in the control group (CON=-38.5±171.7; INT=132.0±193.0;  $p=0.036$ ). Control group leaders did not exhibit changes in any of the studied variables ( $p>0.05$ ), while leaders in the intervention group increased vegetable availability self-efficacy ( $p=0.037$ ), FV barrier self-efficacy ( $p=0.024$ ), and fruit availability intention ( $p=0.024$ ). There were no changes in PA intention or knowledge, or FV knowledge, for either group ( $p>0.05$ ). **CONCLUSIONS:** Six weeks of tailored training videos increased GS leaders' self-efficacy for overcoming barriers related to implementing PA. Future research should assess whether tailored video training is effective for improving PA and FV opportunities for girls during troop meetings.

## **IS PHYSICAL ACTIVITY PROTECTIVE AGAINST POTENTIALLY HARMFUL PSYCHOLOGICAL EFFECTS OF IMPOSED SEDENTARY TIME IN YOUNG ADULTS?**

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Physical activity and sedentary behavior are known to impact physical and psychological health. Previous research suggests that regular physical activity may be a protective factor for depression and anxiety. It is unknown, however, whether meeting physical activity guidelines is protective against the potentially harmful psychological effects of imposed sedentary time. **PURPOSE:** The purpose of the current study was to determine whether physically active (PA) young adults differed from young adults who were insufficiently active (IA), with regard to psychological responses to eight weeks of imposed sedentary time. **METHODS:** Healthy young adults (n=27, aged 22.1±3.0 years), either PA (≥150 min/wk moderate-to-vigorous physical activity, n=16) or IA (<30 min/wk moderate-vigorous physical activity, n=11), were randomized to either the sitting group (SIT, n=16) or the control (CON, n=11) group. Ten hours of sitting time per week was imposed for eight weeks for SIT participants. At baseline, 4 weeks, and 8 weeks, the Depression, Anxiety, and Stress Scale Short-Form (DASS<sub>21</sub>) was used to assess depression, anxiety, and stress. **RESULTS:** At baseline, a greater proportion of PA participants than IA participants were rated as normal on all scales of the DASS<sub>21</sub> (PA:14/16, IA:4/11;  $p=0.011$ ). In the SIT group, there were no significant differences between or within PA and IA for ratings of depression ( $\Delta$ mean±SD) (PA:0.0±0.0, IA:0.5±1.1;  $p=0.207$ ), anxiety (PA:0.0±0.0, IA:-0.5±1.4;  $p=0.334$ ), or stress (PA:0.0±0.0, IA:0.3±1.6;  $p=0.554$ ) throughout the intervention. **CONCLUSION:** In young, healthy adults, despite undergoing eight weeks of imposed sedentary time, depression, anxiety, and stress did not change, regardless of physical activity levels.

**\*\*WITHDREW\*\***

## **DATA EXPLORER -ASSESSMENT DATA INTEGRATION, ANALYTICS, AND VISUALIZATION FOR STEM EDUCATION RESEARCH**

**Josh Weese**

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**BACKGROUND AND PURPOSE:** The Data Explorer is an analytics portal that gives educators the ability to gain insights from assessment data. The focus of this research is to facilitate the importing, validation, integration, and visualization of assessment data. Using online information retrieval and visualization, educators interact with their data, as well as data from others in a usable, efficient, and secure way. Users will also be able to compare data against other educators to understand where their students lie. **METHOD:** Educators are able to upload their assessment data in generic formats; then verifies the information our system has extracted. Once data is verified, student data is processed and presented for being interactively viewed in the web. **RESULTS/FINDINGS:** The Data Explorer, currently is able to handle a number of formatted and lightly formatted data sets. For extracting and identifying student data from files, the system achieves an average accuracy of 94%. **CONCLUSION:** The Data Explorer is a new system that allows educators to upload assessment data and interact with their data in ways that were previously not possible or time consuming. We are now able to bring together data from multiple instructors and institutions, creating one of the largest, collective repositories of physics assessment data.

## **REDUCING FOOD WASTE IN A CAMPUS RESTAURANT: A SUSTAINABILITY INITIATIVE**

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**BACKGROUND AND PURPOSE:** The aim of this project was to initiate a culture change in a campus restaurant that would support sustainability and result in a reduction of food waste generated by the operation through training and operational changes. The effect of training and operational changes on the quantity of waste discarded were assessed. **METHODS:** A pre-and-post design was used to assess the effect of implementing a personalized waste tracking system and employee training on the quantity of food waste generated. Trained observers collected, photographed, and weighed food waste during lunch throughout two 6-week periods. After the first period, the restaurant employees were trained on the importance of reducing food waste, strategies to reduce food waste, and tracking methods to collect data. After the training, managers introduced the following operational changes: reducing recipe batches, using smaller containers, providing burger set-ups upon request, reducing ramekin size of salsa, and displaying table tents that explained the waste reduction initiatives to customers. **RESULTS/FINDINGS:** Weekly kitchen waste decreased, on average, 14.3 pounds after training. Waste of red onions, limes, leaf lettuce, tomatoes, and potatoes experienced a decrease after the training session. Even though, average waste per guest did not change, there was a decrease in waste for specific items such as burger set-ups, pickles, chips and salsa. **CONCLUSION:** Training and operational changes were effective in reducing weekly average kitchen waste and various plate waste items. The university community could experience economic, social, and environmental benefits from introducing a culture of food waste reduction in this campus restaurant.

## **NURTURE THROUGH NATURE: A COMPARATIVE STUDY BETWEEN STANDARD AND NATURE-BASED PLAY IN OUTDOOR PRESCHOOL ENVIRONMENTS**

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**BACKGROUND AND PURPOSE:** Nature-based play is gaining attention in early childhood education because of the social, physical, and cognitive benefits from interacting with nature at a young age. Some studies have proven that nature-based unstructured play have a positive benefit on early childhood development. The purpose of this study is to identify differences in play behavior of preschoolers that may influence early childhood development between nature-based and standard playgrounds. **METHOD:** Comparative observations were conducted at Center for Child Development (nature-based) and Hoeflin Stone House (standard) playgrounds at K-State. Preschooler play behaviors and behavior-environment interactions in both settings were compared using behavioral mapping and time-lapse observation (20 minutes per subject) techniques. **RESULTS/FINDINGS:** Based on the preliminary results, children in nature-based playgrounds are more likley to be active and creative. Also, movable and manipulatable play elements allow children to engage in more social activities than standard elements. For example, children who played on the nature-based playground used movable objects such as buckets and pails to shovel snow and sand to create “potions,” “snowmen,” and “castles,” together in small groups, while standard elements within the same playground such as the slide attracted children who played alone without social interaction. **CONCLUSION:** The findings will lead to a call for research and design into the direction of creating a more nature-based play environment that affords direct interaction with children and thus affects their positive childhood development.

## **THE MIND, THE NARRATIVE, AND THE CITY: DRAWING NARRATIVES OF THE CITY**

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**BACKGROUND AND PURPOSE:** It is believed by some authors that landscapes have narratives and that these narratives influence how we, as humans, interact with the landscape. These narratives build and begin to shape how we understand and perceive our cities. This research investigates the relationship between cognitive maps, experience, and narratives. Specifically, how college students develop and use narratives within their cognitive maps to help with living in new and initially unfamiliar places of residence. Along with narratives, this research aims to understand how spatially accurate elements, which are associated with narratives, are within cognitive maps. Together, these mapped areas will paint a picture of an individual’s narrative or relationship with the city, as a whole. **METHOD:** The main methods are both quantitative and qualitative. A study will be conducted with groups of college students at Kansas State. The study will have a survey, two cognitive map drawing activities, and a discussion portion. Geographical Information System (GIS) will be used to compare the cognitive maps drawn by students with real maps and aerial photography. **RESULTS/FINDINGS:** It is anticipated that this research, like previous research, will show that individual experience and creation of narratives within The City influence the individual's cognitive map. **CONCLUSION:** The results of this study will help the landscape architecture and planning communities understand how people, specifical students, begin to learn and live in the areas of the city that they study in.

## INTEGRATING STARCHY SUBSTRATE INTO CELLULOSIC ETHANOL PRODUCTION TO BOOST ETHANOL TITERS AND YIELDS

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**BACKGROUND AND PURPOSE:** Low sugar concentration after saccharification of treated biomass is one of the major issues that affect the commercialization of cellulosic ethanol. High-gravity bioprocessing as a traditional method often results in sacrificed ethanol yields. Integration of cellulosic ethanol production with existing starch-based ethanol facilities could accelerate the commercialization of cellulosic ethanol production. Fermentation of treated cellulosic biomass alone is not able to achieve the goal of minimal 40 g/L required for economical ethanol distillation and high ethanol yield (>80%). The objective of this research was to integrate cellulosic ethanol production into current starch-based ethanol production to boost ethanol titers and ethanol yields. **METHOD:** Co-fermentation of the corn flour and hydrothermal treated corn stover mixture at various mixtures was conducted. Ethanol content was measured by High Performance Liquid Chromatography (HPLC). **RESULTS AND CONCLUSION:** High ethanol concentration (68.7 g/L) corresponding to ethanol yield of 86.0% was obtained by co-fermentation of the corn flour and hydrothermal treated corn stover mixture (12:12) using enzyme mixtures of raw starch granular enzyme and cellulolytic enzyme. Alternatively, co-fermentation of corn flour with juice from enzymatic saccharification of hydrothermal treated corn stover boosted ethanol titers from 19.9 to 123.2 g/L and 36.8 to 130.2 g/L at biomass solid loading of 8 and 16%, respectively. Co-fermentation technology significantly reduces energy cost requested for ethanol distillation and water usage. These results indicated co-fermentation of starchy grains with biomass could significantly accelerate the commercialization of cellulosic biofuel production.

## IMPACT OF SPEED LIMIT CHANGE ON FREE FLOW SPEED FOR KANSAS FREEWAYS

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**BACKGROUND AND PURPOSE:** Roadway treatments are sometimes helpful in reducing the number of crashes when they are implemented but some of them might have an opposite effect and they could reiterate the severity level of crashes after treatment installation. In 2011, Kansas legislature passed the new maximum speed limit law accordingly, effective from July 1st. More than 800 miles of freeways in Kansas saw a speed limit increase from 70 mph to 75 mph as the maximum speed limit on these sections. The main purpose of this study is to consider the impact of posted speed limit increase on the free flow speed of drivers. The analysis was conducted on the 85% speed difference between before and after speed limit change and the speed data was taken from Kansas Department of Transportation for 1 year before and 1 year after the change based on data availability. **METHOD:** After identifying the traffic count stations located on the sites affected by speed limit change (treated sites), 85% speed was extracted from frequency distribution curve for both before and after the period. According to one-tailed t-test method, 85% speed value in the before period was compared with after period to check any statistical significance change. **RESULTS/FINDINGS:** By conducting the method named, it was found that speed increase for some of the freeway sections was statistically significant. **CONCLUSION:** In summary, raising speed limit caused a significant increase in free flow speed of vehicles driving on freeways after speed limit change and this would cause more crashes when vehicles speed goes up.

**\*\*WITHDREW\*\***

## **SIGNIFICANCE OF WIDE BAND GAP DEVICES IN POWER ELECTRONICS APPLICATIONS**

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The Wide Band Gap (WBG) semiconductors have wider *band gap – energy gap* between valence band and conduction band. The wider band gap implies that it will require more energy for electrons to move from the valence band to conduction band. This capability allows power electronics components to be smaller, efficient, robust, and reliable compared to traditional Silicon(Si) based components. These devices are used in industrial motors, grid intergration, military, lighting among others. The biggest challenge for WBG devices is the system integration and from manufacturing cost. **PROPOSED EXPERIMENT:** To study the advantages and challenges associated with WBG semiconductors a novel Unity Power Factor (UPF) Rectifier(AC to DC converter) for aircraft applications has been built in the Power Electronics Research Laboratory. In the lab, the system is being assembled to study and analyze the 1200V SiC (Attractive Commercial WBG semiconductor material) MOSFETs. The test setup displays promising results for DC to AC converter with smaller filter size and with a swithing frequency more than 5 times higher than tradtionl converters. **RESULTS/FINDINGS:** Switching frequency is significantly higher than Si components, leading to smaller megnetics i.e. filter size. Overall, reducing the system size and lowering the power losses. **CONCLUSION:** Experimental results will provide a concrete analysis of the sytem and a compariosn with traditional systems.

## **OPTIMIZATION OF LIGNOCELLULOSIC BIOMASS-TO-BIOFUEL SUPPLY CHAINS WITH MOBILE PELLETING**

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**BACKGROUND AND PURPOSE:** The low density of lignocellulosic biomass results in high costs associated with biomass transportation, storage, and handling in the biomass-to-biofuel supply chain. Mobile pelleting machines provide an as-yet-unexplored opportunity to increase lignocellulosic biomass density. **METHOD:** A comprehensive biomass-to-biofuel optimization model that integrates mobile pelleting is developed to minimize the overall cost of producing ethanol from lignocellulosic biomass. We present results from a case study that considers corn stover and switchgrass in two different forms at production fields, namely rectangular and round bales, and the potential for pelleting biomass at satellite storage locations using one mobile pelleting machine. Sensitivity analysis is conducted to identify the impact of parameter values on decisions related to biomass densification. **RESULTS AND CONCLUSION:** Under the base case parameter values, the mobile pelleting machine is not utilized. Results indicate that mobile pelleting machine utilization is sensitive to independent changes in biomass densification costs, transportation distances, and satellite storage location fixed cost. We also examine simultaneous changes in these parameters using scenario analysis to offer insight into conditions under which mobile densification is economically viable. Results shows that the mobile pelleting machine is utilized when the distances between facilities are large regardless of other parameter values. Reducing biomass densification costs and/or satellite storage location fixed costs decreases the distance threshold for which mobile densification is attractive. When additional mobile pelleting machines are available, mobile densification becomes more attractive because the increased densification capacity offsets the fixed costs associated with establishing satellite storage locations.

## EFFECT OF PH AND PH-SHIFTING ON LIGNIN-PROTEIN INTERACTIONS AND ADHESION PERFORMANCE OF LIGNIN-PROTEIN POLYMER

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**BACKGROUND AND PURPOSE:** Formaldehyde-based adhesives is widely applied in pressed wood products due to its durable adhesion performance. However, formaldehyde causes adverse effects on the environment and human health. Therefore, there are strong demands for safe, environmentally friendly, and sustainable wood adhesives. Soy protein adhesives (SPA) have a high potential to replace petroleum-based adhesives. However, the major disadvantage of SPA, compared with petroleum-based adhesives, is low water resistance, which limits its applications. Lignin, an abundant renewable aromatic polymer, has shown a potential to enhance the water resistance property of SPA. A lot of lignin by-products are produced from paper, pulp, and ethanol industries annually but only 1–2% has been converted to value-added products. Therefore, it is essential to seek new value-added applications for the effective utilizations of lignin. **METHOD:** In this study, wood specimens were glued with Lignin-SPA adhesives. Wet and dry adhesion strengths were both measured. Glueline, film morphology and physical properties were also observed. **RESULTS AND CONCLUSION:** Lignin enhanced water resistance and thermal properties, and induced alternative folding structures of SPA. Lignin-blended adhesives showed significant improvement on wet adhesion strength. It was also observed that the 8.5-4.5 pH-shifting process can significantly improve the tensile strength regardless of wet and dry tests. The pH-shifting process promoted larger clump of protein particles and bonding interactions which resulted in differences in glueline patterns. Results also showed that lignin-soy protein interaction, solubility, the degree of penetration and the balance of those factors contributed significantly to adhesion strength.

**\*\*WITHDREW\*\***

## INVESTIGATION OF OIL-WATER FLOW PATTERNS AND PRESSURE DROPS IN MILLIMETER CHANNELS

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**BACKGROUND AND PURPOSE:** Crude oil derived fuel sources will continue to play an important role in providing energy to the U.S in the coming decades. The removal of salt water from crude oil, desalting, is a process that is done regularly to reduce corrosion. Current desalting methods, which make use of gravitational and electrostatic forces, have proven to be challenging and inefficient in deep-water regions. This research investigates the use of surface tension forces to induce oil-water separation within the tube by using the annular flow regime configuration, water in full contact with the tube wall flowing in a ring and oil flowing in the core. **METHOD:** A closed-loop, adiabatic experimental apparatus was constructed and validated using water. Oil was introduced to the loop and experiments included a wide range of oil superficial velocities (e.g., 0.84–6.84 m/s for  $D=2.1$  mm and 0.27–3.30 m/s for  $D=3.7$  mm) and water superficial velocities (e.g., 0.21–7.69 m/s for  $D=2.1$  mm and 0.07–4.96 m/s for  $D=3.7$  mm). **RESULTS AND CONCLUSION:** Stratified, annular, intermittent, and dispersed flow regimes were observed in both tubes, although the annular flow regime was more prevalent in the smaller tube. Pressure drops increased with decreasing tube diameter and were flow regime dependent. Flow maps were created for these mini-channels. The effects of viscosity were modest, although increased oil viscosity enhanced stability of oil-water flows. **CONCLUSION:** Results suggest that there is a wider range of annular flow in mini-channels, which could provide a new approach in designing desalting systems.

## HOW TO IMPROVE CHEMICAL STABILITY OF ENERGETIC MATERIALS VIA CO-CRYSTALLIZATION

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**Background and purpose:** Designing energetic materials with improved performance and properties is a demanding area in both military and civil applications. Among many interesting molecules, high-nitrogen content molecules with nitro groups are investigated due to their high heats of formation, density and favorable oxygen balance. However unfortunately most of these molecules are acidic which leads to a higher chemical reactivity and compatibility issues which lowers the long term storage of energetic materials. However through a new technology called co-crystallization it may be possible to add protecting groups to reduce acidity which may lower the chemical reactivity and therefore improve storage and handling issues. **Method:** In this study acidic energetic molecules were synthesized and subjected to reaction with suitable molecules which can form interactions with acidic energetic molecules. Crystals of new solid forms were analyzed via X-ray crystallography which allowed visualizing the interaction between molecules. Thermal and explosive property analysis was carried out and corrosion test studies were performed on a copper strip. **Results:** Analysis of new solid forms confirms the successful interaction between the acidic protons of energetic materials and the molecules used. Corrosion studies provide proof of successful reduction of acidity and chemical reactivity. **Conclusion:** Successful incorporation of suitable molecules with acidic energetic materials reduces acidic properties, reactivity and corrosion enabling long term storage and handling.

## SPECTROSCOPIC SINGLE-MOLECULE TRACKING REVEALS THE ONE-DIMENSIONAL DIFFUSION PATHWAYS IN SURFACTANT-TEMPLATED MESOPOROUS SILICA

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**BACKGROUND AND PURPOSE:** The confined orientational motions of fluorescent dye molecules diffusing along one dimension (1D) within individual silica mesopores are investigated by simultaneous single molecule tracking and single molecule emission dichroism methods. Perylene diimide dyes have been reported to exhibit strong orientational confinement as they diffuse within the nanometer-sized one-dimensional pores of cetyltrimethylammonium bromide (CTAB)-templated mesoporous silica films. It is expected that the Perylene diimide dye molecules are confined to the most hydrophobic regions of the surfactant micelles, and that formation of a water-rich solvent layer at the silica/surfactant boundary may also contribute but evidence for the actual location of the dye molecules is crucial. **METHOD:** The polarity sensitive dye Nile Red is employed in spectroscopic single molecule tracking studies to determine the exact location of the dye and Polarizationdependent single molecule tracking is used to show that the Nile Red molecules exhibit the similar orientational confinement as Perylene diimide dye molecules. **RESULTS/FINDINGS:** The spectroscopic single molecule tracking data reveal that the majority of 1D diffusing Nile Red molecules, as well as immobile and 2D diffusing populations are predominantly found in highly nonpolar environments. **CONCLUSION:** These results are most consistent with confinement of both the Nile Red and Perylene diimide dyes to the hydrophobic micelle core regions in the center of the pores.

## ANALYSIS OF ANIMAL RELATED CRASHES IN THE STATE OF KANSAS

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**BACKGROUND AND PURPOSE:** Every year in Kansas, thousands of crashes occur between motor vehicles and animals, resulting in considerable property damage crashes, injury and fatality to persons, and loss of animal lives. These crash types accounted for 15.86% of all crashes in the state and over 30% for many counties in the state. As a result, these crashes should be considered as an important issue that requires particular attention within rural and urban areas. **METHOD:** This paper reviews animal related road crashes in Kansas from 2006 to 2015. Kansas Department of Transportation (KDOT) provided necessary data for analysis. Descriptive analysis has been done and multiple linear regression will be conducted to understand and find the relationship between variables. **RESULTS:** From the descriptive analysis, it was found that, deer are the predominant species involved in these crashes. Consistent with other studies, travel during dawn and dusk have significant risk factor when comparing animal-related crashes with the time of the day. During the morning peak (6-8 AM) and evening peak (6-11 PM), the crash rate was higher for animal related crashes. Two-third of the animal related crashes occurs from June- November, which can be linked with hunting season and winter. Between 2006 and 2015, 90% of these crashes occurred in good weather. KDOT reported 49 fatal crashes for this period, which resulted 50 fatalities. Nearly 3% of the animal related crashes are injury crashes and the rest are PDO crashes.

## POINT-OF-CARE MICROFLUIDIC DEVICE FABRICATION AIDED BY 3D PRINTING

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**BACKGROUND AND PURPOSE:** Point-of-Care (POC) microfluidic devices (MDs) can replace clinical lab procedures providing opportunities for healthcare providers to diagnose, monitor, and prevent disease without a laboratory setting. Traditional soft-lithographical fabrication of MDs can be difficult and slow. However, advances in consumer priced stereolithography (SLA) technology enables high resolution 3D printing in minutes, for pennies; alleviating traditional microfluidic fabrication limitations. Hence, we studied the ability of SLA printers to fabricate MDs that can be used for POC via two approaches: (1) monolithic printing and (2) PDMS replication via molds. **METHODS:** A 3D printer (D3 ProJet 1200) was used for fabrication of monolithic devices and molds. Test molds were treated with formulations of ink, graphite, baking or fluorosilane to determine an optimal treatment for polydimethylsiloxane (PDMS) cure. Devices were analyzed via light microscopy. **RESULTS:** In previous work, which we include here as evidence to support fabrication approach (1), successful monolithic printing of a POC for anemia diagnosis was shown. However, SLA resin's bio-compatibilities poses problems with most POC applications. PDMS replication via printed molds can alleviate this issue. However, SLA resin was found to inhibit PDMS curing. We hypothesize SLA resin contains surface vinyl residue which interferes with PDMS cross-linking. Permanent marker and 0.2% trifluoromethylsilane, airbrushed on molds, followed by 40C baking for 1 hour allowed PDMS cure and successful fabrication of a MD. **CONCLUSION:** We report a microfluidic fabrication approach utilizing SLA technology for producing POC diagnostic devices via PDMS replication of printed molds in order to overcome SLA resin's bio-incompatibilities.



## VARIATION IN NUTRITIONAL QUALITY OF SCHOOL LUNCHES WITH IMPLEMENTATION OF NATIONAL SCHOOL LUNCH PROGRAM GUIDELINES

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**BACKGROUND AND PURPOSE:** In order to receive reimbursement, schools must meet nutrition standards based on the most recent Dietary Guidelines for Americans (DGA). The purpose of this study was to determine whether there are significant differences in nutrient content and nutritional quality between two menus meeting National School Lunch Program (NSLP) requirements. **METHODS:** Using a cross-sectional content analysis, we compared a typical school lunch menu (TM) from an actual school district, to a best practice school lunch menu (BPM) created by a Registered Dietitian. The BPM was based on best practices from the Child and Adult Care Food Program (CACFP) and 2015 DGA healthy meal pattern recommendations. Daily nutrient content of all macro- and micro-nutrients was determined using Nutritionist Pro™ Diet Analysis Software. Nutritional quality was computed using the Healthy Eating Index 2010 (HEI). **RESULTS:** For NSLP nutrients required for analysis, the BPM were lower in calories (mean±SD, BPM=637.6±31.1kcal, TM=733.7±154.3kcal,  $p=0.001$ ), saturated fat (BPM=6.6±3.1g, TM=11.3±6.0g,  $p<0.001$ ), and sodium (BPM=562.8±139.6mg, TM=1223.1±519.6mg,  $p<0.001$ ) and higher in fiber (BPM=16.0±11.7g, TM=7.4±2.8g,  $p<0.001$ ). For other nutrients of concern, the BPM were lower in total fat ( $p=0.003$ ) and higher for vitamin A ( $p<0.001$ ) and magnesium ( $p<0.001$ ). Overall nutritional quality was higher for BPM according to the HEI scores (BPM=91.8±5.1, TM=75.1±5.8,  $p<0.001$ ). **CONCLUSIONS:** Results indicate that it is possible for significant variation in nutrient quantity and overall nutritional quality provided by school lunches meeting NSLP requirements. Using CACFP best practices and DGA healthy meal pattern recommendations may have a significant impact on the overall dietary quality of school lunches meeting NSLP requirements.

## OXYGEN UPTAKE DURING THREE VARYING DURATION HIGH-INTENSITY FUNCTIONAL TRAINING SESSIONS

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**PURPOSE:** High-levels of oxygen uptake ( $\dot{V}O_2$ ) exist during high-intensity functional training (HIFT), however  $\dot{V}O_2$  during HIFT of varying durations has not been characterized. Our investigation determined  $\dot{V}O_2$  during three varying duration HIFT sessions. **METHOD:** Six healthy men were recruited. Participants completed an incremental exercise test and three HIFT sessions. Pulmonary gas exchange was measured and used to determine maximal oxygen consumption ( $VO_{2max}$ ), gas exchange threshold (GET), and respiratory compensation point (RCP) during the incremental exercise test. Session 1 (S1) included 21-15-9 repetitions of power cleans and ring dips. Session 2 (S2) included 3 rounds of 400-meter run, 21 kettlebell swings and 12 pull-ups. Session 3 (S3) included as many rounds as possible of 5 pull-ups, 10 push-ups and 15 squats in 20 minutes. **RESULTS:** Mean  $VO_{2max}$  was 55.9±5.6 mL/kg/min with GET and RCP representing 61% and 79% of  $VO_{2max}$ , respectively. The average time to complete S1 was 513±59s and elicited a mean %  $\dot{V}O_{2max}$  of 70±7% that was similar to GET and RCP. The average time to complete S2 was 783±79s, with a mean %  $\dot{V}O_{2max}$  of 82±7% that was significantly higher than GET, but similar to RCP. Mean %  $\dot{V}O_{2max}$  across S3 was 66±6%, and was significantly higher than GET at minutes 2-8, but similar at every other interval and RCP. Furthermore,  $\dot{V}O_2$  demonstrated significant oscillations during all sessions. **CONCLUSION:** Participants elicited a  $\dot{V}O_2$  between 66-82% of  $\dot{V}O_{2max}$ . Moreover,  $\dot{V}O_2$  oscillated during HIFT which suggests that metabolic demands did not achieve a steady-state and may provide a potent stimulus for improving fitness.

## NEWLY FORMULATED FORTIFIED BLENDED FOODS RESULT IN IMPROVED PROTEIN QUALITY AND IRON BIOAVAILABILITY IN BROILER CHICKENS

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**BACKGROUND AND OBJECTIVE:** Corn and soybean based fortified blended foods (FBFs) have been the primary food aid product provided by the United States. Sorghum and cowpea have been suggested as alternative FBF commodities because they are drought-tolerant, can be locally grown in areas where food aid is provided, and are not genetically modified. The primary objective of this study was to determine protein quality and iron bioavailability of newly formulated sorghum, cowpea, soy, and corn-based FBFs, compared with the current USAID corn and soy blend FBF, CSB+, in broiler chickens, which have been suggested to be a good model for iron bioavailability. **METHOD:** Nine groups of one-day old broiler chicks (n = 10) consumed control chicken diet for one week before being randomized to corn-soy, white sorghum-soy, white sorghum-cowpea, white sorghum-cowpea with soy protein isolate (instead of whey protein concentrate) extruded FBFs, two over-extruded white sorghum-cowpea FBFs (one with soy protein isolate), a non-extruded sorghum-cowpea FBF, CSB+, or a control chicken diet for 21 days. Results were analyzed by one-way ANOVA with LSD test using SAS Studio 3.6. **RESULTS:** All newly formulated FBFs resulted in significantly higher protein efficiency ratio and caloric efficiency than CSB+. Unlike CSB+, all newly formulated FBFs resulted in significantly increased hepatic iron levels compared to the control group. **CONCLUSION:** Newly formulated FBFs resulted in improved protein quality and iron bioavailability outcomes compared to CSB+, suggesting they are of higher nutritional quality. Further research is needed to identify the best new FBF formulations.

## NUCLEAR ACCUMULATION OF THE ASPERGILLUS NIDULANS GATA TRANSCRIPTION FACTOR AREA IS INDEPENDENT OF DNA BINDING.

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**BACKGROUND AND PURPOSE:** The primary regulator of nitrogen metabolic genes in fungi is the GATA transcription factor AreA. Subcellular localization of AreA in *A. nidulans* is dependent on nutrient availability. When the cell becomes nitrogen starved, AreA accumulates in the nucleus due to blocked AreA nuclear export. We have recently found redundancy in the nuclear localization signals (NLSs) of AreA. Five conserved canonical NLSs and one conserved noncanonical bipartite NLS all function together to mediate nuclear import. Only mutation of the bipartite NLS within the DNA binding domain had any significant effect on AreA function, completely abolishing transcriptional activity. **METHOD:** To determine whether AreA DNA binding affects the intracellular localization of AreA we have HA-epitope-tagged the two classical DNA binding mutants; an altered DNA binding specificity mutant, AreA102, and a non-binding mutant, AreA217. **RESULTS/FINDINGS:** The AreA102<sup>HA</sup> mutant protein showed a similar pattern of subcellular localization to wildtype AreA except when transferred to uric acid (a nitrogen source *areA102* cannot utilize). On uric acid AreA102<sup>HA</sup> accumulated in the nucleus as observed during nitrogen starvation. The AreA217<sup>HA</sup> non-binding mutant protein accumulated in the nuclei of nitrogen-starved cells, demonstrating that DNA binding is not required for AreA nuclear accumulation. In contrast to wildtype, AreA217<sup>HA</sup> accumulated in the nucleus when alternative nitrogen sources were available. **CONCLUSION:** These findings suggest that while nuclear accumulation of AreA is independent of DNA binding, nuclear export is dependent on AreA DNA binding function. We show using nitrogen metabolism mutants that this is due to the requirement of AreA for metabolic signaling of nitrogen availability.

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