Much has happened in the department and I think you will find that we have a lot of news to share. Our students (undergraduate and graduate) continue to do amazing things, including participating in really exciting internships, a few of which you will read about in this issue. The kind of science that benefits animal and human well-being is conducted by undergraduate and graduate students under the direction of our world-class faculty. Animal Science departments are known for their dedication and devotion to students, stakeholders, and excellence in research. WSU Animal Science faculty continue that tradition and are among the most dedicated and productive in the university. You will get a small taste of all that is going on in the department in this edition.

Perhaps the biggest change affecting our department is Dr. André-Denis Wright, the new Dean of CAHNRS. Dr. Wright arrived this past summer and has been meeting with stakeholders statewide. His academic background is in animal sciences and he is known as a gastrointestinal microbiologist (both rumen and intestinal). Dr. Wright has repeatedly voiced support to strategically build animal sciences to make it one of the premier departments in the nation. This will not be an immediate process but a deliberate one that will occur over the next few years. It is great to have a permanent person in the Dean’s office who understands the needs of our students and stakeholders. We look forward to working with Dr. Wright and I encourage you to get to know him as well.

As they do every year, the faculty and students have won numerous awards and honors, published extensively on research conducted to benefit animals and humans. To fund that research the faculty have received many grants which are a direct reflection of their reputations for excellence. In this newsletter you will find some highlights of a few of the faculty and their research successes.

Our undergraduate enrollment has increased 10 years in a row and we now serve 580 undergraduate students. We used to tell you that most all were pre-vet but that is changing a bit. More of our incoming students are interested in management and production and many of the pre-vet students change their minds and decide other careers in animal agriculture are for them. As that occurs, we need your help to identify experiential learning production-oriented internship opportunities.

We are finally done with retirements, thank heaven! Watching faculty who have given tremendous time and effort to the department, college and university leave is difficult, but it has allowed us to plan for the future. We have received support from the college to start hiring a few positions and we are excited for new people and new ideas. Please tune in next year for an update on our new faces!

We hope you enjoy this issue of *The Inside Scoop*. Thank you for all you do in support of the Department of Animal Sciences. Please keep in touch.

Dr. Kristen A. Johnson
Professor and Interim Chair, Department of Animal Sciences

Go Cougs!

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**The Inside Scoop**

Published annually by Washington State University Department of Animal Sciences to enhance communication with alumni and friends.

We invite you to visit us in person or online.

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COLOSTRUM is the elixir of life for a newborn calf. Because there is no transfer of antibodies from cow to calf during gestation, calves are born with naïve and immature immune systems. Their survival is highly dependent on consumption of adequate amounts of high-quality colostrum, which contains life-saving antibodies, important immune and growth factors, and other nutrients. Calves that fail to consume at least a gallon or eight pounds of colostrum in the first 24 hours of life are more likely to get sick and even die.

POSSIBLE GENETIC LINK
Anecdotal evidence from dairy producers suggested that colostrum quantity is reduced in cows that calve in the fall and winter months. More recent scientific evidence generated through a collaborative effort at WSU between Dr. Holly Neiberg’s lab in Animal Sciences and Dr. Dale Moore’s lab in the Department of Veterinary Clinical Sciences identified a possible genetic link between colostrum production and sire line in Jersey cattle. Therefore, Neibergs and her research team, led by Jennifer Kiser, conducted a genome-wide association analysis (GWAA) to determine if individual genetic variants were associated with colostrum production.

Included in their study were 345 Jersey cows that produced from less than one pound to more than 12 pounds of colostrum at their first milking. Kiser and Neibergs used single nucleotide polymorphism (SNP) chips to determine the genotypes of each cow for approximately 50,000 SNPs spanning the bovine genome. A SNP is a single base-pair mutation on a chromosome used as a marker in a GWAA to identify associations between loci (SNPs and candidate genes) and phenotypes such as colostrum production.

CANDIDATE GENES
The predicted heritability for colostrum production from Kiser’s GWAA was 0.76, which means that 76% of the variation in the trait is due to genetic differences among cows and suggests that selection is possible. Her analysis also identified seven loci on five chromosomes that were associated with colostrum production. Within these loci were several putative candidate genes, including brain protein I3 binding protein (BRI3BP), vasohibin 1 (VASH1), and HCK proto-oncogene (HCK) that were associated with colostrum production. Mutations in the BRI3BP gene have been associated with milk fatty acid composition, but information about its function in colostrum production has not been reported.

The VASH1 gene negatively regulates angiogenesis, or formation of new blood vessels. During gestation, blood vessels in the mammary gland grow rapidly in number and size, and capillaries form an extensive mesh-like network around the developing alveoli, where colostrum and milk are produced and stored. This arrangement of blood vessels provides the oxygen and nutrients required for alveolar secretion production. It is possible that a mutation in the VASH1 gene would negatively impact angiogenesis and consequent colostrum production.

How the HCK gene contributes to colostrogenesis has not been previously elucidated but it could be an important activator of milk production. Supporting evidence for this hypothesis came from an unrelated study using mice who failed to produce milk after genes related to HCK were inactivated, suggesting HCK may be important for initiating colostrogenesis before parturition.

SELECTING FOR COLOSTRUM PRODUCTION
Production of adequate amounts of high-quality colostrum are regulated by a complex orchestration of events. The GWAA Kiser conducted in Neiberg’s lab indicated that colostrum production is heritable and identified several chromosomal loci with candidate genes that may be associated with colostrogenesis in Jersey cows. Kiser said these associations should be validated with similar studies in larger herds and across breeds. If verified in additional populations, the genes could be added to commercial genotyping arrays and used to select cattle that produce enough antibody-laden colostrum, reducing calf morbidity and mortality and subsequent economic loss.
A Howling Good Summer!
Canine nutrition internship inspires Max Sitver

Max Sitver, a native New Yorker could have chosen to attend a campus closer to home on the East Coast but decided to move more than 2,500 miles west and attend Washington State University. Aspiring to be a veterinarian, he chose to pursue his undergraduate degree in the Department of Animal Sciences.

“I really liked the small-town atmosphere of Pullman and was impressed by the support structure provided by the department and the university,” he said when asked why he selected WSU over other universities. “I was especially excited about the many available educational and experiential opportunities.”

MAX SITVER

CANINE NUTRITION INTERNSHIP

Soon after stepping foot on the Palouse, Sitver began networking with students, staff, and faculty. Because he expressed interest in animal nutrition, Dr. Kris Johnson connected him with a summer internship program offered by Four Rivers Kennel, an independent, USDA-approved facility in Nevada, Missouri that investigates canine nutrition and performance for the pet food industry. Sitver spent eight weeks last summer at the facility where he learned how to conduct a research study.

“The objective of my study was to evaluate the effectiveness of a dietary supplement on canine muscle recovery after strenuous exercise,” said Sitver.

INTERNSHIP RESEARCH STUDY

He used 20 dogs in a 21-day study and fed the supplement to half of them. On the last day of the study, Sitver jumped on an ATV and took the dogs on a five-mile run. The dogs wore special GPS trackers, like Fitbits, so he could determine the exact distance each dog traveled during the run. He collected blood immediately before and after the run and 24 hours later and measured concentrations of several metabolites and biomarkers. At the same times, he also used a device that evaluated each dog’s gait to detect lameness or other injuries.

“I used these data to evaluate muscle damage and inflammation caused by strenuous exercise and to determine if the supplement improved muscle recovery and prevented lameness,” he explained.

Sitver said that biomarker levels in dogs fed the supplement returned to pre-exercise levels 24 hours after the run, while levels remained elevated in dogs that did not receive the supplement. Supplemented dogs also showed no signs of lameness.

PASSIONATE ABOUT EXOTIC ANIMALS AND NUTRITION

Sitver has been passionate about all animals for as long as he can remember, but his true love lies with exotic animal species. He fueled his passion while working at a facility in New York that educates people about exotic pets. This summer he will participate in an internship at the Bronx Zoo in New York and dreams of filling a similar position at the San Diego Zoo before entering vet school where he plans on becoming an exotic-animal veterinarian who specializes in nutrition.

“I am really interested in nutrition because it plays key roles in many aspects of animal health! I have so much more to learn,” said Sitver.

Sitver recently learned his application to the seven-year WSU Honor’s Veterinary Program was accepted. This third-year undergraduate is excited to complete his degree in animal sciences and begin his education in veterinary medicine.

EXTRACURRICULAR ACTIVITIES

When he isn’t studying, Sitver is busy participating as an active member of CUDS, working at the Cattle Feeding Laboratory, conducting research for his Honor’s thesis, shredding the slopes on a snowboard, or flying an airplane. He is also an avid falconer and hopes to set up housing, otherwise known as a mew, for a falcon on the Palouse.
AN AMAZING EXPERIENCE!
Kassie Stadler’s nutrition internship at the Dallas Zoo

Kassie Stadler has always been in love with animals. They have provided comfort and support for her in good and bad times. Now, the young woman from Yakima wants to give back to the animals she loves so much by caring for them as a veterinarian.

Deciding to come to WSU for her education was easy. Her dad is a WSU alum – Stadler was born to be a Coug! Choosing to major in animal sciences was also an easy decision.

“Animal Sciences provides a well-rounded program,” said Stadler. “The professors effectively teach us what we need to know and how to evolve for the future.”

Stadler was particularly inspired by Dr. Nancy Irlbeck in her Companion Animal Nutrition class (AS 205) and discovered she really wanted to learn more about nutrition of zoo animals. Irlbeck encouraged her to get some hands-on experience at a zoo, so Stadler applied to several different zoo internship programs and was accepted by the Dallas Zoo in Texas.

Beginning in late May 2018 after her sophomore year, Stadler worked as a nutrition intern at the zoo. She worked closely with the zookeepers and helped prepare diets for about 2,000 animals each day.

“I had to precisely measure the amounts of every ingredient because the animal’s diets were perfectly calculated to meet their requirements,” she said.

She also learned to evaluate the body condition scores of elephants and the carnivores at the zoo. Weighing a wild animal is usually not possible, so body condition scores, which are numbers ranking an animal’s body condition on a subjective scale, are used to assess if the amount or composition of the diet are adequate. Landmarks on an animal’s body are often used to estimate fat cover.

“We checked body condition monthly,” said Stadler.

Although similar methods are used to evaluate body condition scores of livestock, evaluating a wild animal’s body condition to determine its body condition score can be challenging because of safety issues.

“We threw alfalfa cubes in the elephant’s enclosure to get them to move so we could evaluate their hips and the curvature of their rumps and spines,” said Stadler.

Stadler also participated in a primate research project in which she evaluated the behaviors and group dynamics of Colobus monkeys and Gibbon apes fed whole or chopped food. Altering food presentation is a form of enrichment that encourages an animal to forage for food, behave more naturally, and increases activity level.

Twice a day she noted their behaviors every minute for an hour and a half. She discovered that the Gibbon apes preferred the whole foods. They extensively manipulated the foods and took longer to eat them. In comparison, the Colobos monkeys had no preference between the two forms of food.

While Stadler said her experiences at the zoo were “amazing” and “insane”, she still has her heart set on becoming a large-animal veterinarian, focusing on nutrition.
**FERTILITY PROBLEMS** in females are devastating to livestock production industries and human reproduction alike. Approximately 25-60% of mammalian conceptions fail to result in live offspring depending upon species, and most of these pregnancy failures occur in early stages in the process when the embryo is first making its presence known to the mother in the uterus. Subfertile animals have decreased conception rates that result in a shorter reproductive lifespan and eventual elimination from production, which increases production and consumer costs. Meanwhile, women who are infertile may only get pregnant using assisted reproductive technologies or fail to conceive despite therapy.

Although female fertility problems are caused by countless factors, Dr. Jim Pru and his research team have been working to identify evolutionarily conserved molecular mechanisms that are essential for the establishment and maintenance of gestation. Recent studies have focused on the processes that affect the normal actions of progesterone in the female reproductive tract.

**PROGESTERONE RUNS THE SHOW**

Progesterone is a steroid hormone that has essential functions in all aspects of female reproduction, most notably ovulation, embryo implantation, and maintenance of pregnancy. The hormone binds to a progesterone receptor, using a lock-and-key type of mechanism and regulates genes that control specific functions.

Because the uterus is highly dependent on the actions of progesterone, it is not surprising that faulty binding between progesterone and its receptor causes many reproductive disorders that result in subfertility, infertility, and several reproductive diseases. Many of these actions are controlled by the classical progesterone receptor. There is evidence that progesterone also binds to non-classical receptors because cells that do not express progesterone receptors still respond to the hormone.

**NON-CLASSICAL PROGESTERONE RECEPTORS**

Progesterone membrane component (PGRMC) 1 and PGRMC2 are alternative progesterone receptors that are highly expressed in female reproductive tissues of mice, rats, cows, monkeys, humans, and most other mammals studied to date. Several early descriptive studies hypothesized that both receptors were important to maintenance of normal reproductive function and may play key roles in fertility.

More recently, evidence supporting this hypothesis was uncovered in Pru’s lab by his former graduate students, Melissa McCallum and Nicole Clark. In a series of intricate experiments using genetic engineer-
ing techniques, McCallum and Clark produced mutant mice in which PGRMC1 and/or PGRMC2 were conditionally deleted from reproductive tissues in an effort to understand the function of these proteins. They conducted six-month breeding trials with these mice and found they were initially subfertile, having fewer pups per litter and longer pregnancy intervals, and this then progressed to premature reproductive senescence. In addition, the mutant mice developed endometrial cysts, a phenomenon consistent with aging in mice and women.

**FERTILITY MAY HINGE ON PROPER FUNCTION OF NON-CLASSICAL RECEPTORS IN UTERUS**

The studies reported by McCallum and Clark provided the first evidence demonstrating that these alternative progesterone receptors play important roles in female fertility and maintenance of normal reproductive lifespan, perhaps by supporting the normal structure of uterine tissue. More recently, Dr. Pru’s lab has focused on understanding a role for PGRMC1 and PGRMC2 in ovarian function.

The importance of these non-classical progesterone receptors to normal ovarian function were substantiated by Pru through a collaborative effect with colleagues at the University of Connecticut Health Center. They discovered that middle-aged mice in which PGRMC1 and PGRMC2 were deleted from reproductive tissues had 80% fewer primordial follicles in their ovaries compared to normal mice.

**PREMATURE OVARIAN INSUFFICIENCY**

Primordial follicles are formed before birth and most remain dormant for long periods of time until they transition into primary follicles, which develop further and eventually ovulate a mature oocyte. The mammalian female is endowed with a finite number of primordial follicles and their number gradually declines with age. When they are depleted, women transition through the menopause. However, women with premature ovarian insufficiency become menopausal before age 40, compared to the average woman who enters menopause around 52 years of age. Interestingly, it has now been established that some women with premature ovarian insufficiency have mutations in the PGRMC1 gene. Many high-producing dairy cows are subfertile, which may be caused by a diminished reserve of follicles and premature ovarian failure. Just how disrupted PGRMC1 or PGRMC2 functions contribute to infertility in cattle remains to be determined.

Pru’s study demonstrates that PGRMC1 and PGRMC2 are essential proteins for the survival of primordial follicles. This study and those reported by McCallum and Clark suggest a malfunction in progesterone signaling via these receptors disrupts mammalian female fertility. Future therapies targeting PGRMC1 and/or PGRMC2 may be used to enhance fertility in female mammalian species or help predict and diagnose some forms of premature ovarian insufficiency in women or treat abnormal ovarian activity in livestock.
THE GENTLE RUSTLE of wind and hooves moving through grass, cattle lowing, and coyotes yipping and howling are some of the sounds that many WSU calves hear when they are born on Department of Animal Sciences’ pastures. These grasslands make up the department’s cow-calf operation, which is based at the Ensminger Beef Center about seven miles southwest of campus and includes additional pasture land in the Snake River canyon.

The beef cattle program at WSU consists of the cow-calf operation and the Cattle Feeding Laboratory, a cattle feedyard located on campus. Both units serve the research, Extension, and teaching aims of the Department of Animal Sciences. The Beef Center is strongly integrated into the Animal Science curriculum, beginning at the freshman level and continuing through upper division classes. In addition, both the Beef Center and Cattle Feeding Lab provide support for courses based out of other WSU departments including the Veterinary School and Crop and Soil Sciences, and offer tours for 4-H clubs, FFA chapters, and other interested parties.

Brent McCann, cattle operations manager and new assistant manager, Kelli Kinzer, work together to uphold the program’s multifaceted mission – raise beef cattle according to industry standards, measure inputs and match cattle to available resources, meet targeted performance measures, maintain sustainability, facilitate research, interact with beef producers and consumers in the state of Washington and beyond. They also provide students the knowledge and skills to be successful in the ever-changing landscape of cattle production.

WSU COWHERD

The WSU herd consists of about 150 cows, 30 to 40 replacement heifers, and two clean-up bulls. Currently, the cowherd contains purebred registered Angus cows, commercial Angus cows, crossbred cows, and purebred and full-blood Wagyu cows. McCann plans to focus on recruiting more registered Angus and Wagyu cows in the cowherd in the next five years. Because larger cows do not necessarily produce larger calves, McCann is also working to moderate frame sizes of all breeds through breeding and selective culling to between 1,200 and 1,400 pounds to decrease production costs associated with maintenance of larger cows.

BREEDING

Cows at the Beef Center are often bred using fixed-time artificial insemination (AI). Cows are treated with exogenous hormones following a standard protocol to synchronize their estrous cycles. This practice helps reduce the need for heat detection and enables breeding by AI within a controlled timeframe. At best, 68% of the Beef Center’s cows become pregnant after one insemination. The remaining cows are bred by live cover when the clean-up bulls are turned out with the cowherd. Most of the calving occurs in the spring, but the operation has a small herd of fall-calving cows for teaching purposes.

CALVING

Cows spend most of the summer in pastures managed by intensive grazing at the Beef Center and are moved to the Snake River pastures in October. Water and forage quantity are usually plentiful in the canyon throughout the winter and the cows require no additional hay. The cows remain on the river pastures through calving season, which runs from mid-March to late-May. Cows and calves are checked daily by McCann and by students who live on-site in a wall tent during periods of peak calving activity. McCann’s experience has shown him that calving on pasture improves animal welfare because calves born on pasture experience less illness and injuries than calves born in barns where stocking density is high. In addition, cows are more focused on their calves, providing ample opportunities to observe a cow’s mothering ability as well as her hardiness, which is especially important for their longevity. Calving the cows at the river also eliminates the need to haul cow-calf pairs to the river pastures shortly after calving occurs.

WEANING

Calves are early weaned at approxi-
mately 300 to 500 pounds depending on breed using a two-step system. In the first step, calves remain with the cows and are fitted with a device that prevents them from nursing but does not impede normal drinking or eating. The calves wear the device for five days and are then separated from their mothers. Signs of stress in calves weaned with the two-step method are significantly decreased compared to traditionally weaned calves who are abruptly separated from their dams. They spend less time bawling and wandering aimlessly and more time eating.

The benefit of early weaning is two-fold: the mother cows dry up and are turned out in nearby farm fields where they graze crop aftermath and the calves are fed to meet their nutritional needs without feeding their dams, too.

CATTLE FEEDING LAB

After weaning, many calves are moved to the Cattle Feeding Lab on campus where they are earmarked for research, WSU Premium Beef, and the student-run Cougar Cattle Feeders group. Some calves are brought into the Cattle Lab and backgrounded before they are marketed to commercial feedlots the following spring. Overall, McCann has implemented management practices that build stronger skeletal frames before finishing to decrease foot and leg lameness issues that may impair animal welfare, growth performance, and economic returns.

Much of the routine work at both facilities, like feeding and cleaning, for example, is handled by students. McCann and Kinzer teach them to develop an eye for cattle or learn how to recognize when they are sick, lame, or underperforming. McCann also tries to impart unique skill sets, like learning to sort pastured cattle on horseback or reading cow manure piles to evaluate health and feed quality, to make students more desirable to future employers.

Beef production is constantly evolving. Cattle operations and personnel at WSU are equipped to produce cattle for cutting-edge research and educate the next generation of beef cattle producers.

Welcome Kelli Kinzer!

Assistant Manager joined WSU Beef Operations in November

Kelli Kinzer grew up on a cattle ranch in Deary, Idaho. She graduated from Deary High School in May of 2015. Kelli then went to the College of Southern Idaho in Twin Falls, where she graduated with a Veterinary Technology degree in 2017. After graduation she went to work for a large animal veterinary clinic as a veterinary technician. Kinzer really enjoyed working with the livestock in the veterinary scene and discovered she wanted to focus on cattle and teaching. The Assistant Manager position for Beef Operations at Washington State University gives Kelli the opportunity to do what she is passionate about - cattle production. She is looking forward to working with faculty, students, and cows.
MEMBER numbers in the WSU chapter of Collegiate Horsemen’s Association (CHA) have waxed and waned over the years, and at one point the club ceased to exist altogether. Fortunately, CHA was resurrected several years ago by a core group of dedicated students and membership has grown steadily ever since. In fact, the club is now an officially recognized chapter of the American Collegiate Horsemen’s Association. This year the chapter boasts more than 25 members led by President Alexa Valdez, a senior animal sciences student from Vancouver, and Advisor Jennifer Michal.

United by a passion for horses, members of CHA creatively put together a diverse set of activities for everyone whose experiences with horses range from none to extensive. Their motto is to have fun while learning about horses! For example, they play a “find the bone” game with BOB (Bag of Bones), the department’s pony skeleton. The team that correctly identifies the most bones wins a prize. They also organize regular social activities such as watching horse-themed movies or touring the Appaloosa Horse Club museum located just seven miles away from WSU in Moscow, Idaho.

Members also learn from industry professionals. Guest speakers from the university and community who are authorities in their fields have shared their expertise in subjects such as nutrition, biosecurity, health, anatomy, dentistry, and acupuncture. Because many CHA members are interested in careers in veterinary medicine, one guest speaker outlined requirements for the vet school application, and another provided advice about etiquette when job shadowing a veterinarian.

Highlights of the past several years include field trips to training clinics and equine facilities. Members have attended a training clinic given by Steve Rother, a nationally acclaimed clinician, toured Pegasus Training and Rehabilitation Center, a world-class equine rehabilitation facility near Seattle, and attended Equine Education Day at McKinlay & Peters Equine Hospital located near Spokane. Closer to home, members regularly attend the WSU Horse Course hosted by WSU student chapter of the American Association of Equine Practitioners. Another favorite activity is attending the annual Palouse Empire Threshing Bee on Labor Day weekend across from the Palouse Empire Fairgrounds in Colfax to watch how wheat used to be harvested with real horse power.

Overall, CHA aims to unite all levels of collegiate horsemen from all equestrian disciplines and promote leadership, education, and community service. Email wsucollegiatehorsemens@gmail.com for additional information about CHA activities and membership.

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**Dairy**
Weekly meetings are full of information, educational activities, and cookies and milk. Members attend the ADSA annual meeting and compete in the Dairy Quiz Bowl. Community outreach activities include Dairy Olympics and Cougar Youth Weekend.

**Companion Animal**
Members actively support education and companion animal activities in the area. Other activities include educational field trips, interactions with live animals, volunteering opportunities, and participating in the “Pet your Stress Away” and other dog-petting events.

**Pre-Vet**
An academic and social club to educate members about careers in veterinary medicine and promote scholarship, fellowship, leadership, and character. The club organizes volunteer opportunities and brings in guest speakers discussing topics related to animal health.

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“I joined this club because it sounded interesting and fun!”
Taylor Sivo
Freshman animal sciences student from Sedro-Woolley
Student Swine Cooperative (SSC)

SSC was in a rebuilding phase during fall semester. The cooperative now has a new advisor and members are updating their production and management protocols. Ten feeder pigs are scheduled to arrive this spring and members will raise them to market weight. Pigs will be harvested at the WSU Meat Science Laboratory on campus and pork sales used to fund the cooperative.

Before their pigs arrive, members plan on touring local hog farms and attending Swine Information Day in Moses Lake in February.

Additional information about joining the cooperative or purchasing pork can be obtained from President Dane Schwarz, a senior animal sciences student from Chelan, by sending an email to wsustudentswinecooperative@gmail.com.

Cooperative University Dairy Students (CUDS)

CUDS celebrated their 41st year of operation by having its first ever reunion. More than 80 alumni, faculty, staff, and family members, including founding faculty member Dr. Joe Hillers, gathered on January 26, 2019 to commemorate the occasion. They renewed old friendships, reminisced about past experiences, and looked forward to the future.

Members of CUDS are selected through an application and interview process. Students manage a working dairy herd of about 35 registered Holstein cows, plus young stock and dry cows at the university’s Knott Dairy Center. Milk from the herd goes to the WSU Creamery where it is made into award-winning Cougar Gold cheese and Ferdinand’s ice cream.

Members work together to make decisions about all attributes of herd management including health, milking, feeding, record keeping, barn maintenance, heat detection, and artificial insemination. The skills members gain through active participation in CUDS usually result in springboards into the dairy business and industry, veterinary medicine, or academic careers.

The CUDS legacy began in 1978 with a vision from Dr. Joe Hillers, who retired from WSU at the end of 2000. Since then, CUDS members learned from Dr. John McNamara who passed the reins after 16 years to current advisors Dr. Joe Harrison and Dr. Amber Adams Progar. Here’s to the next 41 years!
SHANE CARRION  
*PhD (Advisor: Zhihua Jiang)*

Imprinted genes regulate placental hormones and signaling between mother and fetus. Preliminary evidence indicates there might be active placental pathways in the amphibian *Xenopus tropicalis*. I hope to discover the imprinting status of the ZFat and PHLDA2 genes in frogs and compare their functions to those found in mammalian species. Finally, I hope to discern the pattern and placement of placental expression and function of imprinted genes in frogs, which to this point has been limited to eutherian mammals and flowering plants.

JULYNE GALLIOU  
*MS (Advisor: Holly Neibergs)*

My research project focuses on improving dairy heifer fertility by identifying regions of the bovine genome associated with heifer conception rate. This is important because dairy producers need their animals to become pregnant as soon as possible to maximize productivity. Conception rates have been less than optimal for the past 50 years showing a need for improvement. Results from this project can be used for genomic selection to improve heifer fertility.

RICHARD GRIFFITHS  
*MS (Advisor: Jim Pru)*

I am investigating a protein that regulates energy homeostasis in the entire body to uncover how it is involved in early pregnancy. The expression of this protein is negatively affected in situations where women are either underweight or obese. Females with these metabolic issues frequently suffer from infertility. Understanding how this protein contributes to fertility will assist in discovering new methods to treat infertility in women with metabolic disorders.

XIANGDONG LIU  
*PhD (Advisor: Min Du)*

Obesity is caused by excessive white fat accumulation, resulting in serious health problems. In contrast to white fat, which accumulates lipids, brown and beige fat turn fatty acids and glucose into heat. Enhancing brown and beige adipocyte formation can effectively reduce obesity and metabolic dysfunction. I am exploring mechanisms inhibiting brown and beige fat cell formation due to obesity, focusing on analyzing epigenetic modifications in selected genes to promote good fat cell formation.

ERIN MACKEY  
*MS (Advisor: Joe Harrison)*

I am working to develop a nutrient recycling relationship between the dairy and alfalfa industries in Washington. Current manure management practices can result in excess phosphorus in soils, which can negatively impact water quality. In comparison, phosphorus is depleted in fields where crops like alfalfa are grown. My project demonstrates the nutrient value of phosphorus in dairy manure – environmentally and agronomically – by capturing it as struvite to be used as a fertilizer for alfalfa.
PROVIDING SOLUTIONS

KAYLEEN OLIVER
MS (Advisor: Holly Neibergs)
I am working to identify regions in the bovine genome that are associated with fertility of beef heifers. My ultimate goal is to identify markers that regulate fertility in order to improve ability of beef cattle to conceive, remain pregnant, and produce marketable calves. This is important so producers can increase yearly revenue in addition to providing marketable consumer products for the growing population.

BRIAH PARCHMENT
MS (Advisor: Amber Adams Progar)
I am examining the passive effects of feeding a yeast supplement to Holstein cows during their dry off and early lactation periods on subsequent calf growth, immune function and pathogenic resistance. If these measures of calf health improve, this type of supplement can be implemented in peripartum cow protocols. With the skills gained from my program, I hope to obtain a future career geared towards animal conservation and the overall improvement of animal health and welfare standards.

JUN SEOK SON
PhD (Advisor: Min Du)
I am exploring the preventive effects of exercise by a mother during pregnancy on fetal and offspring adipogenesis and myogenesis. Apelin is a protein secreted by adipose tissue that is involved in placental angiogenesis and controls fat and skeletal muscle metabolism. However, the effect of exercise-induced activation of apelin in the mother on fetus and offspring is unclear. Understanding the mechanisms regarding apelin signaling may lead to a strategy that could be used to overcome maternal obesity induced metabolic disorders in offspring.

QIYU TIAN
PhD (Advisor: Min Du)
Contrary to popular belief, fat cells are protective because they provide storage sites for excessive lipids that would otherwise interfere with normal functioning tissues. Fat cells numbers decrease progressively with age and existing cells increase in size to accommodate lipids, resulting in inflammation and metabolic diseases. I am examining epigenetic changes in fat precursor cells that may incapacitate new cell formation and testing dietary supplements that may enhance new fat cell formation in aged mice.

JAMES WOLF
MS (Advisor: Don Llewellyn)
We are exploring the use of alternative forages in ruminant diets. We are currently assessing blends of triticale and barley forage for silage. Yields of triticale forage are good, but quality is lower than other small cereal grain forages. In comparison, barley forage has higher quality, but lower yield than triticale forage. By blending these two crops, we intend to find the optimum proportion of barley and triticale seed that will give the best combination of forage quality and tonnage yield.

AMY ZINSKI
MS (Advisor: Zhihua Jiang)
Recreational and medicinal use of cannabis has increased, even though the cellular and molecular effects in the brain are still mostly unknown. I aim to increase understanding of how cannabis exposure decreases expression of dopamine transporters in the brain of rats and why some individuals are more sensitive to cannabis exposure than others based on their genetics. Results from my studies may help develop better cannabis dependency treatment programs and medicinal cannabis use protocols.
Improving the Timing of Artificial Insemination for Better Herd Genetics

A successful artificial insemination (AI) program relies on efficient estrus or heat detection. A dairy or beef cattle producer who uses AI to breed his or her cows is acting as proxy for a bull and must accurately detect signs of estrus in order to inseminate cows when they are most sexually receptive/fertile to ensure conception.

Observation is the most reliable method to detect standing heat. Unfortunately, signs occur most often during the nighttime hours and can be variable among cows. Displays of estrus behavior can also be affected by an animal’s health status, stage of lactation, body condition, breed, season, environmental temperature, facilities, and herd dynamics. All of these factors may decrease accuracy of heat detection and lead to increased days open, calving intervals, economic loss, and culling rates.

Fortunately, tools such as electronic activity monitors can be used to detect some of the behavioral signs of estrus, such as restlessness and increased activity, among others. Chin-ball markers, tail-head chalk, and pressure-sensing devices can be used to survey if a cow has been mounted and is ready for breeding. These tools effectively detect heat, but the outputs of some are subjective and interpretation may require practice, while others may be cost prohibitive, especially for producers in developing countries that have been slow to adopt AI.

Implementation of an inexpensive, quantitative method of heat detection would certainly improve conception rates in herds throughout the world, but the improvements to animal productivity in developing countries would be immense. Fortunately, organizations like Global Good, a Bill Gates-backed Intellectual Ventures fund that invents technologies for low-resource settings, works hard to find inexpensive and easily adoptable agricultural production solutions. Increasing a producer’s supply of valuable animal protein in non-industrialized countries may help mitigate hunger.

Engineers and scientists from Global Good recently contacted the Department of Animal Sciences for assistance in testing a device that quantitatively determines when a cow is sexually receptive for breeding. This device measures electrical resistance in the vagina. Physiological changes in vaginal electrical resistance (VER) during the estrous cycle were first reported in the late 1960s. Although somewhat variable by animal, VER measurements change in response to the hormone fluctuations that occur during the estrous cycle, generally decreasing and reaching lowest levels when the animal is sexually receptive. A device that accurately measures and signals a producer when VER is decreasing and the animal is sexually receptive would conceivably increase odds of conception through AI and natural mating.

Dr. Martin Maquivar and John Swain spearheaded device testing for Intellectual Ventures/Global Good. With the help of several undergraduate students, they monitored the VER of nine cows from calving through two complete estrous cycles. They used ultrasonography to appraise ovarian structures and determine stage of the estrous cycle and validated these findings by quantifying progesterone in blood samples collected at the same time. Cows were also outfitted with commercially available activity monitors, marked with tail-head chalk to confirm mounting activity, and observed daily for standing heat. The cows were then inseminated after the second estrous cycle and pregnancy confirmed with the BioPRYN® protein-based blood pregnancy test on day 28 and rectal examination on day 35 post-breeding. Pregnancies confirmed the success of the VER measurements in detecting estrus and timing of insemination.

Phase I of the test is complete and results are promising. Successful launch of an inexpensive, quantitative device that reliably indicates when an animal is in heat has potential to transform livestock conception rates worldwide.
We are pleased to announce that **Dr. Robbi H. Pritchard** will be recognized as the Distinguished Graduate in Science, Education, and Technology. Dr. Pritchard earned his PhD in Animal Sciences from WSU in 1983. After post-doctoral training at Texas Tech University, he began his career in the Department of Animal and Range Sciences at South Dakota State University. He was honored as a Distinguished Professor by SDSU in 2005. This award is SDSU’s highest level of distinction, recognizing faculty members who are models of professional accomplishment. Although Dr. Pritchard has retired from SDSU he continues to work with the beef cattle industry. His research focused on nutritional biochemistry and ruminant nutrition. He mentored over 50 graduate students and spoke at more than 150 producer-industry conferences and seminars across the country.

The Outstanding Alumnus Award will be presented to **Dr. Fernando Valdez** who graduated from WSU with a PhD in animal nutrition in 1987. Dr. Valdez is an accomplished livestock nutrition professional currently serving as Global Vice President of Ruminant Business Development for Kemin Industries, Inc., a worldwide leader in the specialty ingredient manufacturing industry. Previously, Dr. Valdez was a dairy consultant and dairy team leader at Purina Mills.

**Dr. George F. and Jean N. Fries** will receive the Distinguished Service Award. Dr. Fries is a 1954 WSU Animal Sciences graduate who served as a research animal scientist with the USDA-ARS for 40 years. He and Jean created the George and Jean Fries Endowment in Animal Sciences to recognize and highlight exemplary undergraduate students who are truly passionate about research. This endowment provides funds each year for undergraduate research projects and travel for one or two students so they can present their research to a national scientific audience. The Fries hope their endowment will inspire undergraduates to pursue a career in research.

For additional information call 509-335-5523
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For more information or to find out how you can support Animal Sciences, please contact:

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