

Research Projects

Below are research projects being conducted by 2018-2019 faculty ^(), staff ^(S), graduate students ^(G) and undergraduate students ^(U) in the Oklahoma State University Department of Animal and Food Sciences.*

ABI development: A genomic data mining resource to accelerate genome-to-phenome discovery in domesticated animals.

Researchers: Darren Hagen*.

Additive effects of paracetamol and sodium acid sulfate to reduce E. coli O157:H7 from beef trimmings.

Researchers: Ravi Jadeja* and Charley Rayfield ^U.

Animal welfare in swine.

Researchers: Janeen Salak-Johnson*, Lana Corbo ^G, and Cassidy Reddout ^G.

Summary: Swine animal welfare with a special focus in psychoneuroimmunology.

Antimicrobial validation of post-packing pasteurization of listeria monocytogens in packages of sliced turkey and ham.

Researchers: Peter Muriana* and Cade Lemons ^U.

Antioxidant activity of pomegranate peel extract on lipid and protein oxidation and color stability of ground beef patties.

Researchers: Gretchen Mafi*, Morgan Pfeiffer ^G, T.M. Neilson ^G, K.J. Griffin, Emily Bechtold ^U, and Ranjith Ramanathan*.

Associated characteristics from bovine respiratory disease (BRD).

Researchers: Paul Beck* and Willie Collins ^G.

Summary: BRD is a disease complex in cattle which is commonly caused by any one of four known bacteria. Initiation of the complex is caused by the respiratory tract being compromised by either one of four known viruses and/or environmental stress factors. Dr. Beck's lab is looking into identifying factors in the blood, lung fluid, lung tissue, and nasal passage which could indicate the factors (and in what ratios) that are associated with a specific bacteria, virus, and/or stress factors.

Back to Basics: Expanding best management practice adoption in small and mid-sized beef enterprises.

Researcher: David Lalman*.

Beef cattle selection and management for adaptation to drought.

Researcher: Udaya DeSilva* (PI).

Biofilm-forming capabilities and dispersal of wild type escherichia coli o157-h7, using various chemical and bacteriophage treatments.

Researchers: Divya Jaroni* and Morgan Sarchet ^U.

Bioinformatic analysis of chicken gut microbiome associated with growth performance.

Researchers: Glenn Zhang* and Ty Montgomery ^U.

Characterization of host-defense peptide inducing compounds in human HT29 Cells.

Researchers: Glenn Zhang* and Jordan Cowger ^U.

Comparative analysis of vaginal and uterine microbiome of bitches in different stages of estrus.

Researchers: Udaya DeSilva*, Katrina Meinkoth, Reed Holyoak, and Kandace Lyman.

Comparing enzyme efficiency on total tract starch digestibility.

Researchers: Chris Richards*, Ryan Reuter*, and Blake Wilson*.

Cystinuria in domesticated ferrets.

Researchers: Udaya DeSilva* and Nicola di Girolamo.

Determination of allelic variation responsible for dwarfism in Hampshire lambs.

Researchers: Darren Hagen* and Wyatt Catron ^U.

Development of host defense peptide-inducing compounds as alternatives to antibiotics.

Researchers: Glenn Zhang* and Qing Yang ^G.

Summary: This project aims at evaluating the efficacy of host defense peptide-inducing compounds in health promotion and disease resistance in live animals in order to explore the potential of these compounds as alternatives to antibiotics for poultry applications.

Development of next-generation antibiotic alternatives.

Researchers: Glenn Zhang*, J. Ritchey, and Scott Carter*.

Summary: The project aims at developing novel alternatives to antibiotics for poultry use.

Dietary effects on sow productivity to three parties.

Researcher: Janeen Salak-Johnson*.

Dietary manipulation to reduce nutrient excretion from swine.

Researchers: Scott Carter*, Pornpim Aparachita ^G, Carson Cooper ^G, Afton Sawyer ^G.

Summary: The effects of diet on nutrients excretion and gaseous emissions of group-housed swine is being investigated. Development of prediction models for nutrient excretion and gaseous emissions will be developed using the data collected.

Differentially expressed tRNA fragments in bovine fetuses with assisted reproduction induced congenital overgrowth syndrome.

Researcher: Darren Hagen* and Anna Goldkamp ^G.

Summary: Assisted reproductive technologies (ART) are defined as a treatment that increases the chances of conception. Utilizing ART can cause an increased risk of congenital overgrowth syndromes, including Beckwith-Wiedemann Syndrome (BWS) in humans and the phenotypically similar Large Offspring Syndrome (LOS) in cattle. A dysregulation of transcripts has been observed in bovine fetuses with LOS, which is suggested to be a cause of the phenotype. We have sequenced small RNA isolated from tongue, skeletal muscle, kidney, and liver from bovine fetuses and will analyze the differentially expressed tRFs in order to gain a better understanding of LOS. We plan to apply the methods from the pipeline we have developed for this project on SRA datasets in order to develop a tRF expression atlas.

Effects of cow age and crossbreeding on cow maintenance energy requirement, efficiency of calf growth, and cow voluntary feed intake.

Researchers: David Lalman*, Claire Andresen ^G, Aksel Wiseman ^G, and Adam McGee ^G.

Our objective is to determine the effects of crossbreeding and cow age on energy use efficiency to weaning for purebred and crossbred beef cows selected for similar mature frame size and body weight. Young cows are thought to have greater maintenance energy requirements than mature cows and therefore, should require more daily calories to maintain body condition. Additionally, heterosis from crossbreeding systems are known to increase growth rate and milk yield. Increased

production traits may increase requirements for feed inputs and therefore cost, offsetting the advantage of increased growth and milk yield. Feed required to maintain consistent cow body weight and cow and calf feed per unit of calf growth will be measured. In a second experiment, voluntary feed intake will be measured in gestating cows.

Effect of fiber in concentrate feed on gastric ulcers in horses.

Researchers: Marissa Chapa [Ⓔ].

Summary: Equine Gastric Ulcer Syndrome (EGUS) is estimated to occur in approximately 53 to 93% of performance horses. Feeding practices, management and dietary composition, including fiber content have all been suggested to impact the frequency and severity of EGUS. The aim of this study was to determine if alteration of fiber content within the concentrate portion of the diet alters gastric ulcer scores. Current treatment can be both costly to the horse owner and are not always ideal for long term treatment. Therefore, utilizing nutrition as a potential preventative measure and as a means to improve this condition is drawing the attention of research in this area.

Effect of heat stress on broiler chickens medicated with different concentrations of nicarbazin.

Researchers: Glenn Zhang* and Adel Pezeshki*.

Summary: Testing how heat stress affect chicken health and performance when medicated with nicarbazin, an anticoccidia.

Effects of a Herbanimal supplement as an alternative to antibiotic use in broiler chickens' performance, carcass composition, and immune status.

Researchers: Adel Pezeshki*, Julia Sutton [Ⓔ], and Jacob Burch-Konda [Ⓛ].

Summary: The aim of this project is to compare herbal and antibiotic supplementation impact on performance, carcass composition, oxidative stress status and cecal microbiota composition of broiler chickens to market age.

Effect of herbal extracts supplement on growth performance, nutrients digestibility and body composition of nursery pigs fed moderately low protein diets.

Researcher: Cedrick Shili [Ⓔ], Adel Pezeshki*, and Mohammad Habibi [Ⓔ].

Summary: Currently, slightly low protein diets with of 15-18% crude protein (CP) are suggested to be used to decrease the feed cost, N excretion and other toxic nitrogenous compounds in nursery pigs. Moderately low protein diets (CP < 15%) may have beneficial effects on health, but they decrease the growth performance. The objective of my research is to assess whether herbal extracts supplement would improve the growth performance of nursery pigs fed moderately low protein diets.

Effect of the inclusion of essential oils, phytochemicals, and organic acids on growth performance of wean-to-finish pigs.

Researchers: Scott Carter*, Jared Harshman [Ⓔ], Pornpim Aparachita [Ⓔ], and Afton Sawyer [Ⓔ].

Summary: The effects of differing feed additives on growth performance of wean-to-finish pigs are being evaluated. Varying concentrations have been used to determine the most effective does for optimizing growth performance.

Effects of oxygen concentration on 4-hydroxy-2-nonenal induced oxymyoglobin oxidation.

Researcher: Frank Kiyimba [Ⓔ].

Summary: 4-hydroxyl-2-noneal (HNE) can increase oxymyoglobin oxidation; however, limited research has evaluated the role of oxygen content in HNE induced metmyoglobin formation. Therefore, the objective of this study was to determine the effect of high oxygen partial pressure on HNE-induced oxymyoglobin oxidation. High oxygen conditions increased HNE induced myoglobin oxidation (P < 0.05) compared with atmospheric conditions. Conversely, HNE was bound to myoglobin at both high oxygen and atmospheric partial pressure conditions, and there were no differences in the extent of adduct formation. These results suggest that the combined effects of high oxygen content and HNE can increase myoglobin oxidation in-vitro.

Effect of temperature and pH on oxy- and metmyoglobin denaturation properties.

Researcher: Thiago Belem ^G.

Summary: Premature browning is a condition where the interior of patty/steak will have a cooked color appearance before the temperature necessary to kill foodborne pathogens. Myoglobin form in the interior of steak or patties determines the cooked color. Although it is known that myoglobin denaturation is responsible for cooked color appearance, limited knowledge is currently available on the effect of temperature and pH on oxy- and metmyoglobin denaturation properties. The objective of the current study was to investigate the thermal denaturation properties of oxymyoglobin and metmyoglobin at pH 5.6 and 6.4 in vitro. The results indicate that oxymyoglobin had greater denaturation and unfolding than metmyoglobin. Hence, understanding the denaturation properties of myoglobin forms will help to formulate strategies such as the addition of antioxidants, packaging, or salts to limit the incidence of premature browning.

Effects of trace mineral source and concentration on growth performance of nursery pigs.

Researchers: Scott Carter*, Ishtar Silva Lara ^G, Pornpim Aparachita ^G, Afton Sawyer ^G, Jared Harshman ^G, and Carson Cooper ^G.

Summary: The effects of a differing sources and concentrations of trace minerals on growth performance of nursery pigs are being evaluated. Varying concentrations have been used to determine the most effective does for optimizing growth performance.

Effects of a water soluble growth promotant on growth performance of nursery pigs.

Researchers: Scott Carter*, Afton Sawyer ^G, Pornpim Aparachita ^G, Jared Harshman ^G, Carson Cooper ^G.

Summary: The effects of a water soluble growth promotant on growth performance of nursery pigs are being evaluated. Varying concentrations have been used to determine the most effective does for optimizing growth performance.

Effects of zinc source and concentration on growth performance of nursery pigs.

Researchers: Scott Carter*, Pornpim Aparachita ^G, Afton Sawyer ^G, and Jared Harshman ^G.

Summary: The effects of a water-soluble zinc source on growth performance of nursery pigs are being evaluated. Varying concentrations have been used to determine the most effective does for optimizing growth performance.

Encapsulation of algal proteins to improve sensory properties.

Researchers: Jessie Payne ^U and Danielle Bellmer.

Endocrine adaptation of beef cattle during long-term water restriction

Researchers: Blake K. Wilson*, Kelsey Bruno ^G, and Larissa Kozlowski ^U.

Summary: Body water balance is regulated primarily in the kidney, where water can be kept or discarded depending on the needs of the organism. Vasopressin is the primary hormone for water regulation, acting on the renal tubules to conserve water. Vasopressin can be released in response to decreased plasma volume, indicating a dehydrated animal. At the same time, the kidney can also control sodium retention depending on the hydration status of the organism. Aldosterone is the major hormone controlling sodium balance, stimulating sodium pumping in the kidney to retain sodium. Both responses are immediate responses to maintain homeostasis for the organism during water stress. Most research with vasopressin or aldosterone has evaluated the immediate response to dehydration or rehydration, rather than activity during prolonged water restriction. Recent literature has investigated the physiological changes in goats and sheep during such conditions. Research has found that vasopressin and aldosterone increased with increasing water restriction levels in different breeds of sheep for one or two weeks. This restriction period may be too short to identify a long-term physiological adaptation. We postulate that increased vasopressin and aldosterone may subside during longer periods of water restriction suggesting potential for cattle to physiologically adapt to water restrictive conditions.

Evaluating the effect of sanitizer (decon 7) on biofilms of pathogenic bacteria in laboratory settings and non-pathogenic bacteria in food processing environments.

Researcher: Peter M. Muriana* and Kundan Shah ^G.

Evaluating the efficacy of sodium acid sulfate to reduce e. coli 0:157 and salmonella typhimurium dt104 from fresh produce.

Researcher: Conner McDaniel [Ⓔ].

Summary: The research project looks into the use of a novel antimicrobial for use as a produce wash step during processing. The current antimicrobial in use is chlorine and it has some qualities that make it less desirable for use with produce. This new antimicrobial does not have those qualities and could offer the food industry a solution to the problems we are experiencing with fresh produce contamination.

Evaluation of culture collections and animal isolates for potential probiotic, biopreservatives, and useful fermentative bacteria.

Researchers: Peter M. Muriana*, Caitlin Karolenki [Ⓔ], Arjun Bhusal [Ⓔ].

Summary: Cultures maintained in the Gilliland and Muriana culture collection, as well as bacteria screen from bovine rumen, feces, raw milk, and feed were screened for biological activities that could be beneficial for probiotic supplements. These included agar anaerobic and aerobic assays for hydrolysis of protein, starch, lipid, cellulose, production of bacteriocins, and nitrate reduction.

Evaluation of implant strategies in extended grazing periods.

Researcher: Ryan Reuter*.

Experience colors perception of equine affective states.

Researcher: Brittani Kirkland [Ⓔ].

Summary: The ability to interpret horse behavior is considered essential for safe handling of horses, but how images are interpreted by the public may have far reaching consequences. The purpose of this study was to evaluate how individuals with varying animal experiences interpret equine affective states seen through images. An online questionnaire (Qualtrics) was provided via anonymous link to undergraduate students at OSU targeting widely differing demographics. The survey collected information on general demographics, background and experience with all animals, and formal education concerning animal behavior. Students were then shown twenty images of horses displaying different behavioral states and asked to provide their assessment of the affective state of the horse using free-choice profiling, a qualitative method that allows observers to generate their own descriptors of an animal's affective state. Responses are being evaluated to determine if descriptor words differ when comparing groups with horse handling experience and those without. Additionally, data is being evaluated to determine if consensus is found within groups. This information will be used for those within the horse industry to better understand public interpretation of equine images and how it may impact perception of the equine industry. Additionally, understanding group consensus will also identify to educators if further training in equine behavior and affective states to undergraduates is warranted.

Fecal microbiota transplantation to enhance production efficiency.

Researchers: Kelsy Robinson [Ⓔ] and Glenn Zhang*.

Summary: Evaluating the feasibility of fecal microbiota transplantation to enhance production efficiency of livestock animals.

Frequencies and severity of injection-site lesions in muscles from rounds of cow carcasses.

Researchers: Deb VanOverbeke*, Gretchen Mafi*, Ranjith Ramanathan*, Morgan Pfeiffer [Ⓔ], Drew Cassens [Ⓔ], and Taylor Neilson [Ⓔ].

Summary: Injection-site lesions represent a major economic loss to the beef industry. As the presence of injection-site lesions in whole muscle cuts limit their value and use, especially for further processors. The frequency and severity of injection-site lesions in the outside round muscles of both beef and dairy cattle were evaluated through a series of audits. Audits were conducted in 2017 on 1,300 rounds from dairy and beef cows from seven locations throughout the United States. Outside round muscles were butterfly cut into 1.25-cm slices and, if present, lesions were counted, measured, and

categorized. Rounds from beef (7%) and dairy cattle (15%) had at least one injection-site lesion present. The most common location of injection-site lesions was quadrant 2 and 3, which contained both the biceps femoris and semitendinosus muscles. Injection-site lesions were more frequent ($P < 0.05$) in the biceps femoris for both beef and dairy rounds. Clear lesions accounted for 57% of injection-sites in both beef and dairy rounds, whereas metallic lesions made up 23% of the total in beef and 25% in dairy. Overall, there was a dramatic decline in the frequency ($P < 0.05$) of injection-site lesions since the 1998 (24 and 45 percentage units greater in beef and dairy rounds, respectively) and 2000 audits (13 and 20 percentage units greater in beef and dairy rounds, respectively). Educational programs, such as Beef Quality Assurance (BQA) and requirements for BQA training, have resulted in substantial improvements in beef management practices for both the beef and dairy industries (study published in Translational Animal Science).

Genetic and biochemical characterization of novel microbes isolated from Equine uterus.

Researchers: Udaya DeSilva* and Samantha Howe ^U.

Improving lean muscle color of atypical dark-cutting beef by antioxidant-enhancement and modified atmospheric packaging.

Researcher: Drew Cassens ^G.

Summary: Any deviation from the bright-red color of beef leads to discounted price or consumer rejection. Atypical dark-cutting beef represents a darker color of lean around a pH of 5.6 – 5.8. Limited studies have determined the postharvest practices to improve the lean color of atypical dark-cutting beef. Therefore, the objective of the current study was to evaluate the effects of rosemary-enhancement and modified atmospheric packaging on atypical dark-cutting beef. The results suggest that enhancement and modified atmospheric packaging have the potential to improve the surface color of atypical dark-cutting beef.

Improving the efficiency of antimicrobial use in feedlot calves and refining treatment protocols for undifferentiated fever using a chute-side diagnostic tool.

Researchers: Blake Wilson*, Paul Beck*, Ryan Reuter*, Colton Robison ^G, Andrea Northup-Warner ^G, Kaitlyn Pierce ^G, Nicole Stevenson ^U.

Summary: We have greatly increased our knowledge concerning bovine respiratory disease (BRD) and numerous advancements have been made in the way of vaccine and antimicrobial technology in the last 40 years. However, published data indicate that no significant reduction in BRD incidence has occurred over the last 40 years. This would suggest that current BRD prevention and treatment strategies used by the beef industry are ineffective or insufficient in preventing and controlling BRD, despite these improvements. The use of new diagnostic technologies that can provide a rapid chute side classification of “normal” or “abnormal” calf health at arrival based on blood cell counts and differentials could greatly improve the diagnosis and treatment of BRD. If this technology can be used to accurately predict early or future BRD incidence, then metaphylaxis and overall antimicrobial use can be greatly reduced and treatment success could be increased by identifying calves that will succumb to BRD before those calves could be detected by other BRD detection methods. Proprietary data has demonstrated that this technology can successfully reduce antimicrobial use and improve calf performance. In addition, if these “normal” or “abnormal” classifications can be further refined based on which variables result in the “abnormal” classification, it could be possible to reduce antimicrobial use further in calves where the “abnormal” response is found.

Improving the growth performance of nursery pigs with low protein diets supplemented with both crystalline and branched chain amino acids.

Researcher: Adel Pezeshki*, Ranjith Ramanathan*, Ed Lucas, Prasanth Chelikani, Scott Carter*, Mohammad Habibi ^G, Monique Randhawa ^U, Tanner Strunk ^U, Chelsea Shelton ^U, Autumn Gregg ^U.

Summary: The overall objective of the proposed research is to characterize an optimal combination of essential amino acids that will improve the feed efficiency of nursery pigs receiving moderately low protein diets and also gain insights into the underlying mechanisms of action of these combinations.

Injection-site lesions represent a major economic loss to the beef industry.

Researcher: Morgan Pfeiffer ^G.

Summary: Injection-site lesions represent a major economic loss to the beef industry. As the presence of injection-site lesions in whole muscle cuts limit their value and use, especially for further processors. The frequency and severity of injection-site lesions in the outside round muscles of both beef and dairy cattle were evaluated through a series of audits. Educational programs, such as Beef Quality Assurance (BQA) and requirements for BQA training, have resulted in substantial improvements in beef management practices for both the beef and dairy industries (study published in Translational Animal Science).

Insulin signaling and growth efficiency in beef cattle.

Researchers: Andrew Foote* and Angelica Smith ^U.

Interaction of dietary Herbanimal supplement with protein to improve the performance and health of nursery pigs.

Researchers: Adel Pezeshki*, Cedrick Shili ^G, Tanner Strunk ^U, Chelsea Shelton ^U, and Autumn Gregg ^U.

Summary: This project is aimed to assess the growth performance, body lean/fat composition and plasma and muscle concentration of essential amino acids in nursery pigs fed with variable levels of Herbanimal supplement and protein.

In vivo confirmation of cross-kingdom regulation.

Researchers: Adelle Crofford ^U and Darren Hagen*.

NADH concentration.

Researchers: Kiefer Peckham ^U and Ranjith Ramanathan*.

Natural antibiotic alternatives to boost animal immunity and disease resistance.

Researchers: Glenn Zhang* and Sarah Vue ^U.

Natural 'green label' fermentates from lactic acid bacteria to inhibit *Listeria monocytogenes* and *Clostridium sporogenes* (spores) on low- and high-fat beef hotdogs.

Researchers: Peter Muriana*, Dennis Pletcher ^G, and Arjun Bhusal ^G.

Summary: *Clostridium sporogenes* is being characterized as a 'surrogate' organism for evaluation of celery nitrite as a 'green label' replacement of sodium nitrite in processed meats. Most vegetables (i.e., celery) are high in nitrate and when fermented by a nitrate-reducing organism, produces nitrite. USDA-FSIS considers vegetable-derived nitrite (i.e., celery nitrite) as 'natural nitrite' and allows processors to claim 'No Added Preservatives' on their products with the exception that it cannot be called 'cured'. We have examined conditions to produce and harvest spores for use in processed meats to compare celery and sodium nitrite to prevent germination of *Clostridium* spores. Surrogate organisms are non-pathogens that may be used for in-plant studies during the manufacture of test products. Bacterial isolates have also been obtained that ferment vegetable nitrate to nitrite.

Natural immune boosting compounds as alternatives to antibiotics.

Researchers: Glenn Zhang* and A. Curtis.

Summary: Developing and commercializing novel alternatives to antibiotics for livestock use.

Nitrite-packaging to improve the appearance of dark-cutting beef.

Researcher: Morgan Denzer ^G.

Summary: Any deviation from the bright red color during beef processing leads to a discounted price. Dark cutting beef is a condition in which beef will not have the characteristic bright red color. We have developed a post-harvest processing technology that enhances the red color of dark cutting beef to normal red color by rosemary in combination with novel nitrite-embedded film packaging. A 50% increase in redness was noticed with new packaging.

Novel non-antibiotic approaches for mitigation of antimicrobial resistance in poultry.

Researchers: Glenn Zhang*, J. Lin, Q. Zhong, T. Tabler, and W. Zhai.

Summary: Developing and commercializing novel alternatives to antibiotics for livestock use.

Oklahoma wildfires: Examining extension partnerships in large animal disaster preparedness.

Researcher: Brittani Kirkland ^G.

Summary: Due to Oklahoma's extensive history with wildfire and its impact on large animal agriculture, this study sought to explore preparedness levels by assessing the needs of those in Extension Education and evaluated current partnerships. Using the community capitals framework, interview questions were created and phone interviews were conducted with Emergency Management and Extension Educators throughout Oklahoma. These questions sought to evaluate the extent of preparedness and utilization of partnerships in recent wildfires in the state of Oklahoma and determine needs current county needs. Identification of these needs can reveal educational materials needed and gaps in current communication between stakeholders. Additionally, assessing these needs can allow for the creation of programs that increase the knowledge and preparedness of Extension educators for livestock related disasters.

Packaging to improve appearance of dark-cutting beef.

Researchers: Ranjith Ramanathan*, Gretchen Mafi*, Steve Hartson, Deb VanOverbeke*, Ravi Jadeja*, Morgan Denzer ^G, Frank Kiyimba ^G, Thiago Belem ^G, Emmy Bechtold ^U.

Summary: Beef purchasing decisions are influenced by color more than any other quality factor because consumers use discoloration as an indicator of freshness and wholesomeness. Any deviation from the bright red color during beef processing leads to a discounted price. Dark cutting beef is a condition in which beef will not have the characteristic bright red color. We have developed a post-harvest processing technology that enhances the red color of dark cutting beef to normal red color by rosemary in combination with novel nitrite-embedded film packaging. A 50% increase in redness was noticed with new packaging.

Process validation of dried meat products (i.e., Biltong) to achieve USDA-FSIS required 5-log reduction of Salmonella without a heat lethality step.

Researchers: Peter M. Muriana*, Caitlin Karolenko ^G, Arjun Bhusal ^G.

Summary: As beef jerky became every more popular and small, home-grown manufacturers started popping up, the regulatory agency that oversees this product (USDA-FSIS) tightened the reigns on manufacturers. They required that each manufacturer's process be validated to prove that they can demonstrate a 5-log reduction of Salmonella; this typically requires the use of a heat lethality step in an oven heated by moist steam. Recently, we became involved with a South African company wishing to manufacture 'traditional biltong' (similar to beef jerky, but much thicker and without a heat lethality step) in the USA but without a heat lethality step. Using a combination of antimicrobial dips, spices, and low moisture drying, we achieved >5-log reduction of Salmonella that was presented to USDA-FSIS for validation of their commercial process.

Recovery of orally-dosed priproxyfen from cattle manure.

Researcher: Ryan Reuter*.

Relationship between the gut microflora and animal performance.

Researcher: Sydney Stewart ^G.

Summary: We are investigating how bacteria, fungi, etc. in the gastrointestinal tracts of various species (primarily poultry and swine) influence disease resistance, average daily gain, feed efficiency, etc., as well as ways to manipulate the gut microbial population to improve animal health and performance.

Role of fibroblast growth factor-9-mediated intraovarian factors in regulating ovarian follicular development in cattle.

Researcher: Leon Spicer*.

Summary: Poor reproductive efficiency in cattle ultimately results in lost income to farmers. Understanding the mechanisms of ovarian follicular growth may help devise ways to increase reproductive efficiency and hence farm profits. During ovarian follicular development, granulosa and theca cell proliferation and differentiation are influenced by the gonadotropins, insulin-like growth factors, and numerous intraovarian factors as well as external factors such as mycotoxins. The goal of this project is to determine the effects of FGF9 and mycotoxins in ovarian function. It is hoped that new insights regarding techniques to improve fertility in dairy and beef cattle will result from these studies.

Role of metmyoglobin reducing activity in beef color.

Researcher: Ranjith Ramanathan* and Laura Yoder ^G.

Summary: Meat color is an important sensory property that consumers assess quality. Discoloration can lead to losses to the beef industry. Meat has an inherent capacity to limit discoloration by reducing property. The current research focuses on one of the biochemical property, metmyoglobin reducing activity, on meat color.

Role of oxygen scavengers in mother bags on beef color.

Researcher: Macy Perry ^G.

Summary: Meat color is the single most influential purchasing decision for consumers, as they associate freshness and wholesomeness with discoloration. Although several factors can influence beef color, limited information is currently available on the effect of oxygen scavengers in mother bag on beef color. The overall goal of this study was to evaluate the effects of type of oxygen scavengers in mother bag on beef product quality. Five different products were used in this study: New York Strip steaks, Top Sirloin steaks, Ground Beef 4.5 lb loaf (73% lean 27% fat), Ground Beef 2.25 lb loaf (85% lean 15% fat), and patties (85% lean 15% fat). Products were displayed in a retail display cases for five days. Muscle/display color and surface discoloration were evaluated by a trained panel. Instrumental color analysis was also measured. Total aerobic plate count was also obtained.

Rumen and fecal microbial dynamics of cattle exposed to water restriction.

Researchers: Hasitha Premathilake ^G and Udaya DeSilva*.

Summary: Changes in rumen and fecal microbiota in response to water restriction in beef cattle is investigated.

Screening and evaluation of the OSU/FAPC culture collection and new animal isolates (FAPC slaughter) to identify probiotic cultures of value.

Researchers: Peter Muriana* (PI), Caitlin Karolenko ^G, and Arjun Bhusal ^G.

Seahorse XFp Oxygen analyzer to enhance mitochondrial research capabilities in meat quality studies.

Researchers: Ranjith Ramanathan* (PI), Adel Pezeshki* (Co-PI), Scott Carter* (Co-PI), Gretchen Mafi* (Co-PI), David Lalman* (Co-PI), Chris Richards* (Co-PI), and Deb VanOverbeke* (Co-PI).

Short pilot trial for the intake of free-choice mineral by grazing pasture cattle.

Researchers: Paul Beck*.

Species specific myoglobin oxidation and reduction.

Researchers: Ranjith Ramanathan* and Emily Bechtold ^U.

Sustainable beef-forage systems for the Southern Plains.

Researcher: Ryan Reuter*.

Sustaining beef production in the Southern Plains through managing greenhouse gas emissions by grazing cattle.

Researcher: Ryan Reuter*.

Tenderness, sensory, and fatty acid attributes of grass versus grain finished beef aged 14 and 28 days.

Researchers: Gretchen Mafi*, Deb VanOverebeke*, Ranjith Ramanathan*, and Morgan Pfeiffer[Ⓒ].

The effects of RNA factors on dark cutting beef.

Researchers: Udaya DeSilva* and Cameron Cavalliere[Ⓚ].

The influence of intra-ovarian factors on bovine ovarian cell proliferation, steroidogenesis and gene expression.

Researcher: Excel Maylem[Ⓒ].

Summary: During ovarian follicular development, granulosa and theca cell proliferation and differentiation are influenced by the gonadotropins, insulin-like growth factors, and numerous intra-ovarian factors. The goal of this project is to determine if newly identified intra-ovarian factors are involved in ovarian function. Therefore, experiments will be conducted to evaluate the role of newly identified factors in hormone-stimulated steroidogenesis, proliferation and gene expression in bovine ovarian granulosa and theca cells from antral follicles of cattle. Along with providing advances in our basic understanding of ovarian theca and granulosa cell function, these studies may help identify ways to regulate follicular development, and may lead to improved reproductive efficiency via new treatment options for improved success with synchronization, superovulation, and treatment of cystic ovaries.

The role of uterine microbiota in mare fertility and reproductive health.

Researchers: Udaya DeSilva*, Hasitha Premathilake[Ⓒ], Reed Holyoak, and Candace Lyman.

Summary: Comparative analysis of uterine microbiome in mares.

Use of a bovine overgrowth syndrome to characterize the molecular etiology of BWS.

Researcher: Darren Hagen*.

Use of Decon7 to inhibit biofilms produced by Staphylococcus aureus and Pseudomonas aeruginosa.

Researchers: Peter M. Muriana* and Kundan Shah[Ⓒ].

Summary: Prior research demonstrated that the sanitizer, Decon7, was superior to 5 other sanitizers against biofilms of *Listeria monocytogenes*, *E. coli* O157:H7, and *Salmonella*. We are now investigating its use against biofilms of *Staphylococcus aureus* and *Pseudomonas aeruginosa* as required by EPA for claims that sanitizers are effective against biofilms.

Use of herbal extracts for health and production of poultry.

Researcher: Julia Sutton[Ⓒ].

Summary: The goal of my research is to investigate the effects of herbal extracts as alternatives to antibiotics on broilers growth performance and health. Also, my work further explores the interaction of herbal extracts with dietary proteins in decreasing the mortality in chickens exposed to heat stress. The ultimate aim of my research is to evaluate the effectiveness of herbal extracts as safe and natural products that can be used to improve the productivity and health in poultry industry.

Use of oxygen scavengers in mother-bags to improve meat quality.

Researchers: Gretchen Mafi*, Deb VanOverebeke*, Ranjith Ramanathan*, Morgan Pfeiffer[Ⓒ], Drew Cassens[Ⓒ], Macy Perry[Ⓒ], Laura Yoder[Ⓒ], and Taylor Neilson[Ⓒ].

Summary: Meat color is the single most influential purchasing decision factor for consumers, as they associate freshness and wholesomeness with discoloration. Although several factors can influence beef color, limited information is currently available on the effect of temperature abuse on beef color. Therefore, the overall goal of this study was to evaluate the

effects of temperature abuse on shelf-life and color stability in beef products in mother-bags with the addition of oxygen scavenger. Temperature abuse prior to retail display had no effect on the lean color, discoloration, or overall acceptability of the product. However, a warmer retail case had a significant effect on surface color and overall acceptability of steaks. Temperature abuse prior to display combined with a warmer display case leads to shorter shelf-life.

Utilizing cotton products in diets for finishing steers.

Researchers: Paul Beck*, Blake Wilson*, Andrew Foote*, and Andrea Northup-Warner[Ⓒ].

Summary: Cotton production is increasing in Oklahoma. The byproducts of cotton milling can be used in finishing diets to replace roughages and energy sources. Cotton gin trash is a low quality byproduct of cotton milling that can be used as a roughage in finishing diets. Whole cottonseed is moderate in crude protein (about 24%) and high in fat (about 20%) and provides effective fiber as a roughage source. This research was designed to determine the impacts on performance and metabolism of finishing steers when cottonseed and gin trash replace the corn milling byproduct, added oil, and hay used in common finishing diets.

Validation of Decon7 against Pseudomonas aeruginosa and Staphylococcus aureus biofilms.

Researcher: Peter Muriana*.

Validation of feed intake EPD's and genomic markers for angus beef cows.

Researchers: Andrew Foote*, Amanda Holder[Ⓒ], Claire Andresen[Ⓒ], Megan Gross[Ⓒ], Alexi Moehlenpah[Ⓒ], Megan Rolf, and David Lalman*.

Summary: This project is focused on validating genetic predictors (EPD's and genomic markers) for dry matter intake (DMI) in mature Angus cows fed low quality hay. Both genetic prediction tools were developed using growing cattle fed a concentrate diet and therefore may or may not be useful in determining genetic merit for feed intake in mature cattle consuming low quality grass hay. Angus cows with divergent DMI EPD's and genomic score for DMI will be evaluated for mean hay intake over a 45-day test period.

Whole-chain traceability to improve food safety: Melons.

Researcher: Ravi Jadeja*.