

Ph.D. Graduate Research Assistantship

Precision Water Supply Engineering, Livestock Systems & Applied Rangeland Research

South Dakota State University

January 1, 2027 – December 30, 2029

Application Deadline: October 1, 2026, at 11:59 PM Mountain Time

South Dakota State University (SDSU) is seeking a motivated, **hands-on Ph.D. student** interested in applied research at the intersection of **precision agricultural engineering, grazing livestock management, and water resources**.

This is a three-year Graduate Research Assistantship beginning **January 1, 2027**, and ending **December 30, 2029**, with the possibility of extension as needed.

The student will participate in a multi-year research and Extension program examining how water resources and grazing management influence livestock distribution, forage utilization, rangeland condition, and producer decision-making. Research will combine applied on-farm studies with controlled, smaller-scale trials at SDSU research facilities. Research activities will include livestock water-system design and maintenance, livestock movement and spatial analysis, rangeland assessment, forage utilization, vegetation measurements, water-use monitoring, and producer-focused Extension programming.

Ph.D. Program & Specialization

The successful applicant will pursue **one of two Ph.D. tracks**, depending on their academic background, research interests, and career goals:

Track A — Ph.D. in Agricultural and Biosystems Engineering **Emphasis: Precision Water Supply & Management Technology**

This track will emphasize the engineering, design, construction, testing, and optimization of water-resource technologies for grazing livestock systems. The student's dissertation would approach grazing-water challenges primarily from an agricultural engineering and water-resource perspective while incorporating livestock, rangeland, and on-farm applications.

Track B — Ph.D. in Animal Science **Emphasis: Range Management Technology**



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This track will emphasize the application of water and precision technologies to cattle and sheep grazing systems, including livestock behavior and distribution, forage utilization, rangeland response, and management outcomes. The student's dissertation would approach grazing-water challenges primarily from an animal and rangeland systems perspective while maintaining a strong hands-on technology-development component.

Regardless of the Ph.D. track selected, the student will become an expert in grazing water technology for cattle and sheep. The two tracks provide different disciplinary pathways toward that common specialization: one centered more strongly on engineering and water-resource technology, and the other on livestock and rangeland applications of technology.

The final Ph.D. program and major advisor will be determined based on the successful applicant and their academic preparation.

Hands-On Technology Development

The Ph.D. is intended to combine science with practical technology development and innovation. The student will learn not only how to scientifically evaluate grazing and water systems, but also how to design, build, deploy, troubleshoot, and improve technologies used in real livestock production systems. This is not a desk-only research position. A major component of the Ph.D. will involve hands-on development and evaluation of proprietary SDSU technology. The successful student will participate in building, assembling, constructing, modifying, troubleshooting, field-testing, and iteratively improving prototype systems alongside the advising team. The funded research includes construction and field deployment of modular systems incorporating mechanical, electrical, monitoring, water-storage, and fabrication components. Prior experience building, fabricating, constructing, or assembling mechanical/electrical systems is preferred. Most importantly, the successful applicant must have a strong willingness to learn, experiment, troubleshoot, and develop these skills throughout the Ph.D. We are looking for a **doer**—someone who encounters a prototype or field problem and asks, “**How do we make this work?**”

Research & Extension Responsibilities

The student will develop an independent dissertation research program within the broader project while participating in collaborative research and Extension activities. Responsibilities are expected to include:

- Design and implementation of grazing and water-resource applied research trials.
- **Construction, modification, troubleshooting, and field testing of research prototypes.**
- Conducting applied research on cooperating ranches and at SDSU research facilities.



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- Working directly with **cattle and sheep** and their production systems.
- **Rangeland assessment and monitoring:** Collection and management of livestock movement, grazing distribution, water-use, forage, vegetation, soil, and rangeland monitoring data.
- GPS/GIS and spatial analysis of livestock distribution and pasture utilization.
- Statistical analysis, data visualization, and development of reproducible research workflows.
- Working directly with livestock producers to identify management goals and evaluate research outcomes under commercial conditions.
- Supporting SDSU Extension activities, including producer field days, pasture walks, demonstrations, educational materials, and presentations.
- Preparing peer-reviewed manuscripts, Extension publications, grant proposals, conference presentations, and a Ph.D. dissertation.

The research is strongly **applied and producer-oriented**. Field research will be a significant component during grazing seasons, while coursework, data analysis, GIS, modeling, manuscript preparation, and dissertation development will comprise a greater portion of the academic year.

Appointment & Location

Appointment: Graduate Research Assistant (Ph.D.)

Dates: January 1, 2027 – December 30, 2029

Location: **Rapid City, SD; Brookings, SD; or a combination of both**, based on the applicant, selected Ph.D. track, required coursework, and research needs.

The assistantship provides a **graduate stipend and tuition remission/coverage for required coursework**. The position **does not include health insurance**. Research-related travel and project expenses are supported through the research program.

Advising

The student will be **co-advised by Dr. Hector Menendez and Dr. Ryan Lefers**.

The student's **major advisor will be determined based on the selected Ph.D. track and successful applicant**.

Dr. Hector Menendez focuses on grazing systems, livestock management, precision livestock research, spatial analysis, modeling, and Extension.

Dr. Ryan Lefers has expertise in agricultural engineering, water resources, entrepreneurship, and applied technology development. Dr. Lefers also serves as the Griffith Endowed Chair in



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Agriculture and Water Resources, Director of the South Dakota Water Resources Institute, and SDSU State Water Extension Specialist.

Dr. Hector Menendez: [LinkedIn](#)

Dr. Ryan Lefers: [LinkedIn](#)

Who Should Apply?

Applicants interested in either the **engineering/water-resource** or **animal/rangeland** pathway are encouraged to apply.

Strong applicants may have backgrounds in **agricultural or biosystems engineering, animal science, rangeland science, water resources, natural resources, precision agriculture, agronomy, or closely related disciplines.**

Prior hands-on building or fabrication experience is preferred. Experience with livestock, mechanical or electrical systems, GPS/GIS, statistics, field experimentation, or applied agricultural research is also beneficial; however, applicants are not expected to arrive with expertise in every area.

Above all, we are seeking someone willing to **build, learn, troubleshoot, work in the field, take ownership of problems, and carry research from an idea and prototype through field implementation, scientific analysis, and publication.**

How to Apply

Interested applicants should submit:

1. **CV or resume**
2. **Unofficial transcripts**
3. **Brief statement/cover letter** describing:
 - Research interests and previous experience;
 - Career goals;
 - Interest in **Track A (Agricultural and Biosystems Engineering)** or **Track B (Animal Science)**; and
 - Why a hands-on, applied Ph.D. focused on grazing water technology is of interest.

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