

# OSU CATTLE PLAN: A NEEDS ASSESSMENT FOR THE BEEF AND DAIRY INDUSTRIES IN OREGON

October 2021



**Oregon State**  
University

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## EXECUTIVE SUMMARY

The agricultural sectors of cattle and calves, dairy products and milk, and hay are all consistently among the top agricultural commodities in Oregon annually. Oregon State University, and in particular the College of Agricultural Sciences, has a long history of supporting these commodity groups by providing key knowledge discoveries, disseminating best management practices, and training scientists, producers, industry leaders and students. The purpose of this needs assessment is to create a shared vision around industry needs and opportunities, and the evolving science to increase the relevance and impact of our collective programs. This document will guide us in making strategic investments in faculty positions and research infrastructure.

### The goals of our needs assessment are to:

- A. Identify industry needs and strategic opportunities that increase programmatic impact and better position both the college and the industry in meeting near-term ( $\leq 10$  years) challenges, and;
- B. Where needs exceed our capacity, to identify potential funding sources and other forms of support.

We conducted a series of listening sessions with key stakeholder groups and advisory boards and CAS faculty between November 2020 and April 2021 to develop a list of critical needs and opportunities. The listening sessions also identified specific activities that the college could potentially accomplish to address these needs. Needs and opportunities were identified in several major areas for both research and outreach and Extension programs including: animal reproduction, health, nutrition and welfare; grazing management; environmental issues; technology; and economics, marketing and processing. Needs for improving the college's academic programs and facilities were also identified, and several key faculty positions needed to address these needs were recognized. Finally, we identified potential funding sources for meeting these needs including state, federal and foundation grant programs. The college will also need support from stakeholder to advocate during the legislative process to increase statewide program budgets and to solicit gifts to accomplish needs that exceed the college's funding capacity.

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## INTRODUCTION

Cattle and calves, dairy products and milk, and hay are consistently among the top agricultural commodities in Oregon annually. Sales of these commodities have fluctuated over time as a result of a number of factors including international trade, competition, government regulation and changes in public perception. Over 53% of Oregon land is federally managed and the cattle and calves sector is particularly reliant on grazing access to federal lands, and as a consequence, these producers are subject to numerous environmental considerations and competing uses on grazing allotments.

Oregon State University, and in particular the College of Agricultural Sciences, has long history of supporting these commodity groups by providing key knowledge discoveries, disseminating best management practices, and training scientists, producers, industry leaders, and students. However, with the increase in market, regulatory and production pressures on these industries, the College needs to periodically assess how well it is serving their needs. Identifying areas of strength and programmatic gaps is important so those gaps can be filled and strengths can be brought to bear on the most critical needs of our stakeholders. Finding new ways to connect and coordinate expertise and partnerships is also important to maximizing our impact. The recent release of new national agricultural priorities and roadmap make it timely to conduct this Oregon focused cattle industry assessment now.

Our assessment of these programs indicated that the programs were active; that many faculty are closely aligned with one or more stakeholder groups; and that their productivity by typical measures remains high. However, it is also clear that there are issues facing the industry that require multiple disciplines and approaches so identifying new connections and collaborations would further help build program impact.

The purpose of this planning effort is to create a shared vision around industry needs and opportunities, and therefore increase the relevance and impact of our collective programs. This plan will guide us in making strategic investments in faculty positions and research infrastructure.

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## OUR PROCESS

The genesis of this plan developed during Dean Sams' first year as he toured the state meeting with stakeholders and reviewing the college's research assets and infrastructure. Although we were anxious to begin the planning process we delayed starting until the fall of 2020 when our new Department Head (Carol Lorenzen) of the Department of Animal and Rangeland Sciences had settled into her position. Dr. Lorenzen will be a critical position in implementing the plan and we envisioned the planning process as an excellent opportunity for Dr. Lorenzen to meet stakeholders throughout the state. Between November 2020 and February 2021, we conducted structured conversations with the Executive Committee or Board of the Oregon Beef Council, Oregon Dairy Farmers' Association, Oregon Cattlemen's Association and the Oregon Dairy Nutrition Council and the advisory boards for both the Eastern Oregon Agricultural Research Center in Burns and Union. We developed a list of faculty expertise (Appendix A) and shared the document along with an agenda for each conversation. We also created an email address (Cattleplan@oregonstate.edu) and encouraged stakeholders and faculty to submit additional input via email. We compiled the input from these conversations and shared it with faculty. In April 2021 we held a conversation with college faculty to solicit their input. In this document, we summarize and capture industry needs and accompanying actions that the college, in collaboration with industry, will use in prioritizing investment in the Oregon cattle industry over the next 5 to 10 years.

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## IDENTIFIED RESEARCH NEEDS AND OPPORTUNITIES

### Animal Reproduction, Health, Nutrition and Welfare

Challenges and opportunities related to animal biology were identified during most of the stakeholder sessions we conducted. Breeding, health, and welfare, especially related to calves, were common topics. Breeding has been successful in producing larger adult cows, but only marginal gains have been achieved in pre-weaning performance of calves. Furthermore, little work has focused on calf health and nutrition compared to adults, and increasing the efficiency and successful outcomes of this age class could result in substantial improvements in producer businesses. Expected progeny differences (EPDs) could be used to select for animals that meet consumer needs or possibly even environmental needs. Research on heifers and calves related to Carbon net-zero may provide opportunities for collaborative work with other disciplines. Emerging diseases in wildlife as a result of climate change and international commerce have the potential to threaten cattle operations and may provide additional opportunities for collaboration with the Carlson College of Veterinary Medicine. Biosecurity is also an area of concern for some stakeholders, which might provide opportunities to collaborate with other colleges (Engineering, Public Health and Human Performance, Science, and Veterinary Medicine) as well.

Because of Oregon's diverse climate and environment work on forage species and production represent a substantial opportunity for the College of Agricultural Sciences, forage species or forage mixes that are suitable for Oregon's increasingly arid environments may enable producers to maintain production levels under changing climates. Forage species, agricultural by-products or supplements that reduce feed costs would be important achievements for both the beef and dairy sectors and may represent unique opportunities for hay and forage producers. Integrated pasture-based forage systems may also result in more efficient livestock production.

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### ***Examples of Needs for OSU and Stakeholders to Consider***

- ▶ Research on reproduction technologies that can increase production efficiencies and overall herd health.
- ▶ Animal breeding research that may produce animals that are better adapted to Oregon's changing climate or consumer desires/needs.
- ▶ Develop more efficient cows that gets calves to market on less input; cows that eat what is there, and can gets to "where" there is.
- ▶ Research on forage species or mixtures that are adapted to arid environments and/or can reduce feed or production costs.
- ▶ Research on rangeland improvement can help producers maintain healthy landscapes and increase grazing capacity.
- ▶ Research or enhanced pasture/forage/grazing use from a systems standpoint that results in improved pastures with an emphasize on herd health.
- ▶ Research on dryland dairy farming.
- ▶ Increase understanding of supplementation issues and opportunities — need to provide better tools regarding supplementation to producers in local areas such as macro and micro nutrient needs.
- ▶ Research that results in more efficient production on irrigated pastures and hay fields resulting in less water use.

### **Grazing Management**

We received substantial input on grazing management issues and opportunities. Oregon's diverse environment results in considerable variation among producers with regard to how they manage cattle grazing. Virtually all of Oregon's producers have multiple objectives under consideration in addition to raising cattle, including timber, fish and wildlife habitat, range improvement, fire suppression, tourism, Carbon sequestration, etc. Furthermore, many producers, especially east of the Cascades, are dependent on grazing allotments on federal land, which invariably imposes additional objectives either directly or indirectly. Cattle grazing can be an effective tool in the active management of forests and rangelands, where targeted grazing can resolve problems such as fine fuel reduction or suppression of invasive plants. Outcome-based grazing is increasingly common on federal grazing allotments where stakeholders set goals together within an adaptive management framework. Achieving sustainability and regenerative goals (i.e., net zero by 2050) as part of grazing management schemes can lead to certifications, which in turn may be important for maintaining market access or opening new markets. Annual variations in climate impose additional challenges to multiple-use grazing objectives because grass and forb production on rangelands can vary by several fold from year to year.

### ***Examples of Needs for OSU and Stakeholders to Consider***

- ▶ Research focused on grazing livestock production and grazing systems that are adapted to the arid and semi-arid landscapes of eastern Oregon.
- ▶ Research related to managed grazing and Carbon sequestration in arid rangeland soils including supplemental feeding on an annual basis.
- ▶ Research on use of livestock to manage fine fuels to maintain and improve desired native vegetation.
- ▶ Research on the use of supplements during winter grazing that might optimize use of invasive plant species (i.e., medusahead).
- ▶ Research related to grazing livestock that also interfaces with other critical themes in eastern Oregon (rangeland health, stewardship, restoration, invasive species issues, forage production, etc.) and is a strategic investment that brings with it the ability to generate substantial funding through partners (new money, cost-sharing, and matching funds) and advance and improve the sustainable and regenerative management of landscapes.
- ▶ Develop decision support tools that predict and guide the use of large fluctuations in herbaceous production (both invasive and native grasses) from year to year.
- ▶ Develop models for durable collaborations that leverage partnerships that bring different strengths to the table with an increased understand of the rangeland-social-ecological system and how livestock grazing might be a beneficial or neutral force for maintaining ecosystem services.

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## Environmental Issues

Numerous environmental issues and opportunities emerged during conversations with stakeholders and faculty and many of these overlap with issues identified in the Grazing Management Section. Oregon's farmers and ranchers have a strong environmental and stewardship ethic and continually seek ways to improve the condition of their property and meet environmental standards associated with their operations. In many cases, the science is incomplete with respect to management options that balance both environmental and production goals, or in the case of federal land management, national standards often do not fit local conditions, or may not be achievable. Science that informs management decisions is needed for several issues including wildfires, forest thinning, endangered fish and wildlife, invasive species, carbon sequestration, recreation, stream bank restoration, riparian grazing, and migratory birds and wetlands. Continual rangeland improvement is a place where OSU can help producers maintain healthy landscapes and increase grazing capacity.

Climate change and Carbon sequestration were among the most common issues mentioned in stakeholder and faculty discussions. For many years producers have struggled with maintaining operational flexibility in the face of extreme fluctuations in weather with county-level drought declarations becoming a common operational condition. Climate change also threatens producers by potentially changing ecological relationships including plant and animal distributions, new diseases and parasites, harmful algae blooms, among others. State policy changes to achieve Carbon neutrality by 2050 presents a host of science questions as well as potential challenges and opportunities. What role will cattle grazing play in Carbon sequestration? Will policy changes provide opportunities for sustainability or regenerative certifications where producers will be acknowledged for being part of the solution, or will the industry be subjected to increasing costs (fuel, purchasing of Carbon credits, etc.)? Methane from cattle has been identified as a significant contributor to global warming, but new feed stuffs or supplements can potentially reduce these emissions.

Water quantity and quality, exacerbated by climate change, will be an on-going issue for the industry. Surface and ground water availability are likely to become more constrained, especially east of the Cascades. Water quality increasingly is an issue often in conjunction with reduced availability. Runoff from confined animal operations is an issue for many cattle producers. Producers on the west side of the state deal with water quality issues during periods when there is too much water.

Fish and wildlife issues were also a concern for stakeholders. Most of the issues related to real and potential constraints on federal grazing land that result from Threatened or Endangered species. Sage grouse and salmon are examples of species where federal agencies' constraints on grazing allotments result in significant operational challenges for producers, and some of the science underlying these constraints is poorly documented or comes from outside the region. Predation has always been an issue for some producers and the recent recolonization of the state by Gray wolves has resulted in additional concerns and increased operational costs for some producers.

### ***Examples of Needs for OSU and Stakeholders to Consider***

- ▶ Research documenting local or ecosystem-specific information/conditions that would inform federal agency grazing standards related to fish and wildlife habitats such as stubble height, streambank alteration, and shrub use.
- ▶ Research on farming/ranching with less water, and in areas of western Oregon farming with too much water where water quality is an issue.
- ▶ Better understanding of stock water quantity, quality, and use.
- ▶ Cattle production research that informs policy decisions related to achieving Carbon neutrality by 2050 may lead to developing market incentives.
- ▶ Research on feed stuffs or supplements that can reduce Methane emissions from ungulates.
- ▶ Research on wolves and their impact on cattle stress/productivity/production.
- ▶ Research on fish and wildlife habitat restoration that may result in increased grazing opportunities (i.e., juniper removal for sage grouse, riparian habitat restoration, etc.).

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## Technology

Increased use of technology to improve efficiencies, monitoring animal and natural resources and providing decision support tools was recognized as presenting opportunities among all the groups we engaged. Radio Frequency Identification (RFID) tags are in common use, but not to the extent that the technology might allow. Information from RFID tags could benefit producers because of use of the data further down the supply chain. These data could be valuable in unknown ways and could reduce tracking paper requirements and potentially help with the market volatility. RFID tags would allow selective culling by tracking cows that produced lower performing or less successful calves. These tags could be used for consumer education. Tracking individual animals via tags could establish ownership, disease traceability, and food traceability for international markets. Smart technologies are used in some dairy operations to monitor animal activity, milk components, reproductive condition and health of individual cows. Unmanned aerial vehicles coupled with remote sensing provide opportunities to better understand pasture, predator, water and other resources so they can be managed in real time. Virtual fencing provides the opportunity to control location, timing and intensity of grazing animals. Enhanced manure/waste management technologies would allow producers to do a better job and increase production efficiencies. Finally, precision irrigation systems and remote sensing networks could increase water use efficiency and improve watershed quality.

### *Examples of Needs for OSU and Stakeholders to Consider*

- ▶ Develop monitoring, decision support and data visualization tools to inform management decisions for adaptive management of natural resources (vegetation, water, etc.) that address drought, climate variability and landscape sustainability.
- ▶ Develop and test new technology applications (RFID tags, irrigation systems, virtual fencing, etc.) for increasing production efficiencies and informing market decisions or certifications between the producer and consumer.
- ▶ Conduct comparative research among different robotic systems in dairy farming operations (milking and feeding robots, milk and animal health monitoring, animal activity control systems, etc.).
- ▶ Help advocate for and support rural broadband infrastructure.

## Economics, Marketing and Processing

Our listening sessions identified numerous challenges and potential opportunities in the realm of rural economics, marketing, and processing. Numerous intersecting factors threaten farm and ranch livelihoods throughout the state. Many producer/operators are  $\geq 60$  years of age and younger family members are more and more frequently seeking opportunities outside of the livestock industry. Also, costs of land, infrastructure, and other challenges present barriers for new ranchers to enter the business, and for farm and ranch families to pass these businesses to younger family members. This is especially the case if financing is required. As some family-owned ranches sell their land/businesses, many are purchased by absentee landowners and corporations. These new owners may have different land ethics (e.g. reduce or eliminate grazing) and ties to rural communities, which will increase demands on land for uses besides grazing (e.g., housing, recreation); thereby making it harder to find grazing land for cattle. These shifting demographic patterns have the potential to economically impact rural communities over the long-term.

Markets, market access, and processing also emerged as major concerns for stakeholders. Beef and dairy are highly competitive industries that are predominantly controlled by large processors. Increasing demand or creating new products can assist in growing these sectors. Access to additional international markets would increase total sales and could increase prices for products and by-products that are not desired by the American public, but which are desirable in other countries. Multiple stakeholders suggested that American consumers are increasingly interested in purchasing products that are sustainably produced, are high quality and have potential health benefits, which are hallmarks of beef and dairy products. Certification programs for sustainability could increase market access and allow market incentives. Product differentiation, branded products, niche markets, direct or online sales, Coops or small processing operations could assist in developing a

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competitive advantage for local producers or groups of producers. Shortening the supply chain between producer and consumer would benefit many producers, yet Oregon has few local processing alternatives. Faster distribution of processed products to retail outlets could also increase demand. Finally, plant or cell-based protein alternatives represent major challenges to the beef and dairy sectors and market analyses that track these trends and identify reasons for consumer preferences may enable new market strategies or developing strategies to compete against protein alternatives.

### ***Examples of Needs for OSU and Stakeholders to Consider***

- ▶ Rural economic studies of factors contributing to demographic changes in farm and ranch communities and analyses of policies that contribute to or may ameliorate these changes.
- ▶ Conduct life cycle analyses that incorporate research on social issues into the animal and land management research.
- ▶ Incorporate social/human dimension components into other natural resources research to better understand attitudes and perceptions among different user groups in rural communities.
- ▶ Research and test certification standards to assure sustainability and human health outcomes of the entire dairy/cattle system.
- ▶ Develop models or tools to better predict market volatility.
- ▶ Develop comprehensive risk management tools and solutions.
- ▶ Research and innovation on new products (value-added dairy and meat, new cuts of meat, products tailored to specific markets [i.e., east Asia], etc.), and increasing shelf-life for products.
- ▶ Help producers develop value added meat products by better integration of Animal and Rangeland Sciences and Food Science and Technology programs.
- ▶ Analyses of regulatory policies that create barriers for development of new processing facilities in Oregon and engaging our elected officials in addressing the issues.

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## **EXTENSION AND OUTREACH**

We received substantial input on the College of Agricultural Sciences Extension and outreach programs. Much of the input related to how Extension has staffed county offices where regional programming (2 or more counties) is becoming the norm because of declining state funding. Stakeholders and faculty perceive that these staffing changes have resulted in county (regional) agents who have too much territory to cover and have limited time for on-the-ground consultation/work and less time to understand the science and turn it into practical solutions. In addition, there is the perception that we produce less online content where it is readily accessible; internet searches for information is now the norm and those searches lead to other university websites with content that is less relevant to Oregon conditions. Stakeholders acknowledged that their knowledge of college is limited mostly to the few units that they regularly interact with and wondered if there were ways to increase stakeholder familiarity with our faculty and programs. Stakeholders applauded the use of zoom and other remote technologies during the pandemic and acknowledged that these technologies increased access to educational programming. Below are general and discipline-specific suggestions for Extension and outreach that arose during our conversations.

### ***Examples of Needs for OSU and Stakeholders to Consider***

#### **General**

- ▶ Increase the production of online content related to all programs.
- ▶ Optimize search engine algorithms to increase the likelihood that Oregon-generated or Oregon-specific content will be among the top sites located.
- ▶ Develop and share with stakeholder groups a list of faculty expertise so they will be more knowledgeable of the college's capabilities.
- ▶ Maintain or increase programming delivered with remote technologies.

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### **Examples of Needs for OSU and Stakeholders to Consider (cont.)**

- ▶ Explore ways to increase Extension personnel networking with stakeholder groups, including those beyond the Animal and Rangeland Sciences Department.
- ▶ Animal Reproduction, Health, Nutrition and Welfare
- ▶ Increase frequency and diversity of applied trainings (i.e., Artificial insemination, nutrition management, grazing systems, robotics, etc.).

#### **Grazing Management**

- ▶ Extension/outreach programs that communicate the value of grazing/cattle production as a conservation tool for public and NGOs.
- ▶ Engage and help train federal agency employees to increase their knowledge of cattle production and grazing management.
- ▶ Extension/outreach programs regarding outcomes-based grazing.
- ▶ Extension/outreach programs that integrate new technologies (i.e., virtual fencing, remote sensing, etc.) into grazing management plans.

#### **Environmental Issues**

- ▶ Maintain or increase engagement in collaborative programs that facilitates multiple stakeholders reaching consensus around wicked natural resources issues.
- ▶ Extension/outreach programs that increase understanding and behavioral change related to climate change and farm/ranch contributions to Carbon neutrality, including development of certification standards.
- ▶ Extension/outreach programs focused on water conservation in farm/ranch operations.
- ▶ Extension/outreach programs regarding human-wildlife conflicts.
- ▶ Extension/outreach programs related to the Endangered Species Act and habitat needs of listed species.
- ▶ Extension/outreach programs that increase understanding and behavioral change related to invasive species, wild fire, juniper encroachment and other environmental issues.

#### **Technology**

- ▶ Develop a rangeland analysis platform that translates natural resources data (monitoring rangelands, animal health, water tanks, riparian areas) into useable forms for the end user. Deliver this remotely and in person.
- ▶ Train industry employees in use of smart technologies (RFID tags, virtual fencing, robotic milking systems, animal health monitoring, etc.).

#### **Economics and Marketing**

- ▶ Support policy development and analyses related to rural economics.
- ▶ Comprehensive support and training for stakeholders regarding the National Environmental Policy Act because Oregon has so much federal land and many producers are reliant on federal allotments for seasonal grazing.
- ▶ Support and maintain system that develops/updates enterprise budgets, and the use of Ag business logic, the online decision tool for small/medium sized ranches.

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## EDUCATION

We received numerous comments and suggestions regarding the college's educational programs during our listening sessions. Many of these comments were related to the tight labor market that cattle producers must deal with and the need for continuing education for employees or training students who are more broadly educated. Several sessions identified the need for cross-trained students who have a discipline-specific degree with training in business management, marketing, human resources management, sustainability, etcetera. The close proximity of the Eastern Oregon Agricultural Research Center in Union to the college's Agricultural and Natural Resources Program at Eastern Oregon University was noted as providing a unique educational opportunity. The following is a list of specific suggestions we heard during the sessions.

### *Examples of Needs for OSU and Stakeholders to Consider*

- ▶ Maintain the college's current degree programs especially in Animal and Rangeland Sciences.
- ▶ Encourage more of the college's students to pursue double degrees, especially in Sustainability, Agricultural and Food Business Management, Environmental Economics and Policy, Fisheries, Wildlife and Conservation Sciences, or Business.
- ▶ Consider curriculum changes (options, specializations, minors) that increase knowledge of business or human resources management to Rangeland Sciences or Animal Sciences B.S. degrees.
- ▶ Increase hands-on or practical training (field courses, living labs, etc.) in all degree programs.
- ▶ Increase student engagement (via field courses, trainings, internships and research projects) at the college's Branch Experiment Stations; the Union station in particular because of its proximity to the OSU program at Eastern Oregon University..
- ▶ The Union Station could be better used as a model ranch operation for testing, demonstration, and other outreach.

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## PRIORITY STAFFING

During our conversations with stakeholder groups, support for faculty positions within the college was expressed in both direct and indirect ways. A few faculty positions were specifically mentioned during these conversations while others were implied by the research and outreach needs being discussed. Stakeholders acknowledged that their understanding of the college's human resources assets was limited to the few units they interact with, and that we may have faculty capable of addressing research and outreach needs identified during the sessions. There was a general concern that Extension's regional agent model was not a good fit for the large counties in eastern Oregon. The following faculty positions were identified as important considerations during the college's priority staffing process—no priorities are implied by the order of this list.

- ▶ Statewide Dairy Extension Specialist
- ▶ Dairy Processing Extension Specialist
- ▶ Cattle Geneticist
- ▶ Associate Director of the Eastern Oregon Agricultural Research Center in Union.  
This position would have Beef Cattle Management or Grazing Management expertise with background or experience in other natural resources (i.e., Range, Fisheries, Forestry, Wildlife) as a preferred qualification.
- ▶ Rural Economics Extension Specialist
- ▶ Range faculty position(s) that will maintain the Society for Range Management program accreditation. Wildlife fire ecology, invasive species ecology, plant ecology, fish habitat ecology, human dimensions, range restoration were potential subdisciplines that would address other needs identified in this document.
- ▶ Beef/Dairy Marketing Specialist
- ▶ Digital Technology/Precision Agricultural Engineer

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## FACILITIES

Modernizing the college's facilities was a topic of discussion among most stakeholders and faculty listening sessions, but was specifically mentioned in a few cases. Modernizing the OSU Dairy was of special interest to the Oregon Dairy Farmers' Association, the Oregon Dairy Nutrition Council and some faculty. The college recently replaced the roof on the dairy, which will significantly extend the longevity of that building, but other enhancements are needed. Specifically, a new milking parlor, in combination with automated systems for monitoring animal activity and health, milk production and feeding/grazing will be needed for future research needs as well as leading the industry in adopting new technologies. The new dairy would also help address IACUC concerns regarding this aging facility and a new design may alleviate concerns among neighbors of the dairy. Those changes in combination with plans for the OSU Creamery would position the college to be among the top dairy research and educational institutions in the West. In addition, modernizing or replacing the Clark Meat Center was also identified as important for training students in meat processing, and conducting research in the areas of meat quality and niche products.

Modernizing the college's beef cattle facilities in Corvallis and at both of the Eastern Oregon Agricultural Research Center locations were also topics of discussion. On campus, the college is fortunate to have attracted funding and constructed the James E. Oldfield Animal Teaching Facility, Hogg Animal Metabolism Laboratory and the Precision Agricultural Systems Center, within the past 10 years. However, other facilities for housing and handling cattle are approaching the end of their usefulness. The Steer-a-Year and other feeding sheds and animal handling equipment both on campus and at the Soap and Berry Creek ranches, need to be replaced. Similar upgrades are needed at both the Union and Burns experiment stations. Student housing is also a need at all of the college Branch Experiment Stations, limiting our ability to engage students in research and educational programs.

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## FUNDING

Potential funding sources for meeting the needs identified during our listening sessions were also discussed during these sessions and fall into three categories: projects, personnel and facilities. Projects are usually funded through grants and contracts while personnel and facilities rely more on governmental appropriations and private or industry philanthropy.

### Projects

In many cases, where the college already has the human resources and expertise capacity to conduct specific research and Extension programs identified in our assessment, the college will alert faculty of these needs or assemble teams to address specific needs. In those cases, the Oregon Agricultural Experiment Station staff can assist individual faculty and teams in identifying specific industry, state, federal agency and non-profit organization programs that might fund these research and outreach projects. Specific programs identified during the conversation included the National Institutes of Health, National Science Foundation, and the USDA National Institute Food and Agriculture funding opportunities. Funding solicitations to large non-profit foundations may need to be coordinated with the OSU Foundation. The industries, both in Oregon and nationally, have research funding resources as well and it is hoped that those funds would be directed to these and related activities through the setting of research priorities as well as selection of proposals for funding.

### Personnel and Facilities

For those needs in which we do not have existing expertise or capacity, the college funds faculty and support staff positions as well as facilities needs via state appropriations to the University's Education and General, Agricultural Experiment Station and Extension budgets. Historically, those budgets have been underfunded relative to the industry's growth, its economic contribution to the state's economy and food system, and the inflationary costs to maintain continuing service levels. Specific program enhancements are sometimes accomplished during the legislative session by stakeholders advocating for specific positions or program area increases. If the college does not

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have the capacity to fill positions identified in this assessment, we will engage stakeholders in conversations regarding legislative strategy or private philanthropy. Larger facility needs identified in our assessment (e.g., OSU Dairy, Clark Meat Lab, Soap Creek Ranch, Union and Burns stations) are part of the college's goals during the ongoing capital campaign, and may also require an industry or legislative match to accomplish. In addition, stakeholders will be critical partners in funding these needs through making essential contributions as well as identifying donors during the campaign.

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## **CONCLUSION**

The Land Grant system is a partnership between universities like OSU, its stakeholders (industry and individuals) and government (local, state and federal) that spans 150 years. We all value it but also recognize we share in its programs, benefits, impacts, progress, needs and costs. This OSU Cattle Plan and the process to develop it exemplify that partnership. The College of Agricultural Sciences has been and will continue to be committed to this relationship. We value the guidance this Plan provides and greatly appreciate the participation of our stakeholders in this visioning process as well as their ongoing, and future support of our efforts to serve them.

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## Appendix A. Natural Resources/Livestock Related Expertise in the College of Agricultural Sciences.

The College of Agricultural Sciences (CAS) has substantial expertise in Corvallis, at our Branch Experiment Stations and in county Extension offices that support livestock and natural resource industries throughout the state. Most faculty in Corvallis have Extension and research or teaching and research assignments. Faculty located at our Branch Experiment Stations have research or research and Extension/outreach duties. With few exceptions, county Extension faculty are 100% Extension, although some may have assignments that include other program areas such as 4-H or community health. The following list of faculty are divided into core faculty who currently have research, outreach or teaching responsibilities directly related to the livestock and natural resource industries, and ancillary faculty who have expertise that is relevant and could be applied to industry issues, but whom are currently working on issues related to other agricultural industries. For example, we have faculty in Applied Economics currently working on economics or policy related to field or horticulture crops or urban areas but the methodologies they employ could be directed towards livestock and natural resources. Most of the faculty on these lists are supported 100% or 75% on state funds. Those designated as \*\* are 100% funded on grants and contracts.

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### CAS ACADEMIC DEPARTMENTS

#### Animal and Rangeland Sciences

**Academic Programs:** B.S. Animal Science (including Pre-Vet Major), B.S. Rangeland Sciences; M.S. and Ph.D. in Animal Sciences, M.S. and Ph.D. in Rangeland Ecology and Management

##### Core Faculty

**Serkan Ates**—Pasture Management for Sustainable Animal Production, Improved Product Quality  
**Massimo Bionaz**—Nutrigenomics in dairy cows, Milk and human health, Welfare and management of dairy cows  
**Cecily Bishop**—Reproductive Physiology  
**Gerd Bobe**—Nutrition, Dietary Disease Prevention  
**Jonathan Dinkins**—Sagebrush Ecology, Avian Ecology  
**Troy Downing**—Statewide Dairy Specialist (located in Tillamook)  
**Charles Estill**—Ruminant Nutrition and Reproduction  
**Michelle Kutzler**—Reproductive Biology of Livestock  
**Carol Lorenzen**—Department Head, Meat Science, Meat Quality  
**Ricardo Mata-Gonzalez**—Associate Dean, Ecology and Eco-physiology of Rangeland Plants, Invasive Species  
**Carlos Ochoa**—Ecohydrology, Watershed and Riparian Systems Management  
**Dawn Sherwood** – Equine Science

##### Ancillary Faculty

**Monique Udell**—Animal Behavior and Social Cognition

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#### Agricultural Education and Agricultural Sciences

**Academic Programs:** B.S. Agricultural Science; Master of Agricultural Education, Ph.D. Education (with College of Education)

##### Core Faculty

**Josh Stewart**—Director of Agricultural Teacher Education  
**Haley Traini**—Co-Director of Leadership Academy  
**Jonathan Velez**—Department Head, Leadership and Agricultural Education

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## Applied Economics

**Academic Programs:** B.S. Agricultural and Food Business Management, B.S. Environmental Economics and Policy; M.A., M.S. and Ph.D. in Applied Economics

### Core Faculty

**John Antle**—Production Economics, Sustainable Agricultural Development  
**Penny Diebel**—Agribusiness Management, Environmental Economics and Policy  
**William Jaeger**—Natural Resource & Environmental Economics, Water, Agricultural Economics, Climate Change Policy  
**Christian Langpap**—Environmental and Resource Economics, Endangered Species Conservation, Private Provision of Environmental Public Goods, Environmental Impacts of Agricultural Policy  
**David Lewis**—Environmental and Resource Economics, Ecosystem Services, Conservation Science, Climate Change, Non-Market Valuation, Land Use  
**Jeff Reimer**—International Trade, Agricultural Economics, Regional Economic Modeling  
**Clark Seavert**—Financial management, capital investment analysis, enterprise budgets, crop & livestock leasing  
**Junjie Wu**—Natural Resource Economics, Environmental Economics, Agricultural Economics, Regional and Urban Economics.

### Ancillary Faculty

**Jennifer Alix-Garcia**—Department Head, Development and Environmental Economics, Ecosystem Services  
**Samuel Bell\*\***—Environmental Economics, Sustainability, Climate Change, Renewable Energy  
**Yong Chen**—Regional Development, Resource and Environmental Economics, Land Use  
**Robin Cross\*\***—Plant Nursery Management, Wine Economics  
**Steven Dundas**—Zoning Policy, Coastal Management, Ecosystem Service Valuation, Recreation Policy  
**David Kling**—Natural Resource Management under Uncertainty, Bioeconomic models, Fisheries  
**Kassahun Melesse**—International Development, Agricultural Technology Adoption  
**James Sterns**—Agribusiness Economics and Management, Agricultural Marketing  
**Nadia Streletskaya**—Behavioral Economics, Food Economics, Consumer Behavior, Marketing

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## Biological and Ecological Engineering

**Academic Programs:** B.S. Ecological Engineering (with College of Engineering); M.S. and Ph.D. in Biological and Ecological Engineering

### Core Faculty

**Dominique Bachelet\*\***—Dynamic Fire Modeling, Climate Change Impacts  
**John Bolte**—Department Head, Mathematical Modeling and Scenario Analysis, Agricultural Systems, Water Supply and Water Use  
**Derek Godwin**—Community Engagement in Watershed Management Issues  
**Stephen Good**—Ecohydrology  
**Chad Higgins**—Nexus of Food, Energy and Water Systems  
**Gerrad Jones**—Water Quality Engineering  
**Salini Sasidharan**—Ground Water Engineer  
**John Selker**—Hydrologic Modeling  
**Desiree Tullos**—Ecohydraulics, River Engineering and Restoration  
**Maria Zamora**—Water/Irrigation Engineer

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## Botany and Plant Pathology

**Academic Programs:** B.S. Botany, B.S. Biological Data Science; M.S. and Ph.D. in Botany and Plant Pathology

### Core Faculty

**Aaron Liston**—Plant Species Diversity  
**Bruce McCune**—Analysis of Ecological Communities and Habitats  
**Melodie Putnam**—Director of Plant Clinic, Diagnosis of Plant Disease  
**Jay Pscheit**—Diagnosis of Plant Disease  
**Cindy Ocamb**—Diagnosis of Plant Disease  
**Luisa Santamaria**—Plant diseases

### Ancillary Faculty

**Linda Hardison\*\***—Director of Oregon Flora Project  
**Andy Jones**—Plant Population Ecology  
**Christopher Mundt**—Plant Disease Epidemiology, Sustainable Agriculture

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## Crop and Soil Science

**Academic Programs:** B.S. Crop and Soil Science; M.S. and Ph.D. in Crop Science, M.S. and Ph.D. in Soil Science

### Core Faculty

**Nicole Anderson**—Grass & Legume Seed Extension  
**Sam Angima**—Associate Dean for Extension, Small Farms, Agronomy  
**Lauren Gwin**—Farm and food system policy, local and regional food supply chains, community food system development  
**David Hannaway**—Statewide Extension Forage Specialist  
**Andrew Hulting**—Statewide Extension Weed Management Specialist  
**Markus Kleber**—Soil Systems Science  
**Amber Moore**—Statewide Extension Soil Fertility Specialist  
**Garry Stephenson**—Extension Small Farms Specialist and Director of the Center for Small Farms & Community Food Systems  
**Dan Sullivan**—Nutrient Management  
**Christy Tanner**—Grass seed and Cover Crops & Drones  
**Abigail Tomasek**—Extension Water Quality Specialist  
**Elizabeth Verhoeven**—Soil fertility

### Ancillary Faculty

**Navneet Kaur**—Statewide Extension Field Crop Entomology  
**Kate Lajtha**—Nutrient cycling in natural and human-disturbed ecosystems  
**Rory Mc Donnell**—Invertebrate ecology  
**Julie Pett-Ridge**—Ecosystem nutrient sources and cycling

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## Environmental and Molecular Toxicology

**Academic Programs:** Undergraduate minor in Toxicology; Masters of Toxicology, M.S. and Ph.D. Toxicology

### Core Faculty

**Kaci Buhl**—Pesticide Safety  
**Jennifer Durringer**—Director of Endophyte Service Testing Lab  
**Jeff Jenkins**—Statewide Extension Toxicologist, impact of pesticide use on air and water quality, human and wildlife exposure to pesticide use in both agricultural settings

### Ancillary Faculty

**Kim Anderson**, Department Head, environmental forensic chemistry  
**William Stubblefield**, Aquatic Toxicology and Ecotoxicology

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## Fisheries, Wildlife and Conservation Sciences

**Academic Programs:** B.S. Fisheries and Wildlife Sciences; Professional Science Master in Fish and Wildlife Administration, M.S. and Ph.D. in Fisheries Science, M.S. and Ph.D. in Wildlife Science

### Core Faculty

**Ivan Arismendi**—Stream Ecology, Hydrology and Watershed-level Processes  
**Jonathan Armstrong**—Fish Behavior, Physiology, Landscape Ecology  
**Katie Dugger**—Population Dynamics and Avian Ecology  
**Bruce Dugger**—Wetland Ecology, Avian Ecology, Conservation Planning  
**Dan Edge**—Associate Dean for Faculty Affairs, Population and Habitat Ecology of Wildlife in Forest and Agricultural Ecosystems  
**Lisa Ellsworth\*\***—Fire Behavior and Modeling, Habitat Ecology, Rangeland Ecology  
**Clint Epps**—Mammalogy, Climate Change, Conservation Genetics, Wildlife Disease  
**Tiffany Garcia**—Herpetology, Aquatic Ecology  
**Guillermo Giannico**—Extension Fisheries Specialist, Salmonid Habitat Ecology, Watershed Management, Fish Passage  
**Christian Hagen\*\***—Response of Grouse to Landscape Change and Conservation Practices  
**Selina Heppell**—Department Head, Population Modeling, Conservation Planning  
**Scott Heppell**—Fisheries Ecology and Physiology  
**Boone Kauffman\*\***—Climate Change, Riparian Ecology and Restoration  
**Taal Levi**—Predator Ecology and Conservation, Disease Ecology, Climate Change  
**James Peterson**—Aquatic Ecology, Population Ecology, Structured Decision Making  
**Dana Sanchez**—Extension Wildlife Specialist, Mammal Habitat Ecology  
**Dana Warren**, Aquatic Ecology and Fish Ecology

### Ancillary Faculty

**Kelly Biedenweg**—Human Dimensions of Natural Resource Management  
**Doug Robinson**—Avian Ecology, Citizen Science  
**Brian Sidlauskas**—Biodiversity and Conservation of Fishes

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## Food Science and Technology

**Academic Programs:** B.S. Food Science and Technology; M.S. and Ph.D. in Food Science and Technology

### Core Faculty

**Sheri Cole**—Food Science and Technology Work Force Training and Dairy Extension  
**Joy Waite-Cusic**—Food Safety and Spoilage Microbiology  
**Lizbeth Goddik**—Department Head, Dairy Processing; Food Industry Outreach  
**Yanyun Zhao**—Value-added Food Processing and Sustainable Packaging

### Ancillary Faculty

**Juyun Lim**—Director, Center for Sensory and Consumer Behavior Research

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## Horticulture

**Academic Programs:** B.S. Horticulture; M.S. and Ph.D. in Horticulture

### Core Faculty

**Len Coop**—IPM and Pest and Disease Modeling  
**John Lambrinos**—On-farm Habitat Restoration, Ecosystem Services  
**Andony Melathopoulos**—Extension Pollinator Health Specialist  
**Marcelo Moretti**—Weed Science, Integrated Weed Management

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## Microbiology

**Academic Programs:** B.S. Microbiology, B.S. BioHealth Sciences (both in College of Science); M.S. and Ph.D. in Microbiology

### Core Faculty

**Jerri Bartholomew**—Salmon Disease, Fish Parasites  
**Katharine Field**—Microbial Contamination in Water  
**Michael Kent**—Fish Disease, Parasitology

### Ancillary Faculty

**Ryan Mueller**—Aquatic Food Webs  
**Mahfuzur Sarker**—Microbial Food Poisoning and GI Disease in Humans and Livestock

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## Statistics

CAS partially supports 10 faculty in the Statistics Department who consult with CAS faculty and graduate students on research design and data analysis and visualization.

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## CAS BRANCH EXPERIMENT STATIONS

### Central Oregon Agricultural and Extension Center

**Jeremiah Dung**—Molecular epidemiology, population biology, disease modeling, and integrated disease management

**John Spring**—Applied Weed Management

**Tracey Wilson**—Central Oregon Agricultural Literacy Coordinator for Warm Springs; Central Oregon Agricultural and Extension Center

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### Coastal Oregon Marine Experiment Station

**Michael Banks**—Genetic Characterization of Fish Populations

**Jessica Miller**—Fish Ecology

**Kathleen O'Malley**—State Fisheries Geneticist

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### Columbia Basin Agricultural Research Center

**Judit Barroso**—Weed Management

**Stephan Machado**—Dryland Cropping System Agronomist

**Donald Wysocki**—Dryland Cropping Systems, Soil, Water and Nutrient Management

**Christina Hagerty**—Plant Diseases

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### Eastern Oregon Agricultural Research Station—Burns

**David Bohnert**—Director, Rangeland Animal Nutrition; Beef Cattle Management; Extension Beef Cattle Specialist (OSU)

**Dustin Johnson**—State Rangeland Program Coordinator (OSU)

**Juliana Ranches**—Statewide Beef Cattle Specialist (OSU)

**Vanessa Schroeder**—Sage Steppe Ecosystems (OSU)

**Tony Svejcar\*\***—Rangeland Ecology and Management

**Katherine Wollstein**—Range Wildfire Specialist (OSU)

**Jonathan Bates**—Rangeland Ecologist (ARS)

**Owen Baughman**—Precision Rangeland Restoration (TNC)

**Chad Boyd**—Rangeland Ecologist (ARS)

**Stella Copeland**—Rangeland Restoration Ecologist (ARS)

**Kirk Davies**—Rangeland Ecologist (ARS)

**Erik Hamerlynck**—Plant Physiologist (ARS) **Rory O'Conner**—Rangeland Ecologist (ARS)

**Andrew Olsen**—Rangeland Scientist (TNC)

**Roger Sheley**—Rangeland Restoration Ecologist (ARS)

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### Eastern Oregon Agricultural Research Station—Union

**Academic Programs at EOU:** B.S. Agriculture Science, B.S. Crop Science, B.S. Rangeland Science, B.S. Soil Science

**Bryan Endress**—Forested Rangeland Ecology, Invasive Species Ecology and Management, also OSU-EOU Program

**Guojie Wang**—Forages, Soil and Water Conservation, Rangeland Restoration, also OSU-EOU Program

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## Food Innovation Center

Jason Ball—Research Chef

Ann Colona—Sensory Program Director

Aimee Hasenbeck—Sensory Scientist

Jovana Kovacevic—Food Safety Extension Specialist

Sarah Masconi—Director of Product and Process Development Program

Dave Stone—Director, Food Safety and Public Health

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## Hermiston Agricultural Research and Extension Center

Sandy DeBano—Upland Entomologist

Silvia Rondon—Integrated Pest Management, Entomology

David Wooster—Riparian Entomologist

Ruijun Qin—Agronomist, nutrient management

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## Malheur Experiment Station

Joel Felix—Weed Management

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## Southern Oregon Research and Extension Center

Rich Roseburg—Director, Agronomy, Forages

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## EXTENSION OFFICES (CEO = COUNTY EXTENSION OFFICE)

### Core Faculty

**Sergio Arispe**—Livestock, Pastures and Forages, Rangeland Conservation; Malheur CEO  
**Mylen Bohle**—Agronomy/Forages; Crook CEO, Deschutes CEO, Jefferson CEO  
**Cassie Bouska**—IPM, Pastures and Forages, Pesticide Safety, Weeds; Coos CEO, Curry CEO  
**Chip Bubl**—Crops and Livestock, Columbia CEO  
**Jenifer Cruickshank**—Dairy Management; Benton CEO, Clackamas CEO, Lane CEO, Linn CEO, Marion CEO, Washington CEO  
**Scott Duggan**—Livestock; Crook CEO, Deschutes CEO, Jefferson CEO, Confederated Tribes of the Warm Springs  
**Shelby Filley**—Livestock and Forage; Benton CEO, Josephine CEO, Lane CEO, Linn CEO, Marion CEO, Washington CEO, Southern Oregon Research and Extension Center  
**Gordon Jones**—Field Crops, Pasture, Forages, Weeds; Josephine CEO, Southern Oregon Research and Extension Center  
**Chrissy Lucas**—Small Farms, Ground Water Quality Outreach Coordinator; Benton CEO, Lane CEO, Linn CEO, Marion CEO, Polk CEO  
**Jordan Maley**—Agriculture/Dryland Crops and Forages; Gilliam CEO  
**Ian McGregor**—Pasture and Forages, Irrigation; Klamath Basin Research and Extension Center  
**Jacob Powell**—Crops and Livestock; Sherman CEO, Wasco CEO  
**Chris Schachtschneider**—Beef Cattle, Rangeland Conservation and Management; Morrow CEO, Umatilla CEO  
**Pete Schreder**—Beef Cattle, Pasture and Forages; Union CEO, Wallowa CEO  
**Christy Tanner**—Field Crops, Forages; Lane CEO  
**Darren Walenta**—Agronomy, forages, IPM; Baker CEO, Union CEO, Wallow CEO

### Ancillary Faculty

**Nick Andrews**—Small Farms; Washington CEO, North Willamette Research and Extension Center  
**Frank Burris**—Watershed Management; Coos CEO, Curry CEO  
**Audrey Comerford**—Agritourism Coordinator; Marion CEO, Polk CEO, Yamhill CEO  
**Melissa Fery**—Small Farms, Tourism and Agritourism; Benton CEO, Lane CEO, Linn CEO  
**Amy Garrett**—Small Farms, Benton CEO, Linn CEO, Polk CEO  
**Heidi Noordijk**—Small Farms Coordinator; North Willamette Research and Extension Center  
**Maud Powell**—Small Farms; Josephine CEO, Southern Oregon Research and Extension Center

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## OTHER EXPERTISE AT OSU

**College of Business**—COB faculty collaborate with CAS faculty in product marketing. COB classes are also core requirements for our Agricultural Food and Business Management degree and our Leadership Minor.

**College of Earth, Ocean and Atmospheric Sciences**—CEOAS has numerous faculty with expertise in Climate Change, Climate Modeling, Geology, Geography and Land Use, Water Resources, and Weather.

**College of Engineering**—COE offers comprehensive engineering programs in each of the main engineering disciplines. COE faculty collaborate with CAS faculty most extensively in the areas of bioinformatics, environmental and biological engineering, robotics, and sensor development.

**College of Forestry**—COF has comprehensive research programs in numerous disciplines related to natural resources, including climate change, fish and wildlife in forest environments, fire science, human dimensions of natural resources, hydrology, natural resource policy, recreation, watershed management. Faculty in COF collaborate extensively with CAS faculty.

**College of Liberal Arts**—CLA has faculty with expertise in human dimensions of natural resources and public policy who collaborate with CAS faculty. Many of the classes offered by CLA schools are general education requirements for CAS degrees.

**College of Public Health and Human Performance**—CPHHS has numerous faculty working on the nexus of human health and nutrition. Faculty in CAS collaborate with CPHHS faculty in a number of areas including food safety, nutritional quality and health benefits of specific food products.

**Carlson College of Veterinary Medicine**—CVM includes two departments (Biomedical Sciences, Clinical Sciences), the Veterinary Teaching Hospital and the Oregon Veterinary Diagnostic Laboratory. Faculty conduct research on the full spectrum of animal health and disease for both large and small animals. CVM faculty collaborate extensively with CAS faculty and CVM provides the veterinary care for animals in CAS facilities.

**Institute for Natural Resources**—INR is legislatively funded institute that provides science support for natural resources policy issues. CAS faculty and others at OSU are called upon to provide scientific expertise as needed. Some INR faculty have academic homes in CAS.



Oregon State University  
College of Agricultural  
Sciences