2019 Research Overview

Department of Animal and Food Sciences, Oklahoma State University

About Our Research

The Oklahoma State University Department of Animal and Food Sciences is committed to contributing to science through both basic and applied research. Our research disciplines consist mainly of animal health and well-being, breeding and genetics, food safety, meat science, non-ruminant nutrition, physiology, and ruminant nutrition.

Our faculty and students conduct various research projects throughout the year in the pursuit of new discoveries. Our researchers have had their work published in various scientific journals and have been recognized for their outstanding achievements. Our department also encourages undergraduate students to gain research experience and knowledge through its Undergraduate Research Scholar Program.

Please read this overview to learn more about the research currently being conducted in our department.

Research 2019

Disciplines

Animal Health/Well-Being

Breeding

Genetics

Food Safety

Meat Science

Non-Ruminant Nutrition

Physiology

Ruminant Nutrition

43 Faculty Research Projects

Overview

Nearly 1.2 million dollars in grant funded research projects.

66 graduate and 30 undergraduate students conducted research under faculty guidance.

Research finding were published in 85 *(and counting)* journals, peer-reviews, and abstracts.

Fun Facts

The OSU Department of Animal and Food Sciences has 18 faculty and several staff members conducting various research projects.

Adel Pezeshki
Nutritional Physiology

Overview
Nutritional biochemistry of protein and amino acids.

Current Projects
The ultimate goal of my dual purpose research is to develop novel strategies to improve the metabolic health and growth in both animals and humans.

Keywords
amino acids; proteins; energy balance; metabolism

Andrew Foote
Ruminant Nutritional Physiology

Overview
Research is focused on physiological mechanisms that contribute to feed efficiency of ruminants using techniques ranging from feeding trials, digestion/metabolism trials, endocrinology studies, RNA-seq, and phosphoproteomics.

Current Projects
(1) The role of glucose metabolism in contributing to nutrient utilization efficiency; (2) Repeatability of feed efficiency measurements across diets and stages of growth and production; (3) Identifying factors that contribute to appetite regulation in beef and dairy cattle; (4) The role of fatty acid metabolism in gut inflammation and nutrient utilization efficiency; (5) Understanding factors that contribute to a healthy and productive transition into lactation for dairy cows.

Keywords
metabolism; insulin signalling; gut-development; appetite regulation; phosphoproteomics

Blake Wilson
Nutrition/Animal Health

Overview
To understand the interactions between nutrition and health in high-risk receiving calves.

Current Projects
(1) Ancillary therapies and the supplementation of trace minerals in calves experiencing both natural and induced bovine respiratory disease (BRD) challenges; (2) Evaluation of currently accepted technologies and management and production practices, improving calf performance and health in the stocker and receiving phases, improving cattle efficiency and well-being during the finishing period, and utilizing nontraditional feeds and innovative management practices to improve overall beef production.

Keywords
BRD; animal health; stocker phase; trace minerals

Darren Hagen
Animal Genetics

Overview

Research focuses on animal genomics, including genome sequence analysis and functional annotation as well as the development of models and algorithms to better classify functional interactions.

Current Projects

My current research is broadly focused on functional annotation of animal genomes. The genome consists of many non-protein coding elements that regulate expression, but we currently lack complete understanding of the complexity of these elements or how they interact. By identifying these interactions, we can advance our ultimate goals of genome to phenome prediction.

Keywords

computational genomics; bioinformatics; epigenetics; functional genomics

David Lalman
Animal Nutrition

Overview

Beef cattle nutrition and management with an emphasis on genetic environment interactions in beef production systems. Dr. Lalman's program goals are to provide producers with information and decision making tools to facilitate production system profitability, improve cow herd efficiency, and to improve product quality.

Current Projects

(1) Back to Basics: Expanding best management practice adoption in small and mid-sized beef enterprises; (2) Resilience and vulnerability of beef cattle production in the Southern Great Plains under changing climate, land use, and markets.

Keywords

beef production; energy efficiency; feed efficiency; cow/calf and stocker phase
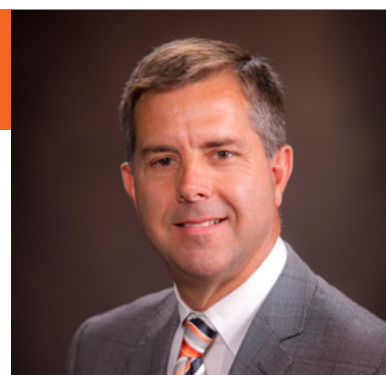
Divya Jaroni
Food Safety

Overview

Development of effective strategies to control foodborne pathogens at pre-harvest and post-harvest levels.

Current Projects

(1) Phage-technology to control bio-film-forming Shigatoxigenic *Escherichia coli* in the food industry; (2) Utilizing predictive modeling and risk assessment to enhance microbiological safety of meat.

Keywords

food safety; pre- and post-harvest; phase; modeling

Glenn Zhang
Immunology

Overview
Development of novel alternatives to antibiotics by modulating host defense peptide synthesis and intestinal microbiota for optimal health and production efficiency.

Current Projects
(1) Immune boosting dietary compounds for growth promotion and disease control and prevention; (2) Gut microbiota that are linked to animal health and growth performance.

Keywords
innate immunity; host defense peptides; microbiome; bioinformatics; alternative to antibiotics

Gretchen Mafi
Meat Science

Overview
Prediction of meat tenderness and palatability; development of value-added meat products; and use of new technology to predict quality.

Current Projects
(1) To evaluate the effects of production systems such as grass and grain-fed cattle; (2) To determine pork quality grade on tenderness and flavor; (3) Impact of oxygen scavengers on beef quality.

Keywords
tenderness; carcass characteristics; flavor; meat quality

Janeen Johnson
Animal Well-being

Overview
Environmental adaptability of domestic animals and minimizing stress in animal-production environments in order to improve animal well-being, health, and productivity of farm animals.

Current Projects
(1) Developing a prenatal stress model; (2) Maternal-fetal immunomodulation of immune, behavior and welfare of the offspring; (3) Social rank and dietary modulation on immune, behavior, and well-being of the weaned pig; (4) welfare implications of length of tail dock in lambs; (5) Projects in both dairy and beef cattle.

Keywords
animal well-being; stress physiology; health; behavior; immunity

Kris Hiney
Communication/Extension/Nutrition

Overview
Effective way of communicating, teaching, and Extension.

Current Projects
(1) Gather industry input on the optimal learning objectives for equine laboratory classes, determine the differences in student's backgrounds on their perceptions of equine affective states, and the existing social capital between emergency managers and Extension educators relative to disasters and large animals; (2) Partner in a canine nutrition project comparing raw fed and kibble fed dogs; (3) Studying the effects of therapy dogs on wellness.

Keywords
equine/canine nutrition; disaster preparedness; therapy dogs

Leon Spicer
Reproduction

Overview
Dr. Spicer's research endeavors involve a wide range of in vivo and in vitro approaches to study nutritional and hormonal control of ovarian function and follicular development.

Current Projects
Experimental approaches span from evaluating control of steroidogenesis, mitogenesis and gene expression in ovarian cells to determining the effect of nutritional supplements on ovarian function and milk production in dairy cattle.

Keywords
insulin-like growth factor-1; reproduction; ovarian follicle; hormone; microarray; gene expression

Paul Beck
Nutrition

Overview
Dr. Beck's research and Extension programs focus on integrated systems for sustainable, economical, and environmentally sound stocker and feedlot production systems.

Current Projects
Current projects seek to improve efficiency of production in extensive grazing systems through targeted supplementation programs for grazing stocker calves across the state of Oklahoma in both range conditions in the west and introduced forage systems in the east. Finishing cattle research is investigating performance and digestibility responses to alternative feedstuffs and increasing roughage levels.

Keywords
feedlot; grazing system; finishing cattle; alternative feeds

Peter Muriana
Food Safety

Overview
Antimicrobial interventions of foodborne pathogens and spoilage organisms.

Current Projects
(1) What happens during the processing of dried beef (biltong): Antimicrobial interventions against Salmonella and microbiome analysis of the change in microbiota during the manufacture of dried beef (Biltong); (2) Application of sanitizers and enzymes to attack biofilms of Listeria, E. coli, and Salmonella in food processing plants; (3) Evaluation of 'natural nitrite' to inhibit Clostridium spore germination in cooked meats and isolation and characterization of bacterial strains for fermentation of vegetable nitrate into nitrite.

Keywords
food safety; interventions; microbiome; bacteriocins; listeria; validation studies

Ranjith Ramanathan
Meat Science

Overview
To understand the biochemical basis of meat discoloration. We utilize both applied and fundamental approaches to improve meat quality.

Current Projects
(1) Improving the value and apprearance of dark-cutting beef; (2) Improving the color stability of aged beef.

Keywords
myoglobin; mitochondria; metabolomics; proteomics; lipid oxidation

Ravi Jadeja
Food Safety

Overview
Research is geared toward the development of methods to improve food safety and quality along the farm-to-fork continuum.

Current Projects
(1) Evaluation of intervention strategies (thermal and non-thermal) to control foodborne pathogens and spoilage microbes within the food production chain; (2) Development of rapid cleaning and sanitation technologies; (3) Validation of antimicrobial intervention/processing parameters for pathogen destruction from various food matrices.

Keywords
FSMA; BRC; antimicrobial; food safety
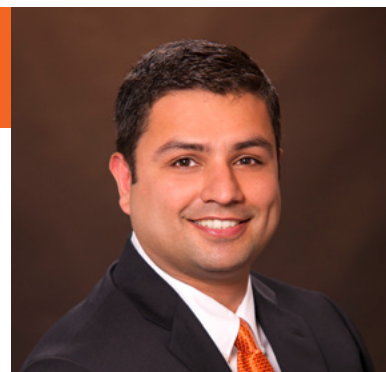
Ryan Reuter
Nutrition/Grazing Systems

Overview
Research focuses on precision management of grazing systems through application of next-generation technology and data analytics.

Current Projects
(1) Forage-based beef cattle nutrition and management; effects of supplementation and grazing management on beef cattle production and sustainability; and incorporating technology into grazing systems; (2) Sustaining beef production in the Southern Plains through managing greenhouse gas emissions by grazing cattle.

Keywords
grazing system; precision technology; big data; data analysis; green house gas emission

Scott Carter
Swine Nutrition/Health

Overview
Impact of diet on nutrient excretion and gaseous emissions; effect of alternative feedstuffs on growth performance and carcass traits; and effects of feed additives on growth performance and carcass traits.

Current Projects
(1) Impact of mineral suppliments on growth and health; (2) Determination of the efficacy of water soluble zinc on growth performance and immune response of nursery pigs.

Keywords
nursery pig; vitamins; health; growth; feed conversion

Udaya DeSilva
Genetics

Overview
Genomic changes and animal production.

Current Projects
(1) Microbiomes of the canine and equine reproductive tracts; (2) The role of microbiomes in animal production and health.

Keywords
microbiome; big data; genomics