16TH ANNUAL
K-STATE RESEARCH FORUM

WEDNESDAY, APRIL 20, 2011
K-STATE STUDENT UNION

Sponsored by:
Graduate Student Council
Graduate School
Offices of the President and Provost

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PROGRAM SCHEDULE

Morning Oral Presentations

9:00 – 10:30	Undergraduate 1*	Big XII Room
9:00 – 10:15	Undergraduate 2*	Flinthills Room
9:30 – 11:00	Undergraduate 3*	Sunflower Room
9:30 – 11:00	Graduate Agricultural Sciences	Room 212

*The top presenter from this session will participate in the final undergraduate session in order to determine first, second, and third place presenters.

Afternoon Oral Presentations

Noon – 3:00	Graduate Social Sciences/ Humanities/Education	Big XII Room
Noon – 3:15	Graduate Engineering/Math/ Physical Sciences	Room 212
1:30 – 3:00	Graduate Biological Sciences	Flinthills Room
3:00 – 3:45	Final Undergraduate Session	Sunflower Room

Graduate Student Poster Sessions

9:00 – 5:00	Posters on display	KS Ballroom
10:00 – Noon	First round of poster judging	
1:00 – 3:30	Second round of poster judging	
1:00 – 3:00	Capitol Graduate Research Summit (CGRS) poster presentations	

Awards Ceremony

4:00 – 5:00	Big XII Room

Awards ceremony will include a keynote address from Dr. Christopher Sorensen, University Distinguished Professor in Physics, and recognition of the 2011 CGRS presenters.

Oral Session Schedules

Undergraduate Session 1
Big XII Room

AM

9:00 **DECORIN SECRETED FROM HUMAN UMBILICAL CORD MATRIX STEM CELLS SIGNIFICANTLY ATTENUATE THE GROWTH OF HUMAN BREAST CANCER CELLS**
Jamie Ball

9:15 **EVALUATION OF THE EFFICACY OF CATIONIC PEPTIDE NANOPARTICLE-BASED THERAPEUTIC GENE DELIVERY FOR HUMAN LUNG CANCER TREATMENT**
Stephanie Jacquez

9:30 **PEROXISOME PROLIFERATOR RECEPTOR GAMMA AGONISTS ALTER ELECTROLYTE TRANSPORT ACROSS PORCINE VAS DEFERENS EPITHELIA** *Jacob Hull*

9:45 **IDENTIFICATION OF MOLECULAR MECHANISMS OF PKC/C1B DOMAIN PEPTIDE-INDUCED GROWTH SUPPRESSION OF HUMAN COLON CANCER IN VITRO AND IN VIVO** *Garret Seiler*

10:00 **UPREGULATION OF GAP JUNCTIONS WITH SUBSTITUTED QUINOLINES IN COLON CANCER CELLS** *Kristina Bigelow*

10:15 **DOCUMENTATION OF CYTOTYPE VARIATION IN *PHLOX PILOSA* L. SSP. *PILOSA* (POLEMONIACEAE) IN THE CENTRAL GREAT PLAINS** *Lindsey Worcester*

Undergraduate Session 2
Flinthills Room

AM

9:00 **A VEGETATIVE COMPATIBILITY ANALYSIS OF FUSARIUM SPECIES ASSOCIATED WITH WHEAT, CORN AND SORGHUM IN KANSAS** *Kerri Neugebauer*

9:15 **SYNTHESIS OF ZIRCONIUM NITRIDE BY NITRIDATION OF ZIRCONIUM** *Evgeniy Shishkin*

9:30 **PHOTOTRIGGERED RELEASE OF AGROCHEMICALS** *Baillie DeHaven*

9:45 **CO-CRYSTALLIZATION: A SUPRAMOLECULAR INSTRUMENT FOR TUNING THE PHYSICAL PROPERTIES OF DICLOFENAC** *Angela Grommet*

10:00 **EXTINCTION TIMES OF SOLUTIONS TO A DEGENERATE PARABOLIC EQUATION** *Perla Salazar*

10:15 **HIGH EFFICIENCY DUAL-INTEGRATED MICROSTRUCTURED SEMICONDUCTOR NEUTRON DETECTOR** *Ryan Fronk*

Undergraduate Session 3
Sunflower Room

AM

9:30 **OBESITY PREVALENCE IS LOWEST AMONG CENSUS BLOCK GROUPS WITH THE HIGHEST INCOME** *Chelsea Bird*

9:45 **CELLULOSIC FEEDSTOCK PRODUCTION SURVEY OF KANSAS FARMERS** *Jared Law*

10:00 **THE ROLE OF BODY IMAGE ON PHYSICAL ACTIVITY INITIATION AND MAINTENANCE** *Paige Johnson*

10:15 **FOR THE GOOD OF MANKIND AND THE GLORY OF GOD: A STUDY OF THE CONNECTICUT KANSAS COLONY AND ITS INVOLVEMENT IN THE KANSAS TERRITORY** *Karre Schaefer*

10:30 **A CLOGGED ARTERY: AN ANALYSIS OF HUMAN TRAFFICKING IN THE HEART OF AMERICA** *Ariel Anib*

10:45 **THE BLACK MAGUS IN DÜRER'S ADORATION OF THE MAGI: FREDERICK THE WISE AND THE GERMAN ATTRACTION TO THE AFRICAN IMAGE** *Tamica Lige*

Graduate Agricultural Sciences
Room 212

AM

9:30 **NUTRITIONAL ENHANCEMENT OF SOYBEAN MEAL AND HULL FOR ANIMAL FEED VIA MICROBIAL BIOCONVERSION** *Liyan Chen*

9:45 **ESTIMATING THE EFFECT OF GREEN TEA TRADE IN THE U.S. FROM 1997 TO 2008** *Koichi Yamaura*

10:00 **MULTIPLE SPECIES THRESHOLD RECOMMENDATIONS IN SORGHUM—IS A ONE-MODEL-FITS-ALL STRATEGY THE BEST APPROACH?** *Alysha Soper*

10:15 **RHEOLOGICAL AND STRUCTURAL PROPERTIES OF HARD AND SOFT WHEAT FLOUR SYSTEMS WITH BRAN INCLUSIONS** *Hyma Gajula*

10:30 **PLANTING GEOMETRY EFFECTS ON SORGHUM PRODUCTIVITY IN WATER LIMITING CONDITIONS** *Kalaiyarasi Pidaran*

10:45 **KANSAS CROP ACREAGE SHIFTS DUE TO INCREASED BIOENERGY CROP DEMAND** *Jason Fewell*

Graduate Social Sciences/Humanities/Education
Big XII Room

PM

12:00 **A RE-EXAMINATION OF INCUMBENTS' RESPONSE TO THE THREAT OF ENTRY: EVIDENCE FROM THE AIRLINE INDUSTRY** *Chi-Yin Wu*

12:15 **WALKING THE GREEN MILE: A JOURNEY IN THE INTEGRATION OF SUSTAINABILITY IN APPAREL AND TEXTILES EDUCATION** *Cosette Armstrong*

12:30 **WRITING CENTER SPACES AS TANGIBLE EXAMPLES OF INVITATIONAL RHETORIC** *Rachelle Doan*

12:45 **"GANAS": THE POWER AND POTENTIAL IN DEVELOPING LATINA ELL TEACHERS FOR RACIAL UPLIFT** *Amanda Morales*

1:00 **GENDER AND DOMESTIC TERRORISM: WHAT EMPOWERMENT CAN TELL US ABOUT A STATES PROPENSITY TOWARDS POLITICAL VIOLENCE** *Caroline Simpson*

1:15 **NARRATIVES IN EXILE: KASHMIRI PANDITS - MIGRANTS IN THEIR OWN HOMELAND AND THEIR STRUGGLE TO MAINTAIN THEIR IDENTITY** *Tamanna Shah*

1:30 **BREAK**

1:45 **STRUCTURAL IMPEDIMENTS TO MOBILITY: A CASE STUDY OF TRIBALS IN INDIA** *Anirban Mukherjee*

2:00 **EFFECTS OF USING DIGITAL STORYTELLING WITH ELEMENTARY STUDENTS** *Staci Horton*

2:15 **COHORT AGING AND POLITICAL ATTITUDES REGARDING ISSUE PARTICULARITY** *Coty Garnett Steinmetz*

2:30 **'U.S. FOREIGN AIDS IMPACT ON NGOS'** *Wendy Dickey*

2:45 **FACILITATING STUDENTS' ASSIMILATION OF ELECTRONICS AND PHYSICAL MEASUREMENTS THROUGH ILL-STRUCTURED CAPSTONE PROJECTS** *Nasser Juma*

Graduate Engineering/Math/Physical Sciences
Room 212

PM

12:00 **GEOCHEMICAL MODELING IN UNDERSTANDING REACTION KINETICS OF CO2-WATER INTERACTION IN ARBUCKLE FORMATION, SOUTH-CENTRAL KANSAS** *Robinson Barker*

12:15 **UNDERSTANDING NITRATE DYNAMICS IN A KANSAS GRASSLAND: SEDIMENT GEOCHEMISTRY AND STABLE ISOTOPE STUDY** *O.C. Eke*

12:30 **SELENIUM SPECIATION AND MOBILIZATION IN A CONTROLLED WETLAND SYSTEM: PARIETTE WETLANDS, UT** *Mathew Crawford*

12:45 **DEMONSTRATION OF RAPID SINGLE CELL ANALYSIS ON SIMPLE MICROFLUIDIC DEVICES** *Eve Metto*

1:00 **PURIFICATION AND ANALYTICAL ASSESSMENT OF THE MYCOBACTERIAL PORIN MSPA AND INVESTIGATION OF ITS CHANNEL ACTIVITY AND POTENTIAL USE FOR A PROTEIN NANO SOLAR CELL** *Ayomi Perera*

1:15 **MAKING A BIOREFINERY ECONOMICALLY VIABLE: AN APPROACH FOR EFFICIENT CONVERSION OF CARBOHYDRATES TO VALUE ADDED PRODUCTS** *Neha Dhiman*

1:30 **BREAK**

1:45 **ELECTRICAL CHARACTERIZATION OF GAN METAL OXIDE SEMICONDUCTOR CAPACITOR WITH AL2O3 AS THE GATE OXIDE** *Md Tashfin Hossain*

2:00 **RECONFIGURATION PERFORMANCE ANALYSIS OF SHIPBOARD POWER SYSTEM WITH NON-RADIAL POWER FLOW** *Sayak Bose*

2:15 **DETECTION AND DIAGNOSTIC OF SHAPE AND VARIATION CHANGES IN NONLINEAR PROFILES** *Shih-Hsiung Chou*

2:30 **A NEW METHOD OF ADAPTIVE INTEGRATION WITH ERROR CONTROL FOR BOND-BASED PERIDYNAMICS** *Kebing Yu*

2:45 **ELASTIC BUCKLING BEHAVIOR OF PLATES AND TUBULAR STRUCTURES**
Arka P. Chattopadhyay

3:00 **MEASURING THE INTERFACIAL ADHESION OF PDMS TO FUNCTIONALIZED SUBSTRATES BY MEANS OF CONTACT MECHANICS** *Nassim Rahmani*

Graduate Biological Sciences
Flinthills Room

PM

1:30 **EVALUATION OF A MULTIFACETED HAND HYGIENE CAMPAIGN IN OUTPATIENT HEALTHCARE CLINICS** *Ramandeep Kaur*

1:45 **5A-REDUCTASE INHIBITION TO DECREASE PROSTATE TUMOR GROWTH** *Alex Acheampong*

2:00 **GENETIC ANALYSIS OF SEGMENTATION IN THE RED FLOUR BEETLE, TRIBOLIUM** *Xin Zhu*

2:15 **ALTERNATE SIGMA FACTOR (RPON) PROMOTES EXTRACELLULAR DNA (EDNA) INDEPENDENT BIOFILM FORMATION IN ENTEROCOCCUS FAECALIS** *Vijayalakshmi Iyer*

2:30 **CAN MACROPHAGES BECOME ADIPOCYTES ?** *Akshay Moharir*

2:45 **IDENTIFICATION OF MOLECULAR MECHANISMS INVOLVED IN TUMOR GROWTH ATTENUATION BY RAT UMBILICAL CORD MATRIX STEM CELLS** *Deepthi Uppalapati*

Poster Titles and Presenters

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2. **EVALUATING THE EFFECTS OF DROUGHT STRESS ON GROWTH AND DEVELOPMENT OF SORGHUM ROOTS** *Raymond Mutava*

3. **EFFECT OF KNEADING SPEED ON THERMOMECHANICAL PROPERTIES OF FLOUR DOUGHS** *Moses Khamis*

4. **COMPRESSIVE STRENGTH OF WHEAT KERNELS AFTER SOAKING** *Paul Mitchell*

5. **FEEDING BEHAVIOR COMPARISON OF SOYBEAN APHID BIOTYPES ON DIFFERENT SOYBEAN ENTRIES** *Predeesh Chandran*

6. **LIFE HISTORY PARAMETERS OF THE ROVE BEETLE, ATHETA CORIARIA AND SUITABILITY AS A BIOLOGICAL CONTROL AGENT AGAINST THE FUNGUS GNAT, BRADYSIA SP. NR. COPROPHILA** *Erik Echegaray*

7. **PRODUCTIVITY DIVERGENCE ACROSS KANSAS FARMS** *Elizabeth Yeager*

8. **TIME OF ONSET, LOCATION AND DURATION OF LAMENESS IN BEEF CATTLE IN A COMMERCIAL FEEDYARD** *Taylor Green*

9. **COMPARATIVE EFFICACY OF TWO IVERMECTIN POUR-ON ANTHELMINTICS IN BEEF STEERS IN A COMMERCIAL FEEDYARD** *Anthony Tarpoff*

10. **COMPARISON OF OBSERVATIONAL AND NECROPSY DERIVED DIAGNOSIS FOR CAUSE OF DEATH FOR CATTLE IN COMMERCIAL BEEF FEEDLOTS** *Dane Anspaugh*

11. **METABOLISM OF AZO DYES, METHYL RED AND METHYL ORANGE BY PLANTS** *Rohit Kamat*

12. **DNA PYROSEQUENCING TO DETERMINE THE INFLUENCE OF FALLOW PERIOD ON SOIL MICROBIAL COMMUNITIES IN THE BOLIVIAN HIGHLANDS** *Lorena Gomez*

13. **KAZAL-TYPE SERINE PROTEASE INHIBITORS IN PHLEBOTOMUS PAPATASI MIDGUT** *Leah Sigle*

14. **MOLECULAR EPIDEMIOLOGY OF VANCOMYCIN-RESISTANT ENTEROCOCCUS FAECIUM ISOLATED FROM A SEMI-CLOSED AND INTEGRATED AGRI-FOOD SYSTEM**
Raghavendra Amachawadi

15. **INFRARED SPECTROSCOPY AS A COMPLIMENT TO X-RAY DIFFRACTION FOR ZEOLITE EXAMINATION**
Sean Tomlinson

16. **DRY THERMAL OXIDATION OF GAN WITH SEM, AFM AND XPS CHARACTERIZATION**
Daming Wei

17. **NONDESTRUCTIVE METHOD TO PREDICT THE BUCKLING LOAD IN SPHERICAL SHELLS**
Shahin Nayyeri Amiri

18. **ENERGY-AWARE DISTRIBUTED TRACKING IN WIRELESS SENSOR NETWORKS** *Nicholas Roseveare*

19. **COMPARING EXPERT AND NOVICE EYE MOVEMENTS WHILE SOLVING PHYSICS PROBLEMS** *Adrian Carmichael*

20. **TUTORIALS TO FACILITATE PROBLEM SOLVING IN CALCULUS-BASED INTRODUCTORY PHYSICS COURSE** *Dehui Hu*

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23. **THE LEARNING SUITE: CREATING ENVIRONMENTS FOR AUTISTIC CHILDREN** *Kyle White*

24. **MULTIMODAL SENSORY ZONING FOR THOSE WITH AUTISM SPECTRUM DISORDER (ASD)** *Timothy Hansen*

25. **THE BUILT ENVIRONMENT AS A COGNITIVE MAPPING DEVICE FOR AUTISTIC INDIVIDUALS** *Kristin Van Dusen*

26. **ARCHITECTURAL DESIGN TO PROMOTE PHYSICAL ACTIVITY AMONG CHILDREN WITH AUTISM SPECTRUM DISORDER** *Joshua Hartman*

27. **EXPLORATION OF ATTITUDES AND BEHAVIORS OF CONSUMERS WITH FOOD ALLERGIES ABOUT DINING OUT: A FOCUS GROUP STUDY** *Yee Ming Lee*

28. **THE MODERATING EFFECT OF EMOTIONAL INTELLIGENCE ON THE RELATIONSHIP BETWEEN EMOTIONAL LABOR AND SERVICE BEHAVIOR AMONG HOTEL EMPLOYEES** *JungHoon Lee*

29. **THE EFFECT OF ONLINE RESTAURANT REVIEWS ON DINERS? VISIT INTENTION: A COMPARATIVE ANALYSIS OF EXPERT VS. PEER REVIEWS** *Ju Won Choi*

30. **ARCHITECTURE AS THERAPY: USING SPATIAL COGNITION TO FOSTER EXPLORATIVE ACTION IN AUTISTIC CHILDREN** *Jill Maurer*

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32. CROP MODELING APPROACH FOR ASSESSING IMPACTS OF CLIMATE CHANGE AND VARIABILITY ON CROP PRODUCTIVITY IN THE OGALLALA AQUIFER REGION
George Paul

33. DIELECTROPHORETIC CAPTURE OF *E. COLI* CELLS AT NANOELECTRODE ARRAYS
Lateef uddin Syed

34. COUPLING PYRAZOLE TO PYRIDINE: STEPS TO ENGINEERING A BETTER AGRICULTURAL CHEMICAL AND PREDICTING BINDING PREFERENCES THROUGH CO-CRYSTAL SYNTHESIS
Evan P. Hurley

35. EFFECTS OF CONTROLLED INTERVENTION STRATEGIES ON THE QUANTITIES OF A CEFTIOFUR RESISTANCE GENE (*bla*$_{\text{CMY-2}}$) IN THE FECES OF FEEDLOT CATTLE
Neena Kanwar

36. DISTRIBUTED SOURCES AND ISLANDING TO MITIGATE CASCADING FAILURES IN POWER GRID NETWORKS
Sakshi Pahwa

37. RELIABLE AND SECURE NETWORKS FOR THE COMMUNICATION OF THE POWER GRID
Sarah Kubler

38. NITROUS OXIDE EMISSIONS FROM A COMMERCIAL CATTLE FEEDLOT IN KANSAS
Orlando Aguilar

39. DIETARY INTAKES OF OMEGA-3 FATTY ACIDS AMONG SOLDIERS DEPLOYING TO COMBAT
Jennifer Hanson

40. AN INVESTIGATION OF WATER USAGE IN CASUAL DINING RESTAURANTS IN KANSAS
Matthew VanSchenkhof

41. PERCEIVED AVAILABILITY OF AND ATTITUDES TOWARD HEALTHY FOOD CHOICES IN ASSISTED-LIVING FACILITIES IN KANSAS
Pei Liu

Oral Presentation Abstracts

Undergraduate 1

DECORIN SECRETED FROM HUMAN UMBILICAL CORD MATRIX STEM CELLS SIGNIFICANTLY ATTENUATES THE GROWTH OF HUMAN BREAST CANCER CELLS

Jamie Ball[1], Naomi Ohta[1], Supriyo De[2], Charan Ganta[1], Marla Pyle[1], Atsushi Kawabata[1], Deepthi Uppalapati[1], Kevin Becker[2], Deryl Troyer[1], and Masaaki Tamura[1]

[1]Department of Anatomy and Physiology, College of Veterinary Medicine; [2]Expression and Genomics Unit, NIH Biomedical Research Center

Stem cell based therapy has a significant potential to treat various diseases including cancer. Our previous study demonstrated that un-engineered human umbilical cord matrix stem cells (hUCMSC) notably attenuated the growth of MDA-MB-231 human breast cancer cells. We used cDNA microarray to determine specific genes involved in the intrinsic ability of UCMSC to control growth of human breast cancer cells. For cDNA microarray using Illumina HumanRef-8 Expression BeadChips, hUCMSC were co-cultured with MDA-MB-231 cells in Transwell culture dishes. After 48hrs of co-culture, total RNA was extracted from untreated hUCMSC and those co-cultured with MDA-MB-231 cells and subjected for microarray analysis. Comparison microarray analysis between untreated and co-cultured hUCMSC indicated a large number of differentially expressed genes. Based upon screening criteria that are; gene expression should show at least 1.5 fold change, proteins are secreted, and proteins are related to negative cell growth, a total of seven up-regulated genes were identified. Followed by the confirmation of gene expression by real time-PCR, the decorin gene was further screened. In the in vitro cell culture studies, addition of decorin neutralizing antibodies (4 micrograms/well) significantly attenuated hUCMSC-dependent decrease of DNA sythesis of MDA-MB-231 cells in direct co-culture. Effect of decorin-specific siRNAs on hUCMSC-dependent cell growth is under investigation. These results indicate that decorin is one of the important gene products in hUCMSC that attenuates growth of human breast cancer cells.

EVALUATION OF THE EFFICACY OF CATIONIC PEPTIDE NANOPARTICLE-BASED THERAPEUTIC GENE DELIVERY FOR HUMAN LUNG CANCER TREATMENT

Stephanie Jacquez[1], Atsushi Kawabata[1], Abdulgader Baoum[2], Cory Berkland[2], and Masaaki Tamura[1]

[1]Department of Anatomy and Physiology, College of Veterinary Medicine; [2]Department Pharmaceutical Chemistry, University of Kansas

The angiotensin II (Ang II) type 2 receptor (AT2R) has been shown to mediate apoptosis in cardiovascular tissues. Thus, the aim of this study was to explore the anti-cancer effect of AT2R over-expression on lung adenocarcinoma cells *in vitro* and *in vivo* using newly developed cationic peptide nanoparticle (NP) vector. The NP vector efficiently transfected human AT2R plasmid DNA into lung cancer cells but caused minimal gene transfection in normal lung epithelial cells. NP encapsulating human AT2R plasmid DNA significantly attenuated growth of A549 human lung cancer cells and murine Lewis lung carcinoma cells as compared to the control NP treated cells. Examination of annexin V expression by flow cytometry revealed the activation of the apoptotic pathway via AT2R over-expression. The efficacy of *in vivo* gene transfection by NP vector was assessed by firefly luciferase plasmid DNA encapsulated NP using mice bearing LLC lung tumors. Administration of the NP was carried out through a bolus intratracheal spray (7.5 micro g plasmid DNA/50 micro liter NP solution). Although moderate expression of luciferase was detected throughout lung bronchial epithelium, intense expression was localized within the tumors (over 95% tumor cells were positively stained). The duration of the expression lasted over two weeks after the transfection. These results indicate that AT2R over-expression effectively attenuates growth of lung adenocarcinoma cells through intrinsic apoptosis. The newly developed NP vector is suggested to be an efficient gene delivery vector for lung adenocarcinoma targeted therapy.

PEROXISOME PROLIFERATOR RECEPTOR GAMMA AGONISTS ALTER ELECTROLYTE TRANSPORT ACROSS PORCINE VAS DEFERENS EPITHELIA

Jacob Hull, Qian Wang, Florence Wang, Vladimir Akoyev, and Bruce Schultz
Department of Anatomy and Physiology, College of Veterinary Medicine

Elevated levels of 15-deoxy-12-14-prostaglandin-J2 (15dPGJ2) have been reported in the reproductive tracts of some cases of male infertility. The goal for this project was to determine a possible mechanism by which 15dPGJ2, an endogenous PPAR gamma ligand, might contribute to male infertility. Vas deferens epithelial cells were isolated from pigs, cultured for 14-21 days and exposed to dexamethasone and/or PPAR gamma agonists for the final 3-4 days of culture. Cells were mounted in modified Ussing chambers and exposed to amiloride (ENaC blocker), forskolin (adenylyl cyclase activator), and DASU-02 (CFTR blocker). Amiloride sensitive current induced by dexamethasone was potentiated two-fold by concurrent rosiglitazone exposure while there was no effect on baseline, forskolin or DASU-02 responses. Protein and RNA were isolated. Western blots suggest a decrease in CFTR expression and an increase in alpha, beta, and gamma ENaC subunits. RT-PCR detected a decrease in RNA coding for CFTR. PPAR gamma agonist treatment in the PVD9902 cell line attenuated forskolin and DASU-02 responses. These effects were concentration dependent, induced by structurally distinct PPAR gamma agonists, and blocked by a PPAR gamma antagonist, T0070907. These outcomes suggest that PPAR gamma activation by 15dPGJ2 in the reproductive duct could alter luminal electrolytes, which would likely affect sperm viability and function. [NIH R01-HD058398 & P20-RR017686 Core C]

IDENTIFICATION OF MOLECULAR MECHANISMS OF PKC/C1B DOMAIN PEPTIDE-INDUCED GROWTH SUPPRESSION OF HUMAN COLON CANCER IN VITRO AND IN VIVO

Garret Seiler[1], Atsushi Kawabata[2], Chiyo Doi[2], Takaya Matsuzuka[2], Jennifer Reischman[2], Lara Pickel[2], Rie Ayuzawa[2], Thu Nguyen[3], and Masaaki Tamura[2]
[1]Division of Biology, College of Arts and Sciences; [2]Department of Anatomy and Physiology, College of Veterinary Medicine; [3]Department of Diagnostic Medicine and Pathology, College of Veterinary Medicine

C1B peptides consist of C1B1 and C1B5 (amino acid residues 101-112 and 141-151), derived from the C1B domain of protein kinase C gamma (PKC gamma). The C1B sites are the binding sites of PKC gamma to cytosolic docking protein 14-3-3 epsilon. Synthetic C1B peptides compete with PKC binding to the docking peptide, thus releasing PKC and stimulating its enzymatic activity. Since PKC enzyme activity is shown to be involved in colon cancer development, the effect of C1B peptides on the growth of various human colon cancer cell lines was examined *in vitro* and *in vivo*. A submicro-molar level C1B5 peptide alone exhibited approximately 50-70% growth attenuation in multiple colon cancer cell lines in a soft agar tumor colony assay. C1B5 peptides did not exhibit cytotoxicity to normal murine fibroblasts and colon epithelial cells. The effect of C1B5 peptide on colony growth of COLO205 cells was reversed by the treatment with PKC alpha/beta inhibitor Ro-32-0432. C1B5 peptide treatment attenuated COLO205 cells *via* two mechanisms: 1) Cell cycle arrest in G_2 phase and 2) stimulation of apoptosis as evidenced by increases in the levels of cleaved caspase 3, total p53 and phosphorylated p53 at serine 20 in C1B5 treated colon cancer cells. Intratumor injection of C1B5 peptide (20 mg/kg/day, every three days) significantly attenuated the growth of subcutaneous xenografts of COLO205 cells in SCID mice. These results strongly suggest that C1B peptides are cancer cell-selective and thus safe, effective chemotherapeutic agents for the treatment of colon cancer.

REGUALTION OF GAP JUNCTIONS IN COLON CANCER CELLS

Kristina Bigelow[1], and Dr. Thu Annelise Nguyen[2]
[1]Division of Biology, College of Arts and Sciences; [2]Department of Diagnostic Medicine Pathobiology, College of Veterinary Medicine

Colon cancer is one of the most common cancers in the United States with a high predisposition to metastasize. Cancer cells exhibit many deficiencies in cell-to-cell communication, particularly gap junctional intercellular communication (GJIC). Gap junctions are involved in the regulation of cell cycle, cell differentiation, and cell signaling. Since the regulation of gap junction is lost in colon cancer cells, the goal of this study is to restore GJIC in colon cancer cells. Recently, substituted quinolines (PQs), gap junction enhancers, have been shown to increase gap junction activity. The level of gap junction protein, connexin43 (Cx43), is low in human colon cancer cells (SW480). Transfection of Cx43 in SW480 cells have a 6-fold increase of gap junction activity compared to control using gap junction activity assay. Western blot analysis confirmed that a significant level of Cx43 was expressed in transfected Cx43 cells compared to control. This suggests that overexpressing Cx43 can restore GJIC. Interestingly, 200 nM PQ causes a 4-fold increase of gap junction activity as well and subsequently causes a decrease in cell proliferation by 15%. However, GJIC inhibitor, phorbol ester (TPA), can reverse the gap junction activity of transfected Cx43 or treated PQ cells. Further analysis of Cx43, survivin, and cyclin D1 in treated cells was observed. Overall, the results show that substituted quinolines can directly enhance gap junction activity and attenuate cell proliferation in colon cancer cells. The findings provide an important implication in which restoration of gap junction activity can be targeted for drug development.

DOCUMENTATION OF CYTOTYPE VARIATION IN *PHLOX PILOSA* L. SSP. *PILOSA* (POLEMONIACEAE) IN THE CENTRAL GREAT PLAINS

Lindsey Worcester, and Carolyn Ferguson
Division of Biology, College of Arts and Sciences

The genus *Phlox* L. (plant family Polemoniaceae) ranges across much of North America and is a taxonomically difficult group. Researchers have used different methods and have looked at various characters of species in *Phlox* to understand the complicated relationships. The *P. pilosa* species complex exhibits hybridization and polyploidy. The patterns of cytotype variation of *P. pilosa* ssp. *pilosa* are of particular interest in the central Great Plains region. Previous reports from the core of the range in the eastern United Sates were of diploid (2x) populations, but two tetraploid (4x) populations were reported in Arkansas and in Texas. For the present study, flow cytometry was used to determine DNA content and infer ploidy level for newly sampled locations in Kansas, Oklahoma, and Texas. Results document the occurrence of diploids along the far eastern part of the sampling range in Kansas and Oklahoma, and the occurrence of tetraploids just west of where the diploids occur, exhibiting parapatry. A single hexaploid (6x) population has been detected. This pattern of cytotype variation is interesting and does not correlate with obvious morphological differences, nor with any taxonomic distinctions. The pattern does show some correlation with altitude, and future work will address precise ecological differences.

Undergraduate 2

A VEGETATIVE COMPATIBILITY ANALYSIS OF FUSARIUM SPECIES ASSOCIATED WITH WHEAT, CORN AND SORGHUM IN KANSAS

Kerri Neugebauer[1], James Stack[2], and Fanny Iriarte[2]
[1]Department of Agronomy, College of Agriculture ; [2]Department of Plant Pathology, College of Agriculture

Several species in the plant pathogen genus Fusarium cause disease and produce toxins in wheat, corn, and sorghum. Individual strains and populations of these Fusarium species vary in their capacity to cause disease and to produce toxins from year to year. To better understand this variation, population analyses are necessary. Once the variation is understood, it can be managed more effectively. Vegetative Compatibility Group (VCGs) analysis is commonly used to study the population biology of fungi. Nitrate-non-utilizing (*nit*) mutants were created by growth on chlorate-containing medium and the nature of the mutations determined by growth on media with different sources of nitrogen. Complementation of *nit* mutants was determined to ascertain compatibility among isolates from the different populations. When hyphae from two complementary *nit* mutants fuse to form a stable heterokaryon (two nuclear types per cell) they are considered to be vegetatively compatible and are in the same VCG. Those that do not form stable heterokaryons are in different VCGs. VCG analyses will be used to characterize strains of Fusarium from populations of wheat, corn and sorghum in Kansas. The results will be present and the significance discussed.

SYNTHESIS OF ZIRCONIUM NITRIDE BY NITRIDATION OF ZIRCONIUM

Evgeniy Shishkin, L. Du, and J.H. Edgar
Department of Chemical Engineering, College of Engineering

The nitridation kinetics of zirconium metal via the reaction Zr + N2 = ZrN and the resulting properties of the nitride are reported. The reaction kinetics were determined as functions of the temperature (1450 °C to 1650 °C) and nitrogen pressure by measuring mass gain. A zirconium foil was annealed at various temperatures and pressures (200-900 torr) in a tungsten furnace. To minimize the effect of diffusion nitrogen through the ZrN, a 0.2mm thick zirconium foil is used. Several samples were ground to powder, and x-ray diffraction patterns were taken, to determine their composition (fraction of Zr and ZrN) and lattice constants. The fraction of nitridation was determined by the weight difference before and after the heating process. The general trend of increase in fraction of nitridation over time was obtained with increase in temperature for time dependent trials and decrease in pressure for pressure dependent trials. An exact relationship is yet to be established, however the linear trend for temperature dependent trials could be seen, while third order polynomial trends could be seen from pressure dependent trials. X-Ray Diffraction (XRD) was useful in determining ZrN presence but the unconverted Zr was rarely identified. Future work will further analyze the samples using XRD at a slower deg/min and use scanning electron microscopy (SEM) to determine the spatial distribution of nitrogen. Ultimately, zirconium nitride is useful as an electrical substrate for gallium nitride based light-emitting diodes (LED).

PHOTOTRIGGERED RELEASE OF AGROCHEMICALS

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The vast majority of agrochemicals exist as solids at room temperature, and the precise nature of the solid defines many of their physical properties such as solubility and thermal stability. A primary problem in this industry is the lack of methods for triggering the release of herbicide/pesticides through external stimuli such as sunlight, or via changes in soil characteristics (e.g. water content or pH). The long-term goal of this research project is to develop new solid forms, co-crystals, which combine a photoactive molecule (which will trigger the release) and an active agrochemical compound. The first challenge that needs to be overcome is to synthesize and characterize co-crystals of a library of photoactive molecules. In order to synthesize the co-crystals, we combined various photoactive molecules with suitable co-crystallizing agents in a series of mechanical grinding experiments. Once the grinding experiments were completed, an infrared (IR) spectrum was taken on the solids to ensure that the two molecules were "attracted" to each other thus forming a co-crystal. If the IR showed positive results the molecules had the potential to grow a co-crystal. We then attempted to generate single crystals of the successful combinations using slow evaporation experiments with a range of solvents (e.g. methanol and ethanol). From the single crystal data, we were able make inferences about predictability of intermolecular interactions between both components. This presentation will discuss both the experimental protocol and the results that we obtained to date.

CO-CRYSTALLIZATION: A SUPRAMOLECULAR INSTRUMENT FOR TUNING THE PHYSICAL PROPERTIES OF DICLOFENAC

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One of the greatest obstacles to providing effective drugs is the poor aqueous solubility of many pharmaceutically active ingredients (APIs). A technique called co-crystallization may offer a solution to this problem. For an API to co-crystallize with another molecule, a co-former must be selected such that it possesses complementary donor/acceptor sites that are more attractive than interactions between two APIs. One reason this method is superior to methods like salt formation is that it can be employed even when the API lacks ionizable moieties, providing an opportunity to improve the solubility of drugs hitherto dismissed during early stages of development because of their poor aqueous solubility. Furthermore, we can use co-crystallization to fine tune the physical properties of the drug without altering its chemical identity. Specifically, we are studying the effects of co-crystallization on diclofenac – a potent non-steroidal, anti-inflammatory analgesic with extremely poor aqueous solubility. To learn better with which co-formers diclofenac prefers to co-crystallize, reactions of the drug with an extensive list of molecules spanning several families of compounds were screened and analyzed using infrared spectroscopy, and the structures of resulting co-crystals were determined using X-ray crystallography. Additionally, solubility studies have been performed on the new diclofenac co-crystals.

EXTINCTION TIMES OF SOLUTIONS TO A DEGENERATE PARABOLIC EQUATION

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Our work deals with explicit similarity solutions of the special case where $M = 0$ and $N = 0$ in the degenerate parabolic equation $u_t = \mathrm{div}(u^M |grad\ u|^{N-1} grad\ u)$. In this case the equations becomes $u_t = \mathrm{div}\left(\frac{\nabla u}{|\nabla u|}\right)$. This equation is both a geometric equation and a singular diffusion equation. These two types of equations call for different techniques. Our interest in this equation is because it is both important in applications and at the cutting edge of what currently available techniques can handle, due to its singularity. This PDE appears in the steepest descent method for minimizing the total variation, in the context of image denoising and reconstruction. When dealing with the deconvolution or reconstruction problem one minimizes the total variation functional $\int_D |Du|$ with some constraints which model the process of image acquisition, including blur and noise. There have been attempts in numerical analysis to solve the problem but there still is a need for a better understanding of the behavior of $u_t = \mathrm{div}\left(\frac{\nabla u}{|\nabla u|}\right)$ when minimizing the total variation and, for that, we need to have at our disposal qualitative and quantitative information about the behavior of solutions. We find radial similarity solutions to the equation $u_t = \mathrm{div}\left(\frac{\nabla u}{|\nabla u|}\right)$. Using these solutions, a comparison theorem, and radial solutions of other authors, we give close upper and lower estimates of the extinction time of entropy solutions for a large class of initial data.

HIGH EFFICIENCY DUAL-INTEGRATED STACKED MICROSTRUCTURED SEMICONDUCTOR NEUTRON DETECTOR

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Currently, the methods that exist for neutron detection are through gas filled tubes, or thin-film coated planar semiconductor devices. Gas filled tubes tend to be bulky, expensive, and fragile. Thin-film coated semiconductor based planar devices tend to be more portable and rugged, but have lower detection efficiency. Microstructured semiconductor-based neutron detectors improve upon thin-film devices by having superior detection efficiency performance over similar thin-film devices. The highest neutron detection efficiency microstructured devices have reached over 40% by device-coupling and stacking devices. The detectors operate as conformally diffused *pn* junction diodes. The diffused devices have shown improved performance attributed to stronger and more uniform electric fields in the active region of the detector. Current methods of microstructuring the silicon substrate involve plasma etching and an alternative method has been investigated for etching straight- and chevron-trench patterned devices. These patterns were anisotropically wet-etched into (110) silicon using a KOH solution with a thermally grown silicon dioxide mask for protection. Etch depths ranging from a few microns, to etching completely through a 500-micron wafer, while keeping straight and smooth sidewalls. A p-type junction was then conformally diffused within high-resistivity silicon devices. The trenches were backfilled with ^{6}LiF. Intrinsic detection efficiency for 0.0253 eV neutrons were found, calibrated against a ^{6}LiF thin-film device and a calibrated ^{3}He proportional counter.

Undergraduate 3

OBESITY PREVALENCE IS LOWEST AMONG CENSUS BLOCK GROUPS WITH THE HIGHEST INCOME

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BACKGROUND: The prevalence of obesity-related diseases is increasing. Lower income is a known determinant for obesity, but it is unclear how obesity is distributed across census block groups stratified by income in the Kansas City Metropolitan area. PURPOSE: This study examined obesity among census block-groups stratified by household income level; we hypothesized a negative correlation between income and obesity. METHODS: We used data from the Kansas City Built Environment and Health Study (KC BEST), which studied obesity in 21 census block groups stratified by income: low ($4,999.00 - $23,386.33), middle ($23,386.34 - $35,569.00), and high ($35,569.01 - $150,001.00). Surveys were administered to 586 adults, 18 to 74 years old. Participants were females (nearly 70%) and reported a household income less than $60,000 annually (60%). Among them, 65.4% were White and 25.1% were Black; 6.3% were Hispanic. RESULTS: Only 3.1% of participants were underweight (BMI < 18.5), 35.7% were normal weight (BMI = 18.5 – 24.9), 28% were overweight (BMI = 25.0 – 29.9), and 33.3% were obese (BMI ≥ 30.0). A statistically significant correlation existed between obesity and block group median income (r = -0.095, p < 0.05). The Pearson Chi-square value was also statistically significant (= 9.213, p = 0.010). Obesity incidence was 25.1% among those in the high income tertile, 39.0% in the middle income tertile, and 35.9% in the low income tertile.
CONCLUSION: As income increased, obesity prevalence decreased significantly; however, obesity prevalence was highest at the middle income tertile. This may be due to the availability of aid (i.e.: food stamps) at the lowest income bracket, granting access to healthier foods.

CELLULOSIC FEEDSTOCK PRODUCTION SURVEY OF KANSAS FARMERS

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The Energy Independence and Security Act of 2007 states that biofuel production must increase to 36 billion gallons by the year 2022. 21 billion gallons must be produced from advanced or second-generation biofuel feedstocks such as cellulosic materials. Agricultural residues and potential bioenergy crops such as switchgrass are primary sources of cellulosic materials. The state of Kansas stands to be a major producer of these materials. While many studies have looked at the technical feasibility of producing bioenergy crops on agricultural lands, none has asked farmers in Kansas whether they are willing to remove crop residues from their fields, or whether they are willing to switch out of their normal cropping patterns and into bioenergy crop production. One problem with bioenergy crop production is the absence of a market for cellulosic biomass. This research employs an enumerated survey to determine a price at which farmers will adopt these crops as well as the types of contracts or contract features farmers require to adopt a new enterprise. Contracts are important because they offer farmers a guaranteed buyer for their production and biofuel companies need contracts in place to procure financing to build biorefineries. Farmers from Northeast, South Central, and West Central Kansas will be surveyed during November and December 2010 to assess their willingness to supply corn residue, grow sweet sorghum, or grow switchgrass for bioenergy production. Farmers, industries, and policy makers will benefit from this information as markets for bioenergy crop production unfold.

THE ROLE OF BODY IMAGE ON PHYSICAL ACTIVITY INITIATION AND MAINTENANCE

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Physical activity is strongly linked with prevention of chronic disease. Yet, few people are able to begin and sustain physical activity programs sufficient to attain health benefits. Although research has shown negative body image is a barrier to physical activity, little research has examined how this construct is related to psychosocial constructs associated with behavior change. This study will explore the potential mechanisms by which body image influences the physical activity behavior change process as described by the transtheoretical model. An online survey was used to assess body image and the constructs of the transtheoretical model (stage of change, processes of change, decisional balance, self-efficacy, and temptation). A series of logistic regressions will be used to determine whether negative body image impedes the process of physical activity initiation and maintenance. Results will be used to develop more successful physical activity interventions for the prevention of chronic disease.

FOR THE GOOD OF MANKIND AND THE GLORY OF GOD: A STUDY OF THE CONNECTICUT KANSAS COLONY AND ITS INVOLVEMENT IN THE KANSAS TERRITORY

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This research examines the Connecticut Kansas Colony and its relationship to Henry Ward Beecher, its purpose for its 1856 migration to Kansas, and its decision to use violence to prevent Kansas from entering the Union as a slave state. Known as the Beecher Bible & Rifle Church, the Colony has gained the reputation of being directly connected to Beecher and having a willingness to use any violence as necessary to end slavery, contrary to the non-violent principles adhered to by Christianity in general. However, little scholarly research has actually been done regarding the Colony. By examining the original record books of the Colony and the Church, which have not been previously reviewed in any serious way by scholars, certain preliminary determinations were made, including: (1) The purpose in emigrating to Kansas was to establish the Institutions of New England -- the Puritan model of John Winthrop's "City on a Hill"; (2) The Colony accepted rifles from Beecher and the Plymouth Congregational Church, but intentionally minimized its links to Beecher; (3) The Colony did not act irrationally or haphazardly in decisions of warfare; and (4) The Colony saw the taking up of arms as self-defense, which included defense of America and God's Word.

A CLOGGED ARTERY: AN ANALYSIS OF HUMAN TRAFFICKING IN THE HEART OF AMERICA

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Over 27 million people are trafficked worldwide. Human trafficking can have many faces: forced prostitution, bonded labor, involuntary servitude, and more. This issue is not limited to countries outside of the United States, but can occur within the border. Although there is significant data about trafficking in the some states, currently, there is not much research or publicity done over human trafficking in Kansas. This study examines the methods that nonprofits, law enforcement, and the government use to combat human trafficking in Kansas. The objective of our research this year is to provide nonprofits and the citizens of Kansas with an in depth look at the extent of trafficking in Kansas. In order to accomplish our objective, I did a literature review, survey by email, along with interviews of various nonprofits and law enforcement. Our preliminary analysis shows that Kansas City and Wichita are hot spots for trafficking due to their proximity to I-35. An analysis of the interviews and surveys will allow us to answer the following questions: What does trafficking look like in Kansas? What are the root causes? What forms of assistance nonprofits provide in combating this issue? What collaborative efforts can be formed among the major actors in anti-trafficking?

THE BLACK MAGUS IN DÜRER'S *ADORATION OF THE MAGI*: FREDERICK THE WISE AND THE GERMAN ATTRACTION TO THE AFRICAN IMAGE

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Albrecht Dürer's *Adoration of the Magi*, commissioned by Frederick the Wise, features a black African King, an iconographic motif that only appeared in the mid fifteenth century. Before he commissioned this altarpiece, Frederick took a pilgrimage to Magdeburg where he was introduced to St. Maurice, a prominent black African figure in Germany's eastern empire. While in Venice, Dürer was exposed to black Africans and took an interest in representing them. The black Magus in the *Adoration of the Magi* is evidence of Frederick's and Dürer's attraction to the African image, which northern Europeans adapted in visual imagery for artistic and religious purposes.

NUTRITIONAL ENHANCEMENT OF SOYBEAN MEAL AND HULL FOR ANIMAL FEED VIA MICROBIAL BIOCONVERSION

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Soybeans are the second most planted crop in the United States after corn. After the recovery of soybean oil, large quantities of soybean meal and hull are generated, which are currently under- utilized. Soybean hull is usually mixed with soybean meal to make the 44% protein content mixture for feeding. It is poorly fermented by non-ruminant animals and decreases the gross metabolizable energy of feeding ingredients due to the complex structure of polysaccharides, which prevents the enzyme from functioning on nutrients. Fermentation with *Aspergillus orzyae* and *Bacillus* spp. degraded dietary fiber in soybean hull and increased its protein content by 5.25% and 6.43%, respectively. Similarly, protein content of soybean meal was increased by 10.6% after fermentation with *Bacillus* spp. and 9.93% with *Aspergillus oryzae*. Soybean meal is high in protein content (around 50%); however, the presence of proteinase inhibitor, allergen factors, phytate and galacto-oligosaccharides in the meal, have negative influence for animal growth performance. Phosphorus in phytate form is not bio-available to non-ruminant animals. The unabsorbed phytate elevates the amount of phosphorus in the manure and leads to environmental problems. Fermentation experiments are ongoing to remove proteinase inhibitor, degrade large peptide size, release phosphorous from phytate, relieve flatulence effect caused by oligosaccharides, and generate a nutritionally enhanced value-added feed product.

U.S. GREEN TEA IMPORTS: PANEL DATA ANALYSIS OF GSP AND NAFTA

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General Agreement on Tariffs and Trade Uruguay Round became the World Trade Organization in 1995 and also the U.S. made a free trade agreement in North America called the North American Free Trade Agreement (NAFTA) in 1994. The Generalized System of Preferences (GSP) program started from 1976, and authorized under the Trade Act of 1974. There are 24 designated beneficiary countries have used GSP as U.S. import program for green tea trade but there is no GSP program for coffee and black tea trade in U.S. between 1997 and 2010. The purposes of this paper are to 1) analyze recent large green tea manufactures behavior that moved their factories to Canada, 2) analyze recent increased Canadian green tea wholesalers' behavior, and 3) analyze the impact of and the GSP program for green tea trade to U.S. To analyze first and second questions, I estimate the impact of NAFTA in U.S. green tea trade and estimate the GSP effects for answering the third point. I propose to apply the gravity model for U.S. green tea imports by focusing NAFTA and the GSP effects. I will examine the period from 1997 to 2010. The study has revealed that NAFTA has a positive effect on the trade flows while the GSP has a negative impact. I find that the GSP and the distance between exporting country and the U.S. are less important, and NAFTA is important for green tea trade to U.S.

MULTIPLE SPECIES THRESHOLD RECOMMENDATIONS IN SORGHUM—IS A ONE-MODEL-FITS-ALL STRATEGY THE BEST APPROACH?

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Insect pest management is a risky and time-intensive business. Therefore, agricultural producers require relevant and accurate information to mitigate losses due to insect feeding. In sorghum, several Lepidopteran species infest seed heads. Larval identification is challenging and costly (time), so current recommendations are often simplified by treating all larvae equally across species. Consequently, the yield-loss model developed for corn earworm (*Helicoverpa zea*) by Buckley and Burkhardt (1962) has been the foundation for management recommendations in modern sorghum Integrated Pest Management (IPM) programs for the last 49 years. Additionally, although pest populations primarily include both fall armyworm (*Spodoptera frugiperda*) and corn earworm, only a single species damage estimate is used in economic injury level (EIL) calculations despite multi-species infestations. Collectively, these infestations can result in yield losses up to 35 percent if left untreated. Therefore, accurate damage estimates for each species are of particular consequence to grain sorghum producers throughout much of the Central and Southern Plains. Using a range of larval densities, our research objectives were to: 1) determine whether the Buckley and Burkhardt (1962) yield-loss model is still valid for corn earworm management recommendations and 2) experimentally test the current assumption that damage is equal for both species. Exclusion-cage studies were conducted in replicated plots at the Ashland Research Farm near Manhattan, Kansas using laboratory and naturally-occurring field populations. Implications for species-specific management recommendations will be discussed.

RHEOLOGICAL AND STRUCTURAL PROPERTIES OF HARD AND SOFT WHEAT FLOUR SYSTEMS WITH BRAN INCLUSIONS

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Phytochemicals in the non-endosperm portion of cereal grains have been proven to have significant health benefits. However, the inclusion of non-endosperm components to dough systems presents technical challenges. Wheat bran is one of most important dietary fiber sources in the bread making industry. The objective of this study was to investigate the effects of bran source, bran size and inclusion level (0-10%) on water absorption and rheological properties of hard red spring (HRW) and soft white (SW) flour doughs and end quality of baked products. HRW and SW bran inclusions in HRW flour resulted in higher absorptions from 65.3-68.8% as compared to 59.6-61.1% for SW flour. The peak time and peak value was also higher in HRW flour (5.3-6.2 min) as compared to SW flour (1.1-2.8 min) with and without bran inclusions. No significant difference was observed in mixing properties with respect to bran size. The loaf volume of HRW flour bread decreased as bran addition increased and no significant difference was observed in regard to source of bran. Microstructural analysis of bran added bread samples indicated gradual shift in air cell size distributions towards higher values due to coalescence of air cells during proofing and/or baking.

PLANTING GEOMETRY EFFECTS ON SORGHUM PRODUCTIVITY IN WATER LIMITING CONDITIONS

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Prior studies indicate clumped planting can increase grain sorghum yield up to 45% under water deficit conditions, possibly by reducing tiller number, increasing radiation use efficiency, and preserving soil water for grain fill. The objective of this study was to evaluate effects of planting geometry on sorghum grain yield formation. The field study was conducted in a factorial design at three locations with two sorghum lines, four populations, and two planting geometries. Components of yield were determined at physiological maturity. Delayed planting decreased yield 39%. A later maturing hybrid increased yield relative to an early hybrid by 11% when yield potential exceeded 900 grams m^{-2}. Clumped planting increased the fraction of fertile culms (culms which formed panicles) from 5-14%. It reduced the number of culms m^{-2} by 12% (Garden City) but increased culms m^{-2} 29% when yield potential exceeded 900 grams m^{-2}. Seeds per panicle and seed weight generally compensated for differences in panicles m^{-2} which resulted from planting population differences. Planting geometry altered components of yield for growing environments differing in planting date and available water. Clumped planting offers advantage by increasing panicle formation and yield components under semi arid conditions.

KANSAS CROP ACREAGE SHIFTS DUE TO INCREASED BIOENERGY CROP DEMAND

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In Kansas, biofuel feedstock production may change, to some degree, from traditional feedstocks such as corn, sorghum, and soybeans, to lignocellulosic sources such as switchgrass or crop residues as required by the Energy Independence and Security Act of 2007. However, the placement of the plants remains an unanswered question. Biofuel plant location has an effect on the crops grown in close proximity to the plant. At the same time, biofuel plants likely locate plants in areas of heavy feedstock production (i.e. corn, sorghum, soybeans, etc.). Biofuel plants have an effect on local crop prices and land values, thus they likely alter farmers' planting decisions. In addition, government policy in the form of incentives affects whether a biofuel plant is built. This research assesses how farmers alter their cropping practices in response to bioenergy production. Specifically, it will look at the share of cropland acres planted to different crops based on biofuel plant location. Data used for the analysis at the county-level include planted acreages in the state of Kansas from 2004 to 2009, weather, commodity prices, and farm-level input cost variables. The study will estimate a system of equations using a seemingly unrelated regression (SUR) model to determine how crops acres shift in response to changes in explanatory variables. By assessing how crop acreage has changed in the past due to biofuel production, farmers, policy makers, and industry will be able to coordinate crop plantings and biofuel plant locations, especially for new, cellulosic ethanol plants.

A RE-EXAMINATION OF INCUMBENTS' RESPONSE TO THE THREAT OF ENTRY: EVIDENCE FROM THE AIRLINE INDUSTRY

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This research is an empirical anaylsis of market entry deterrence in the airline industry. An air travel market is defined as an origin-destination combination, for example, Kansas City to Chicago. Goolsbee and Syverson (2008) find evidence that incumbent airlines tend to cut fares in relevant markets in response to the "threat" of market entry by Southwest Airlines. We re-examine this issue by looking at incumbent airlines' price response when market entry is threatened by a wider variety of potential entrant airlines. Results show that incumbents' response vary by the identity of the airline making the entry threat. In particular, while incumbents cut fares in response to the threat of entry by some potential entrants, importantly, we also find that incumbents may respond by raising their fare depending on who is making the threat, a result consistent with theoretical work by Klemperer (1987). Our empirical model also measures incumbents' price response to actual market entry, and find that incumbents seem to cut price more in response to an increase in actual number of competitors in a market, as compared to an increase in the number of airlines that threaten to enter the market.

WALKING THE GREEN MILE: A JOURNEY TOWARD THE INTEGRATION OF SUSTAINABILITY IN APPAREL AND TEXTILES EDUCATION

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Education for sustainable development (ESD) is an emerging field, a movement advocating for the reorientation of education for sustainability (UNESCO, 2005). ESD emphasizes the development of citizens and stewards who have knowledge, skills, and values that support sustainable behavior and better prepare learners to foster a relationship with and participate in their local and global community (Egan, 2004; Kevany, 2007) in addition to preparing for employment. However, responsive action to this call, particularly pedagogical innovation and curriculum redevelopment, has been sluggish (Everett, 2008; Rode & Michelsen, 2008). Thus, little is known about how ESD may succeed current educational practice or how such practice may impact learners. The purpose of this study was to explore the perceived impact on student learning and development of an apparel product development course that was redeveloped using the ESD framework. A qualitative case study was conducted during one semester. Data collection included student reflective writings and focus group interviews. Early data analysis has indicated that some of the most important learning outcomes are sustainability literacy as well as awareness of personal behavioral patterns; while development outcomes have included significant progress in personal expression and effective collaboration.

WRITING CENTER SPACES AS TANGIBLE EXAMPLES OF INVITATIONAL RHETORIC

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In their article, "Beyond Persuasion: A Proposal for an Invitational Rhetoric," Sonja K. Foss and Cindy L. Griffin posit a theory that embraces the practices of conversation and open sharing of ideas to challenge the traditional power structures that they believe are inherent in moments of persuasion. Responding to critiques of the theory, Jennifer Emerling Bone, Cindy L. Griffin, and T. M. Linda Scholz provide tangible examples of real situations that foster invitational rhetoric in order to refute critics' claims that the theory is unrealistic. Like Bone, Griffin, and Scholz, I believe that invitational rhetoric has real life applications. Therefore, I assert that the collaborative pedagogy informing writing center theory makes many writing centers places that encourage the practice of invitational rhetoric through the sharing of power, dialogue, and trust between students and tutors. Many writing centers emphasize collaborative pedagogy and employ tutors who are also students which allow writing center spaces to escape the hierarchical feel of at traditional higher education classroom. While some institutions are skeptical of the benefits of writing centers, the ability to promote collaborative invitational rhetoric practices can be rather noteworthy with the concerns regarding student retention and graduation rates. Because so many writing centers encourage student empowerment through the use of constructive collaboration, writing centers may be able to reach the students who resist or struggle in the traditional hierarchical classroom, by providing these, and other, students space to foster creativity, listen, and be heard.

"GANAS": THE POWER AND POTENTIAL IN DEVELOPING LATINA ELL TEACHERS FOR RACIAL UPLIFT

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This ethnographic case study focuses on 12 non-traditional, ELL, Latinas within a community-based teacher education program. The objectives of the study were: a) to explore the various factors that foster Latina, English language learner (ELL), non-traditional students' resiliency in college and ultimately their persistence in teacher education, b) to identify what characteristics fostered personal agency and a sense of advocacy regarding their ELL students, and c) to consider reform efforts for the effective recruitment, retention, and professional development of Latino/a, ELL students in teacher education. The researcher utilized three sources of data, 1) an open-ended, qualitative survey, 2) individual in-depth, semi-structured interviews, and 3) academic documents and program artifacts. Given the breadth of qualitative data collected, the researcher employed multiple methods for data analysis utilizing a blended theoretical framework based on the resiliency theory and Critical Race Theory. The findings of this study parallel existing literature that identifies economic struggles, experiences with racism, poor schooling, and gender role expectations as factors that can hinder Latinas' achievement and life trajectories. At the same time, strong family and community networks, a rich cultural heritage, powerful experiences as nurturers, and teachers in the home, and the development of endurance through opposition also influence the Latinas' achievement in positive ways. This study highlights that it is through cultural connections and their desire to see the cultural uplift of other Latino/as, that Latina, ELL teacher candidates are able to develop strong relationships with ELL students that foster their success and integration into US schools.

GENDER AND DOMESTIC TERRORISM: WHAT EMPOWERMENT CAN TELL US ABOUT A STATES PROPENSITY TOWARDS POLITICAL VIOLENCE

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The study of gender empowerment and war has been getting more research recognition over the past ten years. The ultimate goal of the research agenda is to answer the larger question: why does conflict occur? Biology and sociology are used to explain how male violence is pervasive throughout society and even across species. It is this violence that puts females in a subordinate role to males. In politics this relationship is manifested in men historically having decision making power making war and violence prevalent conflict resolution agendas. Past authors have looked at the relationship between gender empowerment, security and intrastate/interstate conflict. The purpose of this paper is to continue building on this relatively new field and examine the relationship between gender and domestic terrorism. The goal is to expand the understanding of role of genders in other, more specific forms of political violence. The central research question asked is: does gender empowerment and the security of women influence the use of terrorist violence?

NARRATIVES IN EXILE: KASHMIRI PANDITS - MIGRANTS IN THEIR OWN HOMELAND AND THEIR STRUGGLE TO MAINTAIN THEIR IDENTITY

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Kashmiri Pandit migrants have been living on the margins of the composite culture in southern parts of Jammu and Kashmir, India since their expulsion in a crude bid to ethnically cleanse the Muslim majority Valley by Islamist terrorists in 1989-90. Even after over twenty years of co-existence with their Hindu brethren Pandits remain alien in their own homeland. They haven't been able to assimilate the host culture and remain a distinctly isolated lot. This self-imposed cultural exclusion has given rise to many socio-psychological disorders in the elderly, besides creating other grave social problems like timidity, social surrender, and high divorce rates among cross-culturally married couples. Whereas the younger generation is slowly adapting to the host culture primarily to gain societal acceptance, the elderly zealously guard their unique identity by using varied survival mechanisms. The most potent mechanism of not only preserving but also reinforcing their identity for future generations is 'narrative'. Almost every strand of their social and cultural ethos over the millennia finds vent through narrative; narratives of language, of rituals, of daily chores, of nostalgia, of belonging, of pain and pleasure, of glory and abundance, and narratives of yore when Kashmir was considered 'the paradise on earth'. This paper, from the social justice perspective, analyses the use of 'narrative' as a powerful emotional tool to preserve culture and protect identity besides elaborating on the phenomenon that the peace is conditioned by the tolerable behavior of the target group.

STRUCTURAL IMPEDIMENTS TO MOBILITY: A CASE STUDY OF TRIBALS IN INDIA

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This qualitative study explores the structural constraints inherent in the Indian education system that inhibits the socio-economic mobility of tribals. Previous studies have tried to analyze the problem from two main theoretical perspectives: the socio-economic perspective and the cultural reproduction perspective. This study examines the applicability of these perspectives in analyzing the participation of tribal students in the Indian education system. The findings indicate that participation in the Indian education system promotes cultural dissonance among tribal students due, in part, to the fact that the Indian education system makes little attempt to address the cultural specificities of tribal students in the design of educational policies. This promotes a poor educational performance by tribal students, which aids in the formation of a negative self-image. Furthermore the research explores the institutional mechanisms employed in the Indian education system that inhibit tribal mobility, the perception of the tribal members concerning the expected benefits of formal education system, and identifies the cultural elements needed for academic and economic success in mainstream Indian society that are not being inculcated in tribal students. The study used a non-experimental, cross-sectional research design with the main tools of data collection being observation and personal interviews. The study was conducted on the Santal, Birhor, Kharia and Lodha tribes located in Bankura, Birbhum, Puruliya, and Paschim Medinipur districts of the state of West Bengal in India.

EFFECTS OF USING DIGITAL STORYTELLING WITH ELEMENTARY STUDENTS

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Who was Johannes Chrysostomus Wolfgangus Theophius Mozart? The child prodigy who dazzled Kings, Queens, Emperors and Empresses as a young boy lead an amazing life in his first ten years. The facts are known and avaiable, however the vast majority of research is devoted to Mozart's music, life and career during his adult years. Perhaps the time for a child to begin to realize the importance of Mozart in history would be to create a connection between the young Mozart's daily activities to a student of approximate age. The purpose of the study is to illuminate the life of the child prodigy Mozart using creative digital storytelling through videos. As a recipiant of National Endowment for the Humanities grant, intensive research about Mozart's rise and fall in fame was completed in Vienna, Austria, June 21 through July 16, 2010. A caviot of my research was devoted to Mozart's child prodigy years to bring awareness of these years to the minds of elementary students. Using digital (video) storytelling, listening maps, and composition projects, students will step into the world of Mozart as a composer and begin to relate his life to theirs. The study was completed in a pilot program in McPherson, Kansas in January 2011. Data analysis will establish the effectiveness of the use of digital video storytelling to reveal the student's ability to correlate the boyhood life of Mozart with the master composer whose music challenged and changed the world.

COHORT AGING AND POLITICAL ATTITUDES REGARDING ISSUE PARTICULARITY

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As we age, we seem to become more settled in our ways, but does this automatically imply that we become more settled in particular political opinions? In their article, "Population Aging, Intracohort Aging, and Sociopolitical Attitudes", Danigelis, Cutler, and Hardy (2007) examine the likelihood of people changing their opinion on political issues such as racism and sexism as they age in the states. This research builds on Danigelis et al.'s (2007) work by examining aging and conservatism with a regression model assessing age, period, and cohort effects. Using the US General Social Survey, this study assesses whether change occurs in cohorts' attitudes regarding issues such as abortion positions, political ideology, and gender roles in the United States while taking into account age period and cohort effects. The goal of this study is to emphasize how issues can influence the outcome of the study when researching aging and conservatism in the population.

'FOLLOW THE MONEY: THE IMPACT OF U.S. FOREIGN AID ON NGOS'

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This study furthers the research into the role of U.S. foreign aid (USFA) within the field of human rights. Instead of looking at human rights specifically, this study looks at how U.S. Foreign Aid impacts Nongovernmental Organizations (NGOs) presence in a developing country. Looking at overall NGOs that are international in scope (INGOs) and differentiating between sustainable development and human rights INGOs in those developing countries. Building upon NGO literature within the field, I use data from Landman (2005) UIA data and Murdie (2009) data on sustainable development and human rights INGOs, which builds off of Smith and Weist (2005), to test my hypotheses. The first model explains the effects of USFA on the presence of INGOs in a developing country, concluding that my hypothesis is supported, that USFA matters. The second table measures the effect of USFA on change in sustainable development INGOs numbers and the third model looks at the effects of USFA on just human rights INGOs. All three models indicate that US Aid is significant when looking at INGOs presence in a developing country and that these NGOs are rent-seekers, following the money. Therefore, given the above conclusions it would be safe to say that an increase in USFA within a developing country determines NGOs target states even if one developing country may have more of a problem with issue areas than another.

FACILITATING STUDENTS' ASSIMILATION OF ELECTRONICS AND PHYSICAL MEASUREMENTS THROUGH ILL-STRUCTURED CAPSTONE PROJECTS

Nasser Juma

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Successful experimental physicists must understand the conceptual basis of experiments and the techniques of modern instrumentation, data collection and analysis. Through capstone projects at the Kansas State University Physics Department, students in an electronics course, Physical Measurements and Instrumentation, apply their knowledge of electronics, instrumentation and LabVIEW to experiments from previous courses. This allows students to apply their newly learned electronics knowledge and skills to previously learned physics experiments and also offers the students an opportunity to solve real-world problems associated with experimental control and data acquisition. The capstone projects therefore give the students an opportunity to put into practice the electronics knowledge and ideas that they have learned as well as help them see the relation between electronics and actual measurements that can be done in the laboratory. We have collected data through in-class observations of the students as they worked in pairs on these projects in addition to interviews that we did with the students before and after working on these projects. We analyzed the collected data and in this talk we highlight some of our findings on the students' learning outcomes and also discuss the challenges faced by the students as they were working on these projects.

GEOCHEMICAL MODELING IN UNDERSTANDING REACTION KINETICS OF CO2-WATER INTERACTION IN ARBUCKLE FORMATION, SOUTH-CENTRAL KANSAS

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With increasing concern over anthropogenic CO_2 emissions into the atmosphere, the scientific community has begun investigating the potential to permanently store, or sequester, carbon dioxide in geologic formations. In particular, saline aquifers have proven potential to store CO_2, with an estimated capacity between 1000 and 10,000 Gt CO_2. Our project is examining the potential to sequester CO_2 in the Arbuckle saline aquifer in south-central Kansas. As part of a larger DOE funded project, this work focuses on the geochemical reactions that would take place during CO_2-water-rock interaction in a subsurface brine environment. We are combining formation water chemistry collected from specific depths in the Arbuckle with mineralogical descriptions of the formation lithologies above and below the proposed injection zones with lab scale flow-cell experiments of the core plugs into a geochemical kinetic model to determine the long term reaction rates of CO_2 in a saline environment.

UNDERSTANDING NITRATE DYNAMICS IN A KANSAS GRASSLAND: SEDIMENT GEOCHEMISTRY AND STABLE ISOTOPE STUDY

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To understand ambient nitrate dynamics in an unmanaged grassland environment, we selected to study the stable isotope chemistry of various substrates at the Konza Prairie Biological Station. These sediments range from alluvium to bedrock materials which are mostly limestone and shale. To understand the biogeochemistry of N cycling in unmanaged grassland, 40 water samples have been collected along a full stretch of the major creeks on site (Kings and Shane Creeks). These samples have being analyzed for δD, $\delta^{18}O$, and $\delta^{15}N$ to determine the manner by which recharge water allows nitrates to be leached into sediment, and to determine if additional nitrate is contributed from weathering of the bedrocks**.** Anion chemistry of the water indicates the presence of sulfates, chlorides, nitrates, fluorides, and carbonates. Although an obvious correlation among the anions is not present, data shows high carbonate content due to the presence of shallow bedrock. We collected subsurface sediments via geoprobe up to 8 ft depth adjacent to the creeks to study $\delta^{15}N$ variation within core sediments. The major finding so far has been the direct 1:10 correlation between the total N and C content of these core sediments including NO_3 and NH_4 mostly concentrated in the upper 2 – 4 ft of the sediment profile. The results of this study provide a broader context for ambient nitrate cycling in unmanaged grassland and a baseline comparison for nitrate levels in surrounding agricultural lands. Future analyses will compare nitrate dynamics in nearby agricultural lands within the Konza.

SELENIUM SPECIATION AND MOBILIZATION IN A CONTROLLED WETLAND SYSTEM: PARIETTE WETLANDS, UT

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With headwaters in the heavily irrigated Pleasant Valley, Pariette Wetlands, UT is an area with high selenium concentrations in both its water and sediments.While selenium is an important nutrient, it is toxic at high concentration for many aquatic organisms in their developmental stages. In order to determine the relationship between the Se concentrations in the water and sediments, water and sediments were sampled throughout the reach of P.W. Along with the water samples in situ pH, oxidation reduction potential (ORP), temperature, specific conductance, and dissolved oxygen were monitored with a Hach Hydrolab®. An observed trend of increased pH from upstream to downstream, and the relative stability of ORP suggest that the Wetlands are a pH controlled system.Water samples from July and Nov. showed a decreasing trend in total Se from upstream to downstream. Se conc. from Nov. were approximate three times greater than those of the July samples indicating seasonal fluctuations in Se conc.Water samples are being analyzed for total anions and cations via IC and ICP-MS and other major and minor constituents along with total Se and Se speciation by HPLC-ICPMS. Sediments are being analyzed for total Se by ICP-MS along with a sequential extraction procedure to locate the labile fractions of mostly inorganic bound Se.Solid state characterization of Se speciation will be determined with XANES and EXAFS.Mineralogy is being determined by petrographic examination and used in conjunction with in situ water parameters and water constituents to develop an understanding of the rock/sediment water interactions and their effect on Se mobilization.

DEMONSTRATION OF RAPID SINGLE CELL ANALYSIS ON SIMPLE MICROFLUIDIC DEVICES

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Microfluidic devices are playing an increasingly important role in chemical and cellular analysis thanks to their small channel manifolds that are capable of precise and accurate manipulation of analytes. More attention is being focused on single cell analysis to better understand diseases like cancer which begin with mutations in single cells. Microfluidics can therefore be employed in the development of early detection systems of these diseases. In our group we have used simple microfluidic devices to demonstrate the transportation and rapid lysis of adherent and non-adherent cells followed by electrophoretic separation of the cellular contents. Results from these experiments will be presented and discussed.

PURIFICATION AND ANALYTICAL ASSESSMENT OF THE MYCOBACTERIAL PORIN MSPA AND INVESTIGATION OF ITS CHANNEL ACTIVITY AND POTENTIAL USE FOR A PROTEIN NANO SOLAR CELL

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An octameric trans-membrane channel protein, MspA has been successfully isolated from *Mycobacterial smegmatis* and purified to obtain crystals. Channel activity of pure and chemically modified MspA has been investigated to reveal a significant current conductance. Ru(II) complexes show significant gating with purified MspA. This phenomenon has future potential in DNA sequencing and the development of antimycobacterial drugs (channel blockers). A full analytical assessment has been carried out to authenticate the structure of the protein, including gel electrophoresis, spectroscopy (fluorescence, UV, FTIR, NMR), HPLC, Bradford protein assay, dynamic light scattering. An X-ray crystallographic study is underway. Other potential applications of MspA as anticancer agent and as a building component of nano solars cell have been investigated as well.

MAKING A BIOREFINERY ECONOMICALLY VIABLE: AN APPROACH FOR EFFICIENT CONVERSION OF CARBOHYDRATES TO VALUE ADDED PRODUCTS

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Declining crude-oil reserves and climate concerns are driving the shift towards renewable feedstocks and the development of a new organics industry based on bio-refining. Energy minimization and economic viability are two goals that must be addressed for the development of a successful biorefinery. Current, ethanol-only facilities have poor return on investment. Successful addition of diverse chemical products into the existing biorefinery's portfolio can help achieve the economic goal, but faces technical hurdles. One of the most important challenges is to develop a facile conversion technology capable of converting the renewable carbon to high value chemicals. Small-scale, on-site thermochemical conversion of biomass to a liquid bio-oil has been demonstrated. Unfortunately, current bio-oils are unstable and must undergo further treatment prior to storage. Hydrogenation has been shown to stabilize bio-oil, but it requires extreme pressures, incompatible with near-field processing. The research presented here focuses on developing hydrogenation technology capable of performing near or on-site. A novel reactor, capable of selectively obtaining industrially useful chemicals from biomass-derivatives at mild conditions has been developed. Specifically, glutamic acid hydrogenation is performed using a membrane reactor containing Ru-coated poly-(etherimide) membrane. Here, the effects of processing conditions on performance are examined and compared to the conventional systems. Advantages of this proposed technology include reduction in the capital cost resulting from mild (low pressure) operating conditions.

ELECTRICAL CHARACTERIZATION OF GaN METAL OXIDE SEMICONDUCTOR CAPACITOR WITH Al_2O_3 AS THE GATE OXIDE

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Gallium nitride and its alloy aluminum gallium nitride (AlGaN) have become immensely important semiconductors because their properties are superior to those of silicon (Si) and gallium arsenide (GaAs) for high power-high frequency capacitors and transistors that will meet future needs for high performance satellite and radar systems for military applications. GaN's wide band gap (E_g = 3.4 eV) translates into improved power output and cooling requirement. This work reports on the electrical properties of MOS capacitors with high k dielectrics (Al_2O_3) deposited on GaN by atomic layer deposition (ALD) at deposition temperatures 240°C, 260°C, 280°C and 300°C. The thicknesses of the oxide deposited on GaN at these growth temperatures were found between 19.7 to 25.3 nm by ellipsometry. GaN is either epitaxial films on sapphire substrate or bulk crystal below the Al_2O_3 film in the MOS capacitors. The oxide capacitance in the accumulation region was obtained from capacitance-voltage (C-V) measurement. This capacitance was used to determine the dielectric constant of oxide film and interface trap density. Hysteresis was observed during the reverse sweep of the C-V curve due to presence of interface traps. The effect of growth temperature on capacitance measurement was investigated. Current-voltage (I-V) measurements were carried out to determine leakage current in Al_2O_3 gate oxide.

ANALYSIS OF ROBUSTNESS FOR SHIPBOARD POWER SYSTEM WITH NON-RADIAL POWER FLOW

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In an all electric ship, intelligent and integrated power system (IPS) that allows for reconfiguration offers better fight-through and survivability capabilities compared to manual service restoration. Automated reconfiguration involves optimizing status (ON/OFF) of switches such that power delivered to loads is maximized after the occurrence of a fault. In this process, multiple generators of various sizes and power generation capabilities are placed throughout the ship. All previous research relating to shipboard power system (SPS) reconfiguration has so far considered radial power flow to optimize switch configuration. Our research considers a new medium voltage balanced hybrid (AC & DC) SPS model in which no radial power flow constraint is assumed. The formulation and analysis shown in this presentation are important for improving robustness of IPS and SPS reconfiguration time. Previous research has shown that, for non-convex SPS reconfiguration problems, convex optimization can be used to reduce complexity of the solution from exponential to polynomial time. In this research convex optimization is used to find reconfiguration solution. Cumulative distribution function (CDF) of power delivered to loads is used to compare the proposed non-radial system with radial system. Preliminary results demonstrate the robustness of non-radial topology in terms of power delivery to loads under multiple simultaneous faults.

DETECTION AND DIAGNOSTIC OF SHAPE AND VARIATION CHANGES IN NONLINEAR PROFILES

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Quality characteristics in profile analysis usually contain few hundred or thousand observations in a profile, so that conventional multivariate statistical process control (SPC) tools can not be applied directly. Most methods for monitoring nonlinear profiles focus on detecting shape changes only. This study provides a framework for detecting and diagnosing shape as well as variation changes of a nonlinear profile. The proposed method first separates a given nonlinear profile into two channels using a discrete wavelet transformation (DWT). The first channel contains the information of overall contour of the profile while the second channel captures the noise around this contour. A Levene transformation is applied to signals in the variation (or noise) channel so that the problem of detecting variance changes is converted into the problem of detecting mean shifts. A B-spline approximation is then used on both the shape channel and the Levene transformed channel to generate knots or control points for dimension reduction. The proposed plotting statistic is defined as the average deviation between the actual profiles and B-spline fitted profiles at the locations of the B-spline knots. Then a pair of univariate or multivariate control charts, such as, EWMA or MEWMA, are used to monitor the process that produces the profile. Similar to X-bar and R charts, the proposed charting method aims to detect assignable causes of variation due to either mean or/and variance changes in profiles.

A NEW METHOD OF ADAPTIVE INTEGRATION WITH ERROR CONTROL FOR BOND-BASED PERIDYNAMICS

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Peridynamics is a new formulation of solid mechanics and possesses some advantages in handling discontinuities within a continuum. Since the formulation is based on direct interactions between points in a continuum separated by a finite distance, integration of interactions between points plays a crucial role in peridynamics. This research is focused on developing a new method of numerical integration with error control for bond-based peridynamics. In this method, the continuum is discretized into cubic cells, and integration over full and partial cells in the horizon of interaction are calculated accurately. An adaptive trapezoidal integration scheme with a combined relative-absolute error control is employed. Numerical examples show that the new method is much more accurate and efficient than the previous method published in the literature.

ELASTIC BUCKLING BEHAVIOR OF PLATES AND TUBULAR STRUCTURES

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The behavior of plates and tubular structures under compressive loads is an important aspect in the design of various engineering structures in fields of aeronautical, marine and civil engineering. Various researchers have established theories on buckling behaviors of plate structures with various boundary conditions and have extended these to postulate the characteristics of tubular structures under compressive loads. In the present study, some of the existing theories of square tubes and rectangular tubes were verified using computational and experimental results with emphasis on certain critical aspects of the theory. Buckling of a plate with a new set of boundary conditions was solved using classical plate bending mechanics and the solution was utilized to study the buckling characteristics of equilateral and isosceles triangular tubes. The analytical results were compared with the Finite Element simulation results. The good agreement between analytical results and simulations validates the theoretical solution for determining the buckling behavior of triangular tubes.

MEASURING THE INTERFACIAL ADHESION OF PDMS TO FUNCTIONALIZED SUBSTRATES BY MEANS OF CONTACT MECHANICS

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Measuring the adhesion between two surfaces is of great interest in surface science applications. The objective of this work is to investigate the effects of interfacial properties and interfacial reactions of different surfaces on adhesion of solid polymeric materials. The Johnson-Kendall-Robert (JKR) theory of contact mechanics is used in this study to determine the adhesion of a model silicone-based polymer (PDMS) and several surfaces with different end functionality. The JKR based adhesion measurements for these systems show that the interfacial adhesion strength of two surfaces is dependent on the chemical properties of those surfaces. The results of this study can provide a direct understanding of designing and/or engineering of desired surface properties.

EVALUATION OF A MULTIFACETED HAND HYGIENE CAMPAIGN IN OUTPATIENT HEALTHCARE CLINICS

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Hand hygiene by healthcare workers (HCWs) is an effective means of preventing nosocomial infections. However, hand hygiene compliance can be low among HCWs. ***Objective:*** This study used a multifaceted approach with the introduction of a gel sanitizer and a novel poster to improve hand hygiene in two outpatient healthcare clinics. ***Design:*** This was a longitudinal interventional study. ***Sample:*** HCWs at two outpatient clinics were observed for hand hygiene opportunities. ***Measurements:*** Direct observation of hand hygiene opportunities was performed during baseline, intervention and follow-up periods. A post-study survey of HCWs was collected. ***Intervention:*** Novel posters and gel sanitizer were introduced. ***Results:*** In both clinics, baseline hand hygiene was poor (10.8-20.6%), but improved after interventions (36.2-54.3%), and was maintained through the follow-up period (31.5-50.9%). Hand hygiene was observed after patient contact (51.1-67%) more often than before contact (22.7-41.5%), and a similar trend was self-reported (80% post-contact, 53.6% pre-contact). Nearly half (47%) of the HCWs surveyed considered introducing gel sanitizer an effective motivating tool for improving hand hygiene, while 42-45% were motivated by the posters. Sixty-five percent believed this multifaceted campaign increased their awareness of hand hygiene, and 44% believed their hygiene practices have improved because of this campaign. ***Conclusion:*** Hand hygiene performance by HCWs in outpatient clinics may benefit from a multifaceted approach with the use of novel posters and promoting gel sanitizer.

5α-REDUCTASE INHIBITION TO DECREASE PROSTATE TUMOR GROWTH

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5α-reductase 1 (5αR1) and 5α-reductase 2 (5αR2) convert testosterone into the more potent androgen dihydrotestosterone (DHT). We hypothesize that finasteride (5αR2 inhibitor) treatment will not significantly alter tumor growth 1-2 weeks prior or 3 weeks post tumor implantation, while dutasteride (5αR1 & 2 inhibitor) treatment will decrease tumor growth regardless of treatment initiation. To test this hypothesis, sixty 8-week old male nude mice were randomized into Control, Pre & Post-Finasteride, Pre & Post-Dutasteride diet groups (all treatment diets contained 83.3 mg drug/kg diet). Tumors were implanted into the rear flanks by subcutaneous injection of 1 x 10^5 WPE1-NA22 human prostate cancer cells in Matrigel™ and allowed to grow for 22 weeks. At study conclusion, prostate and seminal vesicle weights were significantly decreased in all treatment groups versus the control. Dutasteride intake also significantly reduced seminal vesicle weights compared to finasteride intake. There were no significant differences in final tumor areas and tumor weights between groups, likely due to poor tumor growth. In follow-up studies, proliferation of WPE1-NA22 cells, and its parent cell line RWPE-1 prostate epithelial cells, were not altered by treatment with testosterone, DHT, or the synthetic androgen, mibolerone, suggesting that they are not androgen-sensitive. Thus, the lack of response to androgen treatment by WPE1-NA22 cells may explain the inadequate tumor growth observed. (NIH Grant P20-RR017686 and Terry C. Johnson Center for Basic Cancer Research)

GENETIC ANALYSIS OF SEGMENTATION IN THE RED FLOUR BEETLE, *TRIBOLIUM*

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In insects and vertebrates, the body is composed of repeated parts called segments, which form during early development in a process called segmentation. For many years, studies of segmentation have focused on the fruit fly, *Drosophila*. In *Drosophila*, several genes have been identified that are involved in segmentation and are called segmentation genes. By studying the interactions of these genes, a hierarchy of genes has been built that includes maternal, gap, pair-rule and segment polarity genes. This hierarchy regulates the simultaneous formation of segments in the fruit fly. However, in other insects, including the red flour beetle, *Tribolium*, segments form sequentially, not simultaneously. As expected, orthologs of some *Drosophila* segmentation genes are also involved in segmentation in *Tribolium*. Previous studies show that in *Troblium*, a pair-rule gene circuit of three genes regulates segment formation. In *Drosophila*, gap genes regulate expression of pair rule genes. Whether these genes also regulate pair rule genes in *Tribolium* is unclear. To explore the possibility of similar functions and interaction of segmentation genes in *Tribolium*, RNAi is applied in *Tribolium* to knock down the function of gap genes. Reduction of one gap gene, *Tc giant*, causes segmentation defects and the expression of pair rule genes is different from wild type. These results provide evidence that gap genes do indeed regulate pair rule genes in *Tribolium* and effect segmentation through the pair-rule gene circuit.

ALTERNATE SIGMA FACTOR (RpoN) PROMOTES EXTRACELLULAR DNA (eDNA) INDEPENDENT BIOFILM FORMATION IN *ENTEROCOCCUS FAECALIS*

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Transcription initiation is a critical step in bacterial gene regulation and is often controlled by transcription regulators. The alternate sigma factor (RpoN) is one such regulator that facilitates activator dependent transcription initiation and thus modulates the expression of a variety of genes involved in metabolism and pathogenesis in bacteria. This study describes the role of RpoN in the nosocomial pathogen, *Enterococcus faecalis*. Biofilm formation is one of the important pathogenic mechanisms of *E.faecalis* that elevates its potential to cause surgical site and urinary tract infections. Lysis of bacterial cells within the population contributes to biofilm formation by providing eDNA as a key component of the biofilm matrix. Deletion of *rpoN* renders *E.faecalis* resistant to autolysis which in turn impairs eDNA release. Despite the absence of eDNA, the *rpoN* mutant forms robust biofilms as observed using laser scanning confocal microscopy indicating and emphasizing the presence of other matrix components. Initial adherence to polystyrene plate was enhanced in the mutant. Proteinase K treatment of biofilm at different stages of development significantly reduced the accumulation of biofilm by the rpoN mutant. In conclusion, our data indicates the presence of proteins as an additional matrix component in *E.faecalis* V583 biofilms and suggests a regulatory role of RpoN in governing the nature and composition of the biofilm matrix.

CAN MACROPHAGES BECOME ADIPOCYTES?

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Macrophages are a very heterogeneous population of cells and have diverse roles. C2D is a macrophage cell line that lies early in the differentiation lineage of macrophages. We discovered that these macrophages accumulate lipids when cultured in medium containing dexamethasone, 3-isobutyl-1-methylxanthine and insulin (differentiation medium). This process is similar to 3T3-L1 cells where preadipocytes differentiate into adipocytes under same conditions. Other primary macrophages and cell lines did not accumulate lipids under similar conditions, suggesting that only cells early in the macrophage lineage can be programmed to accumulate lipids similar to adipocytes. We quantified the lipids that the cells accumulated using a lipid stain which showed gradual accumulation of lipids over time. Lipid analysis of these cells showed that C2D and 3T3-L1 adipocyte cells have similar lipid profiles. When 3T3-L1 cells differentiate into adipocytes, they undergo clonal expansion which is accompanied with increased levels of transcripts of adipocyte specific genes. Real time PCR results showed that there was not a significant increase in the transcript levels of adipocyte specific genes in C2D cells when differentiated. However, C2D cells undergo clonal expansion before they stop proliferating similarly to 3T3-L1 adipocyte cells undergoing differentiation. C2D cells differentiating are metabolically active even though they do not proliferate. These data suggest that the C2D macrophages accumulate lipids even though they are not expressing adipocyte specific properties.

IDENTIFICATION OF MOLECULAR MECHANISMS INVOLVED IN TUMOR GROWTH ATTENUATION BY RAT UMBILICAL CORD MATRIX STEM CELLS

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Umbilical cord matrix stem cells (UCMSC) represent a promising source of therapeutics for various diseases including cancer. We have shown that naïve rat UCMSC significantly attenuate mammary adenocarcinoma (Mat B III) cell proliferation. To study the underlying mechanisms involved in the Mat B III growth attenuation, we investigated gene expression profiles of rat UCMSC alone and those co-cultured with Mat B III cells in Transwell culture dishes by cDNA microarray analysis using Illumina RatRef-12 BeadChip. The comparison of gene expression profiles between untreated and co-cultured rat UCMSC identified five up-regulated and two down-regulated genes based upon the following screening criteria: gene expression should show at least a 1.5 fold change in co-cultured rat UCMSC; genes encode secretory proteins; and cell growth-related proteins. Following confirmation of gene expression by qRT-PCR, adipose differentiation related protein (ADRP), sulfatase-1 (SULF-1) and glucose phosphate isomerase (GPI) were selected for further analysis. Addition of specific neutralizing antibodies against these three proteins in the co-culture of rat UCMSC and Mat B III cells (1:20) significantly increased [^{3}H] thymidine uptake in the Mat B III cells implying that these gene products are functionally produced and attenuate cell growth. Immunoprecipitation followed by Western Blot analysis demonstrated that these proteins are indeed secreted into the culture medium. These results suggest that ADRP, SULF-1 and GPI might be involved in rat UCMSC-dependent growth attenuation of rat mammary tumor.

Poster Abstracts

ALLOMETRIC MODEL TO QUANTIFY SORGHUM CANOPY FORMATION

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Canopy architecture has a prominent role in fundamental processes of crop growth. Leaf area index (LAI) is commonly used to quantify vegetative canopy structure. The objective of this study was to develop a simple quantitative model to predict LAI for sorghum (*Sorghum bicolor* (L.) Moench) from emergence to flag leaf stage. Measurements included length, maximum width and area of individual leaves, leaf number and LAI for eight sorghum lines under water and nutrient sufficient field conditions. Leaf area per unit land area (LAI) was calculated from an algorithm considering the area of mature leaves (leaves with a ligule), area of immature leaves, total leaf area per plant and plant frequency. Leaf shape factor (slope of the regression line between leaf area and product of leaf length and maximum width) was constant (0.81) for all mature leaves. Phyllochron (thermal time for ligule development of a new leaf on the culm) varied among lines. Third order linear functions were developed for: (i) leaf length and leaf number, (ii) maximum leaf width and leaf number and (iii) maximum leaf width and leaf length for mature leaves of each line. Area of expanding leaves was linearly related to length, relative to expected mature leaf dimensions; and was modeled assuming linear leaf expansion rates. Good correlation was found between modeled and observed LAI with R^2 0.978. Modeled LAI showed a negative bias (slope of 0.89 when regressed on observed LAI) with a root mean square error of 0.438 and mean absolute error of 0.314. Measured LAI for sorghum lines ranged from 1.20 to 4.18.

EVALUATING THE EFFECTS OF DROUGHT STRESS ON GROWTH AND DEVELOPMENT OF SORGHUM ROOTS

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Plant growth depends on the ability of the root system to provide physical support as well as uptake of water and nutrients from the soil. The dynamic nature of the rhizosphere dictates the adaptability of the root system through the ability to exhibit morphological, structural, and physiological responses to maximize the acquisition of resources and the ability of roots to exploit water moisture at deep soil horizons is a traits associated with drought tolerance. Plant roots have not been extensively studied as the above ground part of the plant and there is limited on sorghum roots development and their response to drought and hence the need to generate information. The purpose of this study was to quantify these responses in sorghum and identify desirable rooting traits that can be used in the development of drought-tolerant genotypes that are efficient in water use. The objectives were: (i) to quantify genetic variability exhibited in root system growth and development in response to drought stress for selected sorghum genotypes, (ii) to investigate spatial and temporal distributions of lateral root growth and development in these genotypes. Results showed a large variability in total root length among sorghum genotypes. The fine roots with a diameter of ≤0.25 mm were significantly affected by drought stress and root dry weight was also affected by drought stress more than shoot dry weight. Fine root (≤0.5 mm diameter) distribution at different soil depths was affected by drought stress.

EFFECT OF KNEADING SPEED ON THERMOMECHANICAL PROPERTIES OF FLOUR DOUGHS

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Dough mixing is one of the most important ways to characterize the quality of wheat flours, yet adequacy of dough mixing are still partly based on operator experience. All reactions occurring during dough development are related to complex mechanisms involving the wheat proteins and water and a number of components; starch, proteins, water, sugars and lipids; to transform through mechanical energy. Wheat flour dough is highly non-Newtonian, time?dependent, strain?dependent and viscoelastic. These rheological properties are very sensitive to water content, composition, temperature, mixing torque and speed. In industry, a wide variety of mixing geometries and speeds are used for dough development. The main objective of this research was to study impact of mixing speed on thermomechanical properties of bread making quality wheat flours using Mixolab (Chopin, France). Dough consistency increased while the stability decreased with increasing kneading speed. C2-C1 difference increased indicating progressive weakening in dough network at elevated mechanical energy input and temperature. Maximum viscosity (C3) increased possibly due to quick rupture of starch granules leading to higher paste consistency. Strong relationships were observed between the mixing speed (rpm) and the following Mixolab parameters: C1 time, C1 torque, C2 torque, C1-C2, C3 torque, C4 torque, C3-C4, alpha, and total work done. Increased mixing speed resulted in increased dough consistency. Mixing temperature had higher impact on dough consistency and stability than mixing speed. Softening effect of temperature was more significant at low mixing speed.

COMPRESSIVE STRENGTH OF WHEAT KERNELS AFTER SOAKING

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Proper tempering of wheat prior to milling is a major contributor to milling efficiency and high yields of low ash flour. Well-tempered wheat will have tougher more plastic bran, weaker interactions between endosperm and aleurone, and a softer endosperm. Achieving optimum final moisture and using the proper time and temperature during tempering will ensure maximum yield of low ash flour, and conserve energy by minimizing the force required by the break and reduction rolls during milling. Direct measurement of wheat's material strength has primarily focused on isolated endosperm or bran alone while neglecting the structural properties of the system as a whole. Good quantification of wheat's mechanical properties as an intact system may allow the creation of a model for determination of ideal milling moisture content. To determine how the structural properties of wheat kernels vary with respect to moisture content wheat kernels were soaked in water at multiple temperatures. Changes in total moisture over time were determined by air oven and used to determine coefficients for Peleg's moisture sorption equation. Soaked kernels were also crushed immediately after soaking using a TA.XT2 texture analyzer to determine effects of moisture on the compressive force deformation curves of individual wheat kernels.

FEEDING BEHAVIOR COMPARISON OF SOYBEAN APHID BIOTYPES ON DIFFERENT SOYBEAN ENTRIES

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The soybean aphid, *Aphis glycines* Matsumura (Hemiptera: Aphididae), has become a major pest of soybean, *Glycine max* L. (Merr.), since it was first detected in Wisconsin in 2000. Three soybean aphid biotypes have already been documented in the United States in the first 10 years after its invasion. So far, there were a few studies done on feeding behavior of soybean aphid in United States. Electrical Penetration Graph (EPG) technique is a convenient and successful tool to study the feeding behavior of piercing and sucking insects in great detail. It is the first attempt to study the feeding behavior differences of biotype 1 and biotype 2 on soybean entries using the EPG technique. This study includes both resistant and susceptible entries from Kansas and Michigan. The aphids were starved for one hour before attaching them to gold wire. The wired aphids then attached to a probing system, the whole system in turn attached to a computer. Aphids were placed on soybean plants at V1 stage and the circuit is completed when the aphids start probing. The experiments ran for 9 hrs each for the given channels. The graphs were saved on the computer hard disk, with 8 channels at a time. The result shows that the resistant and susceptible entries show significant differences in their EPG parameters, especially for the sieve element duration in both biotypes. But, no differences were found in any other probing phases between resistant and susceptible entries, except the number of potential drops (PDs) in biotype 2. Thus, it is concluded that resistance is largely associated with phloem tissues.

LIFE HISTORY PARAMETERS OF THE ROVE BEETLE, *ATHETA CORIARIA* AND SUITABILITY AS A BIOLOGICAL CONTROL AGENT AGAINST THE FUNGUS GNAT, *BRADYSIA* SP. NR. *COPROPHILA*

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Fungus gnats (*Bradysia* spp.) are major pests of greenhouse production systems in the USA. A number of biological control agents have been successfully used in dealing with fungus gnats, including the rove beetle *Atheta coriaria*, which is a predator that may regulate fungus gnat populations. Despite the evidence associated with its potential as a biological control agent there is no quantitative information available on efficacy of *A. coriaria* against the fungus gnat *Bradysia* sp. nr. *coprophila*. The overall objective of this study was to determine if *A. coriaria* is a viable biological control agent against fungus gnats under laboratory conditions. Life history parameters were evaluated based on visual observations: Total development time from egg to adult was 15.8 ± 0.39 days at 26°C. After one generation, 69.1 adults were obtained per female; the lowest number of adults per female was 39 while the highest number was 104. Female adult longevity was 47.8 days and the sex ratio was 1:1. A growing medium moisture content <60% may negatively influece adult survival. Efficacy against fungus gnat larvae was evaluated in petri dishes and deli squat containers using growing medium as a substrate, and different predator and prey densities. Although there were no significant differences in prey consumption among the different predator:prey ratios, there was a positive numerical response with higher consumption rates per adult observed at higher prey densities. Consumption rate was higher for second instar than third instar fungus gnat larvae.

PRODUCTIVITY DIVERGENCE ACROSS KANSAS FARMS

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This study used 30 years of continuous data for 135 farms in Kansas to explore changes in productivity using Malmquist productivity indices (MPI). The input oriented MPI concentrates on the level of inputs necessary to produce the observed outputs in the within time and adjacent time period under the technology at those time periods. The indices were used to determine whether there was productivity convergence or divergence in Kansas farms. The results showed that there was significant divergence among the farms and not a tendency for farms to catch-up to the same levels of productivity as the top farms in the sample. The average annual productivity growth over the sample period, 1979-2008, was 0.49 percent. The top farms based on MPI were larger in terms of value of farm production, crop farm income and livestock farm income and received a larger percentage of their income from oilseeds, feed grains, and swine than the other farms on average and relatively less of their income from small grains.

TIME OF ONSET, LOCATION AND DURATION OF LAMENESS IN BEEF CATTLE IN A COMMERCIAL FEEDYARD

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Bovine lameness from a variety of etiologies is a significant cause of feeder cattle morbidity. Inappropriate animal handling or improper facility design can lead to animals being injured with subsequent lameness. Newly arrived, high risk cattle are stressed and exposed to viral pathogens which can make them more susceptible to concurrent infections which can cause clinical lameness. The objective of this study was to determine the onset, location, and duration of lameness in newly arrived feeder cattle. During the months of July and August 2009, a total of 3,243 feedlot steers in a commercial feedlot were observed for lameness prior to processing, post-processing, and 1, 2, and 3 weeks post-processing. Lame and non-lame cattle performance was compared. A proportion comparison and confidence interval was then calculated using R version 2.10.1. The proportion of cattle observed lame pre-processing was 1.6% and was significantly less than the proportion of cattle observed lame after processing (2.5%, P=0.02). Lameness appeared to peak immediately post-processing (48 hd /3,243 hd, wk 0), yet nearly all (12hd/3,243hd, 99.63%) lameness cases were resolved by 3 weeks on feed. Cattle that were lame tended to have lower ADG than cattle that were not lame (3.41 vs. 3.60 lb/d; lame cattle vs. non-lame cattle; P = .11). This study indicates that the prevalence of feeder cattle lameness at arrival can be significantly increased due to processing activities. Further research to look at the effects of different handling strategies and facility designs on feeder cattle lameness is needed.

COMPARATIVE EFFICACY OF TWO IVERMECTIN POUR-ON ANTHELMINTICS IN BEEF STEERS IN A COMMERCIAL FEEDYARD

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Data comparing brand name anthelmintic efficacy to that of generic in feedlot cattle are limited. The objective of this study was to compare the efficacy of Vetrimec® pour-on and Ivomec® pour-on by utilizing the fecal egg reduction test in newly arrived feedlot steers. Forty cattle per pen from 10 feedlot pens were randomly assigned to one of two anthelmintic treatments: 1) Ivomec or 2) Vetrimec pour-on. Rectal fecal samples were obtained at the time of initial processing prior to treatment on day 0, and again on day 14. Animal weights were obtained on day 0, and again at sort date. Fecal egg counts were obtained using a modified Wisconsin technique. Linear and mixed models were fit with treatment, pen and their interaction terms as predictors of net egg count difference and average daily gain using R version 2.10.1. Fecal Egg Count Reduction percentages (FECR) were calculated and used to report treatment efficacy. There were no anthelmintic treatment by pen interactions for fecal egg reduction or performance. There were no differences in net egg count reduction between treatments (P= 0.15). Regardless of treatment, only 26% of animals had a FECR of >90%. There were no differences in pre-treatment body weights between treatment groups (P=0.096). Cattle treated with Vetrimec Pour On had improved average daily gains compared to cattle treated with Ivomec Pour On (3.90 lbs/day vs 3.74 lbs/day, Vetrimec vs Ivomec, respectively; P = 0.02). There were no differences in parasite control between generic and name brand products in this study.

COMPARISON OF OBSERVATIONAL AND NECROPSY DERIVED DIAGNOSIS FOR CAUSE OF DEATH FOR CATTLE IN COMMERCIAL BEEF FEEDLOTS

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Feedlots routinely use necropsies to determine the cause of death of feeder cattle. Necropsy results provide insight on the common causes of mortality while providing a surveillance mechanism for emerging diseases. Performing necropsies is dangerous to ranchers handling knives with zoonotic pathogens. The objective of this study was to determine the accuracy of a pre-necropsy mortality diagnosis to the mortality diagnosis from necropsy results which could result in less need for performing these tasks on a day to day basis. All feedlot mortalities were assigned a cause of death by feedlot personnel based upon history of the animal, where it was found dead, physical appearance, and by past experiences. A diagnostic necropsy was then performed by trained study personnel to determine the cause of death. Fifty-four head of feedlot cattle were identified that had pre- and post-necropsy observations recorded. Cause of death was categorized into seven catagories; respiratory/histophilus, AIP, Honker, Bloat, Buller/Injured, Peritonitis, and OB to compare the relationship between observational cause of death and cause of death determined during necropsy. A standard kappa test was used to determine the correlation between the two causes of death. The pre-necropsy and post-necropsy causes of death had a correlation of 0.6039. A kappa test value in this range indicates a moderate correlation between observational and necropsy determined cause of death. More research is warranted to determine the accuracy of pre-necropsy cause of death diagnosis as this data is from a single feedyard.

METABOLISM OF AZO DYES, METHYL RED AND METHYL ORANGE BY PLANTS

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Azo dyes like methyl red and methyl orange are known to be major human carcinogens besides being water pollutants. These dyes are still a cause of concern in the developing nations due to their unrestricted usage. Laccases and peroxidases isolated from bacteria and fungi are presently being explored for decolorizing dyes. Whole plants have rarely been employed in degrading dyes. The goal of our work is to identify and characterize the groups of enzymes from plants involved in the breakdown of dyes. Hydroponically cultivated *Arabidopsis thaliana* were treated with 20 mg/L solutions of methyl red and methyl orange prepared at two pH values, 4.6 and 6.3 in the presence or absence of external hydrogen peroxide. Presence of peroxide at either pH does not accelerate the decolorization of the dyes. Plants assayed at pH 4.6 (methyl red-4.5 nmoles/hr; methyl orange-3.9 nmoles/hr) were found to degrade the dyes at the same rate as that observed for pH 6.3 (methyl red-4.2 nmoles/hr; methyl orange-3.5 nmoles/hr). Within three days the plants were able to decolorize 60% of both the dyes. A strong salt, 0.1M magnesium sulphate, has been found to extract nearly 30% of the total enzyme activity measured by ABTS [2,2'-azino-bis(3-ethylbenzthiazoline-6-sulphonic acid)] and peroxide at either pH. The peroxidase activity as measured by ABTS color reaction is in ~1000 fold excess over observed degradation of methyl red or methyl orange. This suggests that the enzymes involved in the dye uptake might have low substrate affinity, or low reactivity with the dyes.

DNA PYROSEQUENCING TO DETERMINE THE INFLUENCE OF FALLOW PERIOD ON SOIL MICROBIAL COMMUNITIES IN THE BOLIVIAN HIGHLANDS

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In the Bolivian highlands (Altiplano; approx. 4000 masl), traditional fallow periods are being shortened in an effort to increase short-term crop yields, which may be at the expense of soil quality and plant health. Using 454-pyrosequencing and DNA-tagging, we characterized the response of the microbial community to (1) the length of fallow period and (2) the presence of *Parasthrephia* sp. and *Baccharis* sp. (both locally known as 'Thola'), considered beneficial to the maintenance of soil health in fallow fields in this region. The two study regions, Umala and Ancoraimes, differ in their soil characteristics, which may be a fundamental reason for the inherent differences in regional management practices. Soils in Ancoraimes have higher levels of organic matter, nitrogen and other macronutrients, which supported more diverse fungal communities ($P<0.001$). The presence of Thola after ten years of fallow had a positive effect on soil fungal diversity. Unexpectedly, the longer fallow periods were associated with lower fungal richness and diversity, perhaps because some fields with longer fallow periods were perceived by managers to have lower quality soils. Analyses of bacterial communities and fungal community composition are underway. Our results suggest that the drivers of microbial richness may be more complex than predicted by fallow period alone, and that plant cover may be important in conserving microbial communities.

KAZAL-TYPE SERINE PROTEASE INHIBITORS IN PHLEBOTOMUS PAPATASI MIDGUT

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Sand flies are blood feeding insects that vector leishmaniasis, a disease caused by parasites of the genus Leishmania. Parasites are transmitted from an infected individual to naïve individuals by the blood feeding habits of female sand flies. Phelbotomus papatasi is a species of sand fly that vectors Leishmania major, one species of these protozoan parasites. Blood acquired during feeding contains proteins from the host that are involved in the blood coagulation cascade. In some blood feeding arthropods, serine proteases in the gut are involved in inhibition of blood coagulation to maintain the fluidity of an ingested blood meal. Two Kazal-type serine protease inhibitors were identified in the midgut transcriptome of P. papatasi. We are interested in the role of these proteins, PpKzl1 and PpKzl2, as possible inhibitors of the blood coagulation cascade and the effects on digestion. We are currently characterizing PpKzl1 and PpKzl2 molecularly and biochemically using a variety of methods. We have expressed recombinant forms of these proteins and are in the process of testing their specific activity on thrombin. Expression profiles suggest that both transcripts are constitutively expressed in the midgut of P. papatasi. RNAi knock-down of each transcript has been used to assess the role of each protein in blood digestion within the fly. Using a hemoglobin assay and red blood cell count the rate of digestion in knock-down flies will be compared to controls. Understanding the molecular physiology of sand flies may provide us with novel approaches to prevent disease transmission.

MOLECULAR EPIDEMIOLOGY OF VANCOMYCIN-RESISTANT *ENTEROCOCCUS FAECIUM* ISOLATED FROM A SEMI-CLOSED AND INTEGRATED AGRI-FOOD SYSTEM

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Enterococci have emerged as important nosocomial pathogens and rank as the second most common cause of nosocomial infections, both in the United States and worldwide. The purpose of the present study was to characterize the virulence genes in enterococci that are often associated with *vanA* type resistance, perform multilocus sequence typing for between-host comparisons, determine the transferability of the *vanA* gene to host-specific or non-host-specific susceptible enterococcal isolates via conjugation, and compare these traits with vancomycin-susceptible *E. faecium* (VSE) isolates. A total of 1,252 enterococci isolated from human wastewater samples for the presence of vancomycin resistance; when identified, the presence of *vanA* and *vanB* genes was assessed. A total of 63 human isolates were positive for the *vanA* gene and one isolate was positive for *vanB* gene. Out of 63 VRE isolates, 57 were positive for the *esp* (enterococcal surface protein) gene, a potent virulence factor among VRE clones. All the VRE isolates were negative for *asa1*, *gelE*, *cylA*, and *hyl* genes. Conjugation studies via both broth and filter mating revealed ready transfer of *vanA* gene to susceptible strains arising from both hosts.

INFRARED SPECTROSCOPY AS A COMPLIMENT TO X-RAY DIFFRACTION FOR ZEOLITE EXAMINATION

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Zeolites (microporous molecular sieves) are widely used in industry in catalysis, gas separation, and soaps. With their regular crystal structure and consistent pore spacing, zeolites have many possible future applications as well. Zeolites are usually examined with X-ray diffraction spectroscopy, which examines long-range structure. Infrared spectroscopy is a useful tool for identifying short-range structure changes in zeolites occurring from chemical treatment, which cannot be seen with X-ray diffraction. Structural changes in zeolite CIT-6 and its derivatives upon chemical treatment have been identified with mid- and far-infrared spectroscopy. Changes resulting from extraction and calcination, altering the framework composition, and ion-exchange are examined and discussed. Differences in the local structure of the sample were observed in the mid- and far-infrared spectra, including changes in the intratetrahedral asymmetric stretch, the double ring mode, and the intratetrahedral bending mode regions. The far-infrared spectra indicated that thermal and chemical treatments transformed the structure of the CIT-6 into the structure of zeolite beta.

DRY THERMAL OXIDATION OF GaN WITH SEM, AFM AND XPS CHARACTERIZATION

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The oxidation of group three nitride semiconductors is an important aspect in the fabrication of high power transistors with insulated gates. Gallium nitride (GaN) and its alloys (AlGaN) have electrical properties that are superior to silicon, thus resulting in better performance (greater efficiency, higher power, and higher frequency) in many electronic devices such as high electron mobility transistors (HEMT) and metal oxide semiconductor field effect transistors (MOSFET). Such devices will be greatly enhanced by adding a high quality electrically insulating layer, and this may be prepared by thermal oxidation. Thus, the dry thermal oxidation of polycrystalline GaN powder and GaN epitaxial layers was studied, over the oxidation temperatures from 800 °C to 1000 °C for up to 6 hours. The physical and chemical properties of the oxides were characterized by scanning electron microscopy (SEM), atomic force microscopy (AFM) and x-ray photoelectron spectroscopy (XPS) respectively. An amorphous oxide layer formed at 800°C, but polycrystalline Ga_2O_3 was detected at a temperature over 850°C. As the oxidation temperature was increased, the oxide surface becomes rougher. The thickness of the oxide forming on the GaN epilayer was calculated according to a depth profile plotted with XPS data. A very thin oxide layer was formed from 800°C to 850°C over 6-hour oxidation. The oxidation rate was controlled by an interfacial-controlled reaction mechanism at low temperatures (~800 °C) and diffusion controlled at high temperatures (1000 °C).

NONDESTRUCTIVE METHOD TO PREDICT THE BUCKLING LOAD IN SPHERICAL SHELLS

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Spherical shells are more widely used in aerospace and marine applications. Accordingly, the determination of their behavior becomes more and more important. One of the most important problems in shells is the determination of buckling loads either experimentally or theoretically. Nowadays, the modern design approach goes into model investigation, especially for complicated structures like shells. In most cases, the true behavior of the shell is not known apriori. As a result, relevant assumptions are made which are verified by means of model tests. This study investigates the applicability of a nondestructive method to determine the critical buckling load in spherical shells. For this purpose, Southwell?s nondestructive method for columns is extended to spherical shells subjected to uniform external pressure acting radially. Then by means of experiments, it is shown that the theory is applicable to spherical shells with an arbitrary symmetrical loading. The results show that the technique provides a useful estimate of the buckling load provided that care is taken in interpreting the results.

ENERGY-AWARE DISTRIBUTED TRACKING IN WIRELESS SENSOR NETWORKS

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We consider a wireless sensor network engaged in the task of distributed tracking. Here, multiple remote sensor nodes estimate a physical process (for example, a moving object) and transmit quantized estimates to a fusion center for processing. At the fusion node a BLUE (Best Linear Unbiased Estimation) approach is used to combine the sensor estimates and create a final estimate of the state. In this framework, the uncertainty of the overall estimate is derived and shown to depend on the individual sensor transmit energy and quantization levels. Since power and bandwidth are critically constrained resources in battery operated sensor nodes, we attempt to quantify the trade-off between the lifetime of the network and the estimation quality over time. A unique feature of this work is that instead of merely allowing a greedy minimization of uncertainty in each time instance, the lifetime of the wireless sensor network is improved by incorporating a heuristic scaling on the operating capability of each node. This heuristic in turn depends on the remaining energy, equivalent to the past history of power and quantization decisions. Simulation results demonstrate the quality of the state estimate as well as the extended lifetime of the network when power and quantization levels are dynamically updated.

COMPARING EXPERT AND NOVICE EYE MOVEMENTS WHILE SOLVING PHYSICS PROBLEMS

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Eye movement data has been shown to enhance our understanding of student's problem solving behaviors in physics and also help us identify differences between novices and experts. In this study we compare the eye movement data of experts and novices using introductory conceptual physics problems. The problems chosen all utilize concepts that have an inherent spatial component in their visual representation. To become aware of the critical concept in each problem, the solver must attend to that spatial component of the figure. To gain additional information about how the experts and novices answered each problem, we interviewed the participants about the reasoning process they used and compared these answers to the eye movements. We will discuss our results from interviews as well as eye-tracking data from both experts and novices.

TUTORIALS TO FACILITATE PROBLEM SOLVING IN CALCULUS-BASED INTRODUCTORY PHYSICS COURSE

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Studies indicate that students in introductory level physics encountered a lot of difficulties when solving physics problems involving differentiation and integration. Physics teachers tend to assume that students have the prerequisite mathematical skills for success in the course, however, research has shown that most students do not know how to apply mathematical tools in a physics context. Based on the knowledge of the difficulties students encountered, we developed, tested and refined packages of tutorial materials to facilitate their problem solving abilities with differentiation and integration on several topics of introductory level physics. We organized studnets in group problem solving sessions and we assessed their ability to transfer the knowledge they have learnt to a new type of problem which involves their conceptual understanding.

USING DATA-MINING TO CLASSIFY STUDENT BEHAVIORS

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The main objective of the study is to identify the general characteristics of groups within a typical Studio College Algebra class and then adapt aspects of the course to best suit their needs. In a College Algebra class of 1,200 students, like those at Kansas State University, the greatest obstacle to providing personalized, effective education is the anonymity of the students. Data mining provides a method for describing students by making sense of the large amounts of information they generate. Instructors may then take advantage of this expedient analysis to adjust instruction to meet their students' needs. Using exam problem grades, attendance points, and homework scores from the first four weeks of a Studio College Algebra class, we were able to identify five distinct clusters of students: Overachievers, Underachievers, Employees, Rote Memorizers, and Sisyphean Strivers. Several targeted interventions are currently being developed to benefit underperforming groups of students. By identifying students who are likely to struggle within the first month of classes, instructors can intercede in time to improve performance. In order to improve placement of incoming students, new student services and student advisors across campus have been given profiles of the student clusters and placement suggestions. Currently, work is being done to automate the process by adding a small section to the online placement exam that helps identify student characteristics and preferences before they enroll.

THE LEARNING SUITE: CREATING ENVIRONMENTS FOR AUTISTIC CHILDREN

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The way we perceive the world and the environment around us significantly affects our life. It is natural to learn from the environment and the people around us in order to complete essential tasks and communicate our wants and needs. However, this learning is not intuitive for all individuals. For children with autism spectrum disorder (ASD) this instinctive learning does not come natural and they are unable to gain these necessary life skills. Autism is one of several pervasive developmental disorders characterized by significant impairments in social and communication skills and stereotyped patterns of interests and behaviors (Mash & Wolf, 2005). While it is not fully understood what causes autism, it is known that individuals with ASD learn differently than typically developing individuals. The numerous treatment methods used to teach ASD individuals often require a variety of different spaces from large open areas to small instructional spaces (Lovaas, 2005). Children that only learn in one environment will subconsciously only retain that information in that particular space. The ability to apply knowledge to different locations and situations is lost. Therefore, it is difficult for autistic children to learn in a typical classroom setting because it does not provide adequate learning spaces. This project will explore the possibilities for successful integration of these teaching methods with the built environment, the 'Learning Suite,' and how that environment can promote the learning of life skills for individuals with autism. Teaching autistic children how to learn life skills will increase their intellectual functioning and allow them to become active members within their community.

MULTIMODAL SENSORY ZONING FOR THOSE WITH AUTISM SPECTRUM DISORDER (ASD)

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A multimodal sensory experience occurs when all the senses are used simultaneously. This diversity in multisensory experience is often neglected because of the dominance of vision in our society. (Drake, 2009. pg xix) Once the emphasis is placed on experiencing the sensory input rather than analyzing it, the environment becomes a less stressful experience for those with profound sensory limitations. (Fowler, 2008. pg 19) The human body is continually recalibrating to suit the environmental conditions at hand. (Drake, 2009. pg xviii) Sensory thresholds, much like pain thresholds, are the point when nerves are activated by the sensations they receive. An individual's sensory threshold determines 'how much or how little sensory input they require to function effectively.' (Fowler, 2008. pg 63) This relates directly to the sensory needs of those affected by ASD in how they react and interact with the environment around them. The idea of spatial and sensory transitions zones reduces distraction and diversion and may improve navigational skills of autistic users. (Mostafa, 2008. pg 205) Barriers that reduce sensory transitions and connections hinder the sense of freeness an individual feels within a built environment. Individual control of ones environment gives a sense of ease and independence. (Kellert, Judith, and Martin, 2008. pg 234) The use of multimodal sensory zoning can create positive environments for those with ASD and their typical peers, encourage sensory adaptability alongside enhanced learning abilities, and help them adapt to everyday environments.

THE BUILT ENVIRONMENT AS A COGNITIVE MAPPING DEVICE FOR AUTISTIC INDIVIDUALS

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The built environment influences not only emotional feelings but also cognitive understanding of the world around. David Kopec defines cognitive maps as pictorial and semantic mental images of how places are arranged. These maps enable one’s orientation in time and space to make decisions and take appropriate actions (Simpson & Myles, 1998). Children affected by autism spectrum disorders are often disoriented in the world around, struggling to locate themselves in space. Sensitive to sensory input, autistic children can become distracted or distressed when attempting to modulate and organize themselves in specific environments. When autistic children are focused on maintaining their own bodies in space, they lose focus and are unable to engage in cognitive activities (Simpson & Myles, 1998). Sensory stimulating environments should enable children with autism to generate accurate body maps to allow movements and activities to be useful and productive. By increasing the sensorial and emotional meaning of places, the cognitive map becomes more imaginable. This project will explore how the built environment can be a therapeutic device to engage the senses to aid children in understanding and orienting themselves in the world. By applying ideas developed by Kevin Lynch such as representing paths through circulation and districts by spatial zoning, the building can serve as a cognitive mapping device to help children relate to their surroundings. What would become of the built environment if critical design factors included sensory response and memory? (Malnar & Vodvarka, 2004).

ARCHITECTURAL DESIGN TO PROMOTE PHYSICAL ACTIVITY AMONG CHILDREN WITH AUTISM SPECTRUM DISORDER

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Physical activity is a vital part of a healthy lifestyle for all people (U.S. Department of Health and Human Services, 1996) but is often overlooked in people with disabilities such as autism spectrum disorder (ASD) (Ellis, Cress, & Spellman, 1992). Autistic children may be at risk for being physically inactive due to social and behavioral deficits often associated with the condition, which could limit opportunities for these individuals to successfully participate in physical activity (Rosser-Sandt & Frey 2005). Individuals with autism often lack the motivation to exercise for sustained periods, which is necessary to reap health benefits associated with physical activity (Reid & Todd 2006). The primary question then is: can the built environment promote and encourage its autistic users to be physically active? There are many implications that the designed environment can be a stepping stone to help increase mobility and recreational play in children with autism. How can a building respond to these challenges? The building form, as it integrates with the landscape, will provide challenging and engaging physical activities for autistic children. The facility will also create a protected playground courtyard within two building wings that allows for safe and uninhibited play. Through the use of a therapy pool, a gross motor skills space and several playscapes the project will help these children physically develop. Ultimately the architecture will begin to shape and encourage the engaging functions dealing with physical activity.

EXPLORATION OF ATTITUDES AND BEHAVIORS OF CONSUMERS WITH FOOD ALLERGIES ABOUT DINING OUT: A FOCUS GROUP STUDY

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Food allergy is a public health issue as 12 million adults are having food allergies in the U.S. The objective of the study was to investigate attitudes and behaviors of consumers with food allergies about dining out using focus groups. All sessions were audio-taped, transcribed verbatim, and analyzed using NVivo Version 8.0. Seventeen participants participated in one of four focus groups in February 2010. Participants perceived cross-contact, hidden ingredients, and long communication chain in the restaurants as potential causes of food allergic reactions. Perceived barriers to provide allergen-free food were lack of training and awareness among employees. Participants perceived buffet and ethnic cuisine restaurants as risky dining places due to cross-contact and hidden ingredients. The participants preferred eating at national brand, chain restaurants since employees were well-trained about food allergies. Participants expected the servers to strictly follow the instructions given and they also felt the needs of regulations to protect people with food allergies. Participants wished to have the major allergens and listings of ingredients on the menus. Participants suggested people with food allergies to ask for clarifications from the servers while dining out, look up food allergy information online, bring Epi-pen with them, or pack their own snacks in case allergen-free food might not be provided. Results showed that consumers with food allergies experience many difficulties in restaurants due to restaurant employees' lack of knowledge and training regarding food allergy.

THE MODERATING EFFECT OF EMOTIONAL INTELLIGENCE ON THE RELATIONSHIP BETWEEN EMOTIONAL LABOR AND SERVICE BEHAVIOR AMONG HOTEL EMPLOYEES

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Pursuing a "customer first" or "friendly service with a smile" philosophy remains a priority for today's hospitality companies. Employees are required to exhibit proper emotion toward customers by expressing positive emotion and suppressing negative emotion. Previous research has suggested that this emotional labor (EL) is a primary predictor of employees' service behavior (SB) due to its taxing and stressful nature. Recent studies have commonly indicated that employees' emotional intelligence (EI) is associated with EL. Since EI helps employees become more adaptive in regulating their emotions and skilled at handling difficult social encounters, it may contribute for employees to behave appropriately during customer contact. Despite increased interest in EI, EL, and SB, no study has empirically examined how EI impacts the relationship between EL and SB. Thus, the purpose of this study is to examine the direct relationship between hospitality employees' EL and SB and to determine the role of hospitality employees' EI on the relationship between EL and SB. The sample of this study will be approximately 300 employees in hotels in the U.S. Online survey will be used to collect data from online hospitality professional networking sites. Factor analysis and hierarchical regression analysis will be conducted to analyze data to meet the purpose of the study. The findings from this study will contribute to better understanding of the roles of EI in the EL processes and provide the hospitality industry with new insight into EI and its beneficial impact on EL and SB.

THE EFFECT OF ONLINE RESTAURANT REVIEWS ON CUSTOMER INTENTION TO VISIT: A COMPARATIVE ANALYSIS OF EXPERT VS. PEER REVIEWS

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Taking advantage of restaurant review websites enables customers to exchange information and opinions toward their restaurant experience. Online reviews have been an influential tool for decision-makers, yet little is known about the impact of evaluation and adoption regarding restaurants. The purpose of this study is to determine how online restaurant reviews affect customer decisions to choose a restaurant. Specifically, this study aims to: 1) examine the extent to which information quality and source credibility influence customer perception of its usefulness; 2) evaluate the determining role of the information usefulness on customer intention to visit; and 3) test which type of reviews encourages customers to adopt the information. Online users who have experienced restaurant review websites will be participated and structural equation modeling will be used to analyze data. The moderating effect of review types will be tested using multiple group comparison technique. The main findings will be that: 1) the information quality and source credibility of online reviews will have a positive effect on the information usefulness; 2) the usefulness of online reviews will have a positive effect on customer intention to visit; and 3) customers using peer-created reviews will be affected by the credibility of information whereas customers using expert-created reviews will be affected by the expertise of information. The results will draw managerial implications to construct marketing strategies including reviews with reliable articulation or recent/sufficient information and the increase in customer awareness.

ARCHITECTURE AS THERAPY: USING SPATIAL COGNITION TO FOSTER EXPLORATIVE ACTION IN AUTISTIC CHILDREN

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Autistic children process the world through vision (Grandin, 2006). Due to multiple deficits with visual processing, autistic children have slowed or lacking reactions to visual stimuli (Sokhadze et al, 2009). Visual processing is related to almost every task that a developing child engages in, including spatial cognition (Bertone et al, 2005). Spatial cognition is essential to understanding the physical environment. Autistic persons, and children in particular, struggle with spatial cognition and therefore have difficulty understanding their physical environment (Schlooz et al, 2006). It is proposed that by reexamining normative design elements, architecture can begin to respond to various sensory and spatial processing disabilities. One particular issue autistic children struggle with is exploratory action (Pisula et al, 2010). Exploratory action is essential to childhood development, because new sensory experiences help a child learn. Exploratory action, therefore, has become something that must be taught to autistic children, rather than an intrinsic process garnered by typical development (Kawa et al, 2010). The focus of this exploration is how to use architecture and the designed environment to foster exploratory action in autistic children. It is proposed that decentralization and a clear spatial order (Whitehurst, 2007), in combination with a myriad of sensory experiences fostered by the environment, will allow architecture to respond to the therapeutic needs of autistic children. Rather than merely being a passive presence that does not interrupt therapy (Paron-Wildes, 2009); the designed environment can become an active presence that physically and aesthetically becomes an integral part of therapy for autistic children.

The following graduate student posters were presented at the 8th annual Capitol Graduate Research Summit (CGRS) in Topeka on February 17, 2011. The CGRS is a showcase of scholarly research with implications for state-related issues conducted by graduate students at Kansas State University, University of Kansas, University of Kansas Medical Center, and Wichita State University. Participating students present their research to state legislators, the Kansas Board of Regents, and the public. The top two presenters from each institution were awarded $500 scholarships from Kansas Bioscience.

PREFERENCES OF U.S. AND E.U. UNDERGRADUATES FOR CLONING

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The concept of animal cloning was first introduced to the public's attention in 1996 with the birth of "Dolly the Sheep," the first mammal to be cloned. Now, after more than a decade the technology has reached a point of feasibility on a commercial scale. With the publication of the U.S. Food and Drug Administration risk assessment on animal cloning in 2008, a report that concluded that the technology was safe and posed no risk to consumers, the issue has received renewed attention. In 2010, the European Parliament has attempted to ban the technology for human food use which could cause trade descrapancies between Europe and the U.S. Despite the advantages cloning could bring to the Kansas livestock industries and the regulatory assessments by both domestic and international government agencies, there continues to be concern about the marketability of the technology on a consumer level. In this paper, we examine attitudes to the use of cloning in animal food production among samples of U.S. and European college students. We compare expressed levels of concern about cloning to concerns about other food production technologies, issues, and production practices (genetic modification, bacterial contamination, packaging, etc). Furthermore we attempt to correlate attitudes toward cloning and willingness to purchase cloned products to individual characteristics including socio-demographic variables (gender, household income, farming background) and attitudinal variables measuring political disposition (whether the individual tends to lean conservative or liberal on social and economic issues). The data was collected using Survey Monkey.

Relevance of Research to State-related Topic(s)

With the promises for greater efficiency in livestock production, a more sustainable industry, and the looming 58% increase in future world demand for meat products (2009 United Nations), the likelihood of the human food chain becoming more dependent on animal cloning is being realized. While there is still much research to be done on the science, understanding how to communicate the aspects of animal cloning to consumers while keeping the integrity of the science and continued increased profits for the product. In addition, the livestock industry is incredibly important to Kansas's economy. Interestingly, Kansas has been on the forefront of bringing cloning technology to the commercial beef industry in the United States and Europe. The acquired information will open a new realm of study and refocus efforts and marketing preparedness for the technology in the future on both a regional and global scale.

CROP MODELING APPROACH FOR ASSESSING IMPACTS OF CLIMATE CHANGE AND VARIABILITY ON CROP PRODUCTIVITY IN THE OGALLALA AQUIFER REGION

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Future cropping systems depends on how the future climate unfolds. The objectives of this study were: (a) to analyze climate variability and change resulting from greenhouse gas emissions using high resolution regional climate model (RCM); and (b) to determine its impact on the crop production in the Ogallala region. Three RCM's used in this study were Canadian Regional Climate Model (CRCM), Regional Climate Model (RegCM3) and the Hardley Regional Model (HRM3). The A2 climate scenario for historic period (1971-2000) and future (2041-2070) were acquired from North American Regional Climate Change Assessment Program (NARCCAP). Spatial crop modeling was performed in AEGIS/WIN 4.0.2 program available in the DSSAT (Decision Support System for Agrotechnology Transfer) crop simulation model suite. The A2 climate scenario showed variable spatial pattern and magnitude across the Ogallala region with extreme climate conditions during the cropping season. Analyses showed that Ogallala region will experience 4-5°C increase in the maximum temperature for the month of July and August. In addition rainfall distribution will be highly variable with some regions receiving high rainfall during the month of May and very low rainfall during the month of August. Simulation results of future climates predicted a 30% decrease in the yield of grain sorghum. However, a substantial increase in wheat production throughout the region with an average increase of 35% was predicted in future climates. Crop management decision helped improve productivity by decreasing yield losses.

Relevance of Research to State-related Topic(s)

Fifty six counties in the State of Kansas are in Ogallala aquifer region. Crop production in these counties is stressed due to the limited water availability from the aquifer. Coupled with the water stress is the changing climatic conditions (e.g. extreme temperatures, variable rainfall) which has adverse effects on crop production. Using three regional climate models, our study provides crucial information on the magnitude of change that could be expected in future climates. We used future climate data and spatial crop model to analyze the performance of various crops. Results of the study provide critical information needed to help decision/policy makers to device long-term strategies to cope with impacts of climate change and variability on water use and crop production. Based on our results agronomists, breeder and water managers can formulate/modify their programs, targeting the requirements of future climate, water and food security.

DIELECTROPHORETIC CAPTURE OF *E. COLI* CELLS AT NANOELECTRODE ARRAYS

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Rapid detection of pathogens like bacteria and viruses is of great importance for monitoring water and food quality, the early detection and diagnosis of diseases, countering bioterrorism attacks, and other applications. Successful detection requires the manipulation and capture pathogenic particles for further analysis. In our study we use alternating current (AC) based dielectrophoresis (DEP) and electrochemical impedance spectroscopy (EIS) techniques using a nanoelectrode array (NEA) in a microfluidic chip for bacteria capture. A nano-DEP device was fabricated using photolithography. This device employs a vertically aligned carbon nanofiber (VACNF) NEA vs. a macroelectrode of indium tin oxide (ITO) coated glass in a "points-and-lid" configuration. A high-frequency AC field was applied to generate "positive DEP" (p-DEP) at the tips of exposed CNFs. Enhanced electric field gradient generated at the CNF tips due to reduction in electrode size down to nanometer scale helps to overcome large hydrodynamic drag force on *E. coli* at high flow velocities. A significant number of *E. coli* cells were captured at flow velocity of 1.6 mm/sec. A noticeable change in absolute impedance (|Z|) value at the NEA was observed in EIS experiments. The capturing efficiency is being assessed and optimized for future applications.

Relevance of Research to State-related Topic(s)

Early detection is the key to prevent or reduce the damage of pathogenic bacterial contamination in food, water and other resources. A recent outbreak of *E.coli* O157:H7 in packed steak was reported by USDA which lead to a recall of 248,000 pounds of steak products distributed nationwide including Kansas. This is just one of the thousands of instances that take place every year. Such instances cause a significant economic loss and disruption to the human life. The current pathogen detection methods are too laborious and time consuming, taking several hours to days to get a test result. We are putting our efforts in developing a reliable electronic detection method, which will be faster than traditional techniques. Kansas is a leading state of USA in meat processing and agriculture. It is very important that pathogenic outbreaks are prevented at an early stage to avoid significant financial loss and human health damage.

**Winner of $500 Kansas Bioscience award*

COUPLING PYRAZOLE TO PYRIDINE: STEPS TO ENGINEERING A BETTER AGRICULTURAL CHEMICAL AND PREDICTING BINDING PREFERENCES THROUGH CO-CRYSTAL SYNTHESIS

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Kansas is a leader in the agricultural industry, harvesting large amounts of very important crops each year. To protect crops from harmful insects and rodents, a chemical insecticide or herbicide is typically applied to the surface of the crop or to the surrounding area. Among recent promising candidates for new insecticides and herbicides, pyrazole- and pyridine-based compounds have emerged as leading candidates. However, there are a few examples of species that have both components. Thus, understanding where other molecules found in nature, such as potential carboxylic acids, preferentially bind is paramount to understanding the inherent selectivity and chemistry occurring in these agrochemicals. To potentially control and modulate the physical properties of various pyrazole/pyridine based agricultural chemicals, we have chosen two initial steps. First is to synthesize and characterize various ditopic compounds with both pyrazole and pyridine functionalities. The second step is to probe the binding preferences of incoming carboxylic acids. To accomplish this, co-crystals of the as-prepared ditopic compounds and various carboxylic acids are synthesized. The resulting crystal structures are then examined to help determine any reliable and predictable interactions between donor (carboxylic acid) and acceptor (pyrazole/pyridine) compound. We believe that this approach will potentially help engineer a better agrochemical candidate.

Relevance of Research to State-related Topic(s)

For Kansas to continue economic development in the agricultural industry, the crop yields each year are critical. By developing new and better chemicals to protect the crops from harmful insects or unwanted weeds, yields can be higher, which in turn leads to more income for farmers as well as increased development of the agricultural industry. Our research hopes to have an impact in the field of agrochemicals, where we can potentially provide useful information for companies wanting to develop better agrochemicals for applications as pesticides and herbicides.

EFFECTS OF CONTROLLED INTERVENTION STRATEGIES ON THE QUANTITIES OF A CEFTIOFUR RESISTANCE GENE (*bla*$_{\text{CMY-2}}$) IN THE FECES OF FEEDLOT CATTLE

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Antibiotics are widely used in animal agriculture. They can favor resistance in bacteria. This resistance may spread to humans and pose public health risks. Efforts should be focused to assess the dynamics of antibiotic resistance and evaluate intervention strategies that may mitigate its dissemination in farms. This study investigates the effects of two intervention strategies (i.e., feeding chlortetracycline (CTC) following ceftiofur treatment and mixing of ceftiofur-treated with untreated steers) on ceftiofur resistance in bacteria. In a controlled field trial, 176 steers were randomly allocated to 16 pens of 11 steers each. Ceftiofur was given on day 0 to all steers in 8 pens and only 1 steer in another 8 pens; 4 among each 8 pens received three 5-day regimens of CTC in their feed starting at day 4. Fecal samples were collected every other day to 26 days. Community DNA from 200mg feces was extracted via the Qiagen Stool Kit. The ceftiofur resistance *bla*$_{\text{CMY-2}}$ gene copies/µl of DNA was determined using quantitative real time PCR. Total DNA concentration was assayed using Nanodrop®. The relationship between the quantity of *bla*$_{\text{CMY-2}}$ gene (ln of the ratio to total DNA) and explanatory variables (CTC and mixing in a full factorial design interacting with period (DAY)) was assessed using multi-level mixed model. CTC increased the gene copies consistently across other factors ($P<0.0001$). Mixing had an inconsistent period-specific effect of decreasing the gene copies. Results (gene copies) normalized to 16s gene for all bacteria or total aerobic bacteria c.f.u. count will be presented.

Relevance of Research to State-related Topic(s)

Antibiotic resistance research has a major impact on healthcare. Antimicrobials used as growth promoters, preventive or therapeutic agents can selectively favor resistant bacteria. Further, these resistant bacteria may spread to humans resulting in potential public health risks. There is a need to understand factors that contribute to dissemination and propagation of antimicrobial resistance and also to design intervention strategies that will help control this global problem. Ceftiofur was licensed in North America for veterinary use in 1988 and the first report of it's resistance was documented in 1998. Ceftiofur is categorized as the critically important antibiotic by WHO. Ceftiofur is widely used in veterinary practice; ceftriaxone, a closely related human drug is used in humans to treat salmonellosis. Goal of this research is to evaluate the effects of two practical intervention strategies (chlortetracycline treatment after the ceftiofur treatment and mixing ceftiofur- treated with untreated animals) on ceftiofur resistance.

DISTRIBUTED SOURCES AND ISLANDING TO MITIGATE CASCADING FAILURES IN POWER GRID NETWORKS

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Distributed renewable generation includes the application of small generators such as wind turbines, scattered throughout a power system to provide for the electric power needed by the consumers. In general, the term distributed generation refers to all the small electric power generators which are located on the utility system, at the site of a consumer. However, in this work, we deal with distributed generation at the transmission side to enable islanding (intentional splitting) of the transmission grid in the event of critical faults which may lead to a cascading failure. This intentional splitting allows the system to accomodate the overloading because it not only reduces the total load on the main grid but presence of distributed renewable sources also helps to continue powering the different islands of the grid. We perform a topological analysis of the power grid as a complex network and partition the grid using a two-step optimization process, followed by load shedding, if required. The first step uses a quality function called modularity which gives basic optimal islands based on power flow but without differentiating between sources and other nodes. The second step combines islands to form superislands such that atleast one distributed renewable source is present in every island to achieve load balancing. This strategy helps to minimize the number of links that are disconnected to form islands, and at the same time, achieves the purpose of protecting the transmission network by reducing stress on the main grid.

Relevance of Research to State-related Topic(s)

Power grids are among the largest and most complex technological systems ever developed. Recently, there has been a growing concern about the excessive usage of power grid networks and the increasing possibility of cascading failures. Research in this area gained much importance after the 2003 blackout in the United States. This work is a part of the research funded by the Energy and Power Affiliates Group (EPAP) consisting of Westar Energy, Burns and McDonnell, Omaha Public Power District and Nebraska Public Power District, at ECE department of Kansas State University. Kansas has a very good supply of wind which makes it a perfect candidate for implementation of islanding using distributed renewable sources such as wind farms.

**Winner of $500 Kansas Bioscience award*

RELIABLE AND SECURE NETWORKS FOR THE COMMUNICATION OF THE POWER GRID

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The need for reliable and quick communication in power grid is growing and becoming very critical. With the Smart Grid initiative, an increasing number of intelligent devices, such as smart meters and new sensors, are being added to the grid. The current communication network architecture needs to be evaluated and improved. In this poster, we present a simulation model to evaluate the communication system. The simulation model is written in c plus plus and models the components of the network. The simulation results provide insight on how to design the network in order for the system to be robust from failures. We are using the simulation model to evaluate the interdependency between the communication network and the power grid. Security of the network is a very important aspect. Without the implementation of security protocols, there is a risk of attacks on the network. Attacks can come from malicious users of the network or from entities outside the network. These attacks may lead to damage to equipment, loss of power to consumers, network overload and loss of data, and loss of privacy. The poster will present some of the major issues related to the security of the communication network.

Relevance of Research to State-related Topic(s)

The demand for energy in the State of Kansas is increasing. Also, the implementation of renewables, such as wind energy and solar energy is increasing in Kansas. The added demand and generation will create more data for the utility companies to process. Added to this is the push for the Smart Grid initiative that many utilities are facing. All of this new information being generated needs to be reliably and securely transmitted back to the control centers of the utility companies. Utility companies, including ones in Kansas, are expressing interest towards improving their communication networks. With the new NERC CIP standard many of the utilities need to improve the security of their networks. If the security of their networks does not meet the standard these utilities could be facing financial repercussions from the damage attacks could have on their networks.

NITROUS OXIDE EMISSIONS FROM A COMMERCIAL CATTLE FEEDLOT IN KANSAS

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Nitrous oxide (N_2O) is an important greenhouse gas with a global warming potential of 296 times greater than carbon dioxide. Nitrous oxide is generated from various sources, including soils, livestock and manure management. Nitrous oxide emissions from agricultural soils have been studied extensively; however, limited scientific information is available on emission rates of N_2O from pen surfaces in open beef cattle feedlots. The main objective of this preliminary study was to quantify the N_2O emission rate from a pen surface in a commercial beef cattle feedlot in Kansas. Air sampling was conducted for 10 days from July to November 2010 on a pen surface in a commercial beef cattle feedlot. Static enclosed chambers with a diameter of 30 cm were placed on various locations in the pen surface. Samples of air were collected from the chamber headspace at 0, 5, 10, 15, 20, and 30 min with syringes and then analyzed with a gas chromatograph to determine the N_2O concentration. From the N_2O concentrations, the N_2O emission rates were determined. Results indicated large spatial variability in measured N_2O emission rates. Details of the measurement protocol and analysis of results will be presented. These preliminary results will be useful in designing a sampling scheme to establish the emission rate for the whole feedlot.

Relevance of Research to State-related Topic(s)

Increasing levels of greenhouse gases, such as carbon dioxide, methane, and nitrous oxide (N_2O) has resulted in the atmosphere warming trend of 1.0 to 1.7°F. This may have severe consequences to humans. Considering the following facts, Kansas might be an important N_2O contributor to the national greenhouse gases inventory:

- Agricultural activities are ranked fourth as N_2O emission source, and animal feeding operations is one of its three main N_2O emission sources.
- The nation production of cattle in 2009 was 94.521 million heads. One-third of it is produced in large feedlots, wherein huge amount of manure is deposited on the soil, being able to decomposition by microorganisms, emitting several pollutants as greenhouse gases.
- Kansas ranked second, with 7% of the total cattle national inventory

Because pollutants associated to cattle feedlots are important issues for their potential risks on people's health, the State of Kansas will benefit from this research as this research tries to estimate emission rates of N_2O from a Kansas' feedlot.

DIETARY INTAKES OF OMEGA-3 FATTY ACIDS AMONG SOLDIERS DEPLOYING TO COMBAT

Jennifer Hanson[1], Mark Haub[1], Joseph Hibbeln[2], Jennifer Junnila[3], Daniel Johnston[4], Michael Dretsch[5]
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Background: Psychological health problems and human error are leading causes of death and disability among military service members. One theory gaining acceptance is the postulation that omega-3 fatty acids are deficient and that ensuring adequate intakes may mitigate the growing psychological health crises in the US military. Objective: To evaluate dietary intakes of omega-3 fatty acids among soldiers prior to deployment to combat areas. Procedure: Two hundred fifty-four soldiers scheduled for deployment to Iraq completed a food frequency questionnaire designed to measure consumption of foods rich in long-chain omega-3 fatty acids. Soldiers were from Ft. Riley, Kansas (n = 95) and the Texas National Guard (n = 159). Results: Intakes of long-chain omega-3 fatty acids ranged from 0 to 2,320 mg/day with a mean of 297.8 mg/day. Overall, 43.7% (n = 111) consumed seafood at least twice per week, 11.8% (n = 30) reported taking an omega-3 supplement, and 16.5% (n = 42) reported they had eaten an omega-3 enriched food. Frequent seafood consumption was more common among the Texas soldiers, with 49.1% (n = 78) consuming seafood at least twice weekly compared to only 34.7% (n = 33) among the Ft. Riley soldiers; $X (1, N = 254) = 4.956$, $p = .026$. Consumption of omega-3 supplements, omega-3 enriched foods, and sushi did not differ by location. Conclusion: Many deploying soldiers are consuming seafood less frequently than recommended. In addition, soldiers from Ft. Riley consumed seafood less frequently than the soldiers from the Texas National Guard.

Relevance of Research to State-related Topic(s)

Military related psychological health problems and human error are leading causes of death and disability among service members. As a result of the mounting evidence supporting their role in neurological functioning, omega-3s are believed to play a critical role in cognitive performance and psychological resilience. Unfortunately, little is known about the omega-3 intakes of military service members. This is especially true, as numerous new supplements and omega-3 enriched food products become available. Kansas is home to three major military installations and numerous National Guard and Army Reserve Units. Issues that affect the military, ultimately impact the state. The objectives of this study are to: 1) measure soldiers' dietary intakes of omega-3s and 2) advance the body of knowledge related to the cognitive and neuroprotective benefits of omega-3 fatty acids. This research is relevant and timely with regard to the health and well-being of Kansas's service members and veterans.

AN INVESTIGATION OF WATER USAGE IN CASUAL DINING RESTAURANTS IN KANSAS

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Hospitality operations are considered the heaviest consumers of energy and water per square foot of building space among commercial industries. Water and its processing may make up more than 80% of hospitality operations' utility costs, and will continue to increase due to infrastructure upkeep, higher demand, and climate change effects. Implementing water efficiency in Kansas restaurants could save two billion gallons of water each year. Studying the current water usage in Kansas restaurants may result in decreased costs, increased awareness and more sustainable water use. The purposes of this study are to (1) identify water usage via metrics employing water and sales data from a sample of Kansas' casual dining restaurants (CDR's) and (2) determine whether the antecedents of behavioral intent can predict owner intent to reduce water use using the Theory of Planned Behavior (TpB). Objectives include:

1. Establish how much water is currently used across multiple metrics in CDR's.
2. Understand differences of water use metrics in CDR's between location, type of food, type of ownership, kitchen equipment, and revenues.
3. Using TpB, ascertain owner's intent to decrease water usage.

Relevance of Research to State-related Topic(s)

Water levels of aquifers in Western Kansas are decreasing at alarming rates jeopardizing economic stability for agriculture, livestock operations, manufacturing, energy production, and domestic supply. Climate change is increasingly affecting surface water which primarily provides water for the Eastern half of Kansas and approximately two-thirds of the population. This study determines the benchmarks of water use in restaurants and provides a springboard into determining potential water use efficiencies for Kansas. By involving restaurant owners and understanding their attitudes toward water use it is possible to develop methods for marketing water efficient methods to the controllers of the industry. Decreasing water use by Kansas restaurants directly impacts local economies by reducing energy consumption, infrastructure needs, and water demand. Additionally, because restaurants are able to reach an overwhelming percentage of Kansans, they may be used to market water education by educating public consumers.

PERCEIVED AVAILABILITY OF AND ATTITUDES TOWARD HEALTHY FOOD CHOICES IN ASSISTED-LIVING FACILITIES IN KANSAS

Pei Liu, Junehee Kwon
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The purpose of this project was to assess perceived availability of healthy food choices and examine relationships between attitudes, subjective norms (SN), perceived behavior control (PBC), and behavior intention to consume healthy food at assisted-living facilities using Theory of Planned Behavior (TpB). Twenty-six directors of assisted-living facilities in Kansas were contacted and requested participation in the project, and eight agreed to participate (30.8%). An instrument based on the theory of planned behavior (TpB) was developed and tested with 115 elderly residents in eight facilities in Kansas. Descriptive statistics and linear and multi-regression analyses were conducted to evaluate the relationships between variables and to test the TpB model. The results showed that attitudes toward healthy food and SN were positively associated with consumption intention. However, perceived behavioral control among residents was not a significant predictor of the intention to select healthy food choices. This could be because elderly assisted-living residents may feel they are not in control of their food offered in their facility, therefore PBC did not affect their intention to consume healthy food items. The results of this study reconfirmed that elderly population living in elder care facilities desires and are willing to choose healthy food choices. Managers from these facilities may utilize this data to recognize their residents' needs, investigate ways to improve residents' diets, and potentially increase healthy food consumption of their elderly clients.

Relevance of Research to State-related Topic(s)

According to U.S. Census Bureau (2000), 35 million people were aged 65 and older in 2000. 13% of total population in Kansas was 65 years old and over in 2009 and the elderly population will continue to increase in the next twenty years. This increase in the elderly population will have an impact on many aspects of our society, and meeting the needs the elderly will become increasingly important. The results of this study confirmed that elderly population living in elder care facilities desires and are willing to choose healthy food choices but feel the lack of their control over food choices. Managers from these facilities in Kansas may utilize this data to recognize their residents' needs, investigate ways to improve residents' diets, and potentially increase healthy food consumption of their elderly clients.

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