Wyoming Agricultural Experiment Station
2021 SELECTED RESEARCH IMPACTS

For over 130 years the Wyoming Agricultural Experiment Station (WAES) has been providing support for fundamental and applied research on agricultural, natural, and community resource issues related to the needs of Wyoming, the region, the nation, and the world. WAES operates four Research and Extension Centers located in Laramie, Powell, Sheridan, and Lingle. As the research branch of the University of Wyoming College of Agriculture and Natural Resources, WAES funds and actively promotes research with emphasis on areas identified through stakeholder input and national priorities. The following impacts represent a small sample of the research we support. Learn more at www.uwyo.edu/uwexpstn.

Mycoplasma bovis discovered in free-ranging pronghorn antelope

Mycoplasma bovis is responsible for significant economic loss worldwide as a cause of pneumonia in feedlot cattle and mastitis in dairy cattle. *M. bovis* is also getting increased attention for its impact on commercial bison production and more recently for its potential impact on free-ranging wildlife. Prior to our investigation, the disease had not been reported in pronghorn antelope (*Antilocapra americana*). However, during our research we discovered that a single, genetically unique strain of *M. bovis* was responsible for fatal outbreaks of pneumonia in pronghorn in 2019 and 2020. We also found that *M. bovis* can persist in grass hay, water, and soil for up to six hours in shaded areas and up to three hours in direct sunlight. Conditions such as higher humidity, cooler temperatures, and shade prolong and promote the persistence of viable *M. bovis* in the environment which could have important implications for infectious disease transmission at the wildlife-livestock interface.

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Chickpea yields stable under modest water stress

Best management practices for chickpea production in Wyoming are relatively unknown. If optimal chickpea production practices can be identified, it could provide an option for producers to diversify planting rotations to include crops that do not require nitrogen fertilization. Reducing nitrogen fertilizer use has been shown to decrease greenhouse gas emissions and improve water quality, among other environmental benefits. Chickpea trials were conducted at the Powell Research and Extension Center in 2020 and 2021, looking at factors such as phosphorus fertilization and irrigation rates. Results averaged across six cultivars and six fertilization rates showed that reducing irrigation water by 20% only slightly affected yield compared to full irrigation. Two cultivars, Frontier and Orion, had the highest yields under deficit irrigation and may prove to have good drought tolerance across environments. These results indicate that chickpea has agronomic potential for the Big Horn Basin, with the added benefit of reducing environmental impacts thanks to the crop's relatively low input requirements.

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Bacterial fingerprinting in bighorn sheep

In the early 1900s there were an estimated 1.5 million bighorn sheep in the United States. Over the past 100 years there has been a dramatic population decline, and only about 50,000 animals remain. The decline is largely attributed to pneumonia, and UW scientists are working to gain a better understanding of its causes in an effort to help save bighorn sheep populations. Together with Wyoming Game and Fish personnel, veterinary science investigators collected bacteria associated with pneumonia from three big horn sheep herds with histories of pneumonia outbreaks. A unique protein "fingerprint" was created for each bacteria using mass spectrometry, as a means to associate certain fingerprints with pneumonia. This fingerprint method creates an efficient screening tool for current wildlife managers, and allows them to make more informed decisions regarding herd health management.

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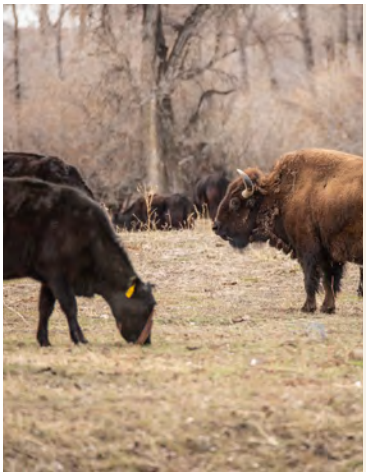

Coccidiosis in cattle and bison

Coccidiosis is a disease of the intestinal tract that can result in significant economic losses for livestock producers. When found in cattle and other domestic ruminants, the disease can reduce growth and performance, and in some cases cause death. Because little is known about transmission of the disease between domestic food animals and wildlife species such as bison, University of Wyoming veterinary scientists collected more than 200 bison fecal samples from six ranches in Wyoming, Nebraska, South Dakota and Colorado. DNA testing showed that cattle and bison share several coccidia parasite species, including the major pathogens *Eimeria bovis* and *Eimeria zuernii*. Lab tests are now being developed to evaluate the effectiveness of anticoccidial drugs on the samples collected. Quick and accurate testing could make available customized treatment suggestions tailored to the specific needs of individual ranching operations. More efficient treatments could reduce the quantity of antiparasitic drugs currently in use, contributing to more sustainable livestock production and food security.

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Minimum-tillage practices in a Wyoming irrigated cropping system

Intensive tillage in irrigated annual cropping systems degrades soil and results in lower crop yields and higher requirements for fertilizer and other inputs. Farmers are becoming more aware of the role of healthy soil in sustaining crop yields in an increasingly unpredictable climate, but they need information about benefits of soil health practices. Researchers in the Ecosystem Science and Management department set up a long-term, side-by-side comparison of minimum-till and traditional practices in the Big Horn Basin and North Platte River of Wyoming. Results showed soil health practices built up almost a ton of soil organic matter per acre per year after six years in a sugarbeet–dry bean–barley rotation. Barley and sugarbeet yields under deficit irrigation and minimum-till practices exceeded yields under deficit irrigation and traditional tillage by 60% and 25% respectively. These results support adopting conservation practices that reduce farmers' production costs and support biodiversity, water resources, nutrient cycling, carbon storage, and other ecosystem services.

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Chronic wasting disease and genetic susceptibility in Wyoming elk

Chronic wasting disease is a serious threat to elk and other cervids including deer and moose. The disease—caused by a type of protein called a prion—results in weight loss, behavioral changes, and nearly 100 percent mortality. Previous studies indicate some elk have mutations in the prion protein gene that correlate to slower disease progression and potentially lower susceptibility. Researchers in the Veterinary Sciences department collaborated with the Wyoming Department of Game and Fish to collect 700 elk samples at hunter check stations this past year. Genetic analyses were conducted to determine the presence or absence of the mutation associated with slower disease progression. Additional samples will be analyzed in the coming year to bring the total to 1000. This information will provide resource managers with the genetic susceptibility data necessary to develop predictive models and strategies to help prevent and manage the spread and devastation caused by chronic wasting disease in elk.

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To view past impact summaries and the WAES research database, visit www.uwyo.edu/uwexpstn/research-results-impacts.

Contact (307) 766-3667 or aes@uwyo.edu to learn more about these research projects and other WAES programs.

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