



United States Department of Agriculture  
Agricultural Research Service



## National Program 215

### Pasture, Forage, & Rangeland Systems



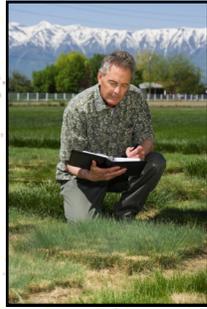
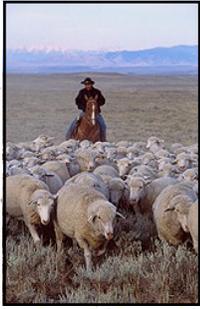
## Recent Accomplishments from ARS Pasture, Forage & Rangeland Research Scientists

- A bioherbicide produced by soil bacteria which arrests the germination of annual bluegrass, jointed goatgrass, cheatgrass and other weeds that reduce the quality of pastures, turfs, and rangeland was discovered.
- Conservation-Production tradeoffs associated with managing and monitoring arid and semi-arid rangelands for several ecosystem services at multiple scales were assessed by Cheyenne, WY and Fort Collins, CO scientists.
- Research in integrated beef cattle-forage production systems has identified cattle breed combinations, forage species, grazing systems, and pasture and animal management that facilitate efficient and sustainable forage-based production of beef.
- In low-input systems, no-till seeding of cool-season grasses into dormant warm-season pasture increased annual forage yield, compared with conventional tillage and sowing; and broadcast overseeding provided additional benefit over no-till.
- Development of remote sensing techniques to quantify crude protein concentration and digestibility of bermudagrass pastures in real-time enables timely decisions on managing pastures and supplement needs of grazing livestock.
- Scientists at Logan, UT released native and introduced plant materials with better establishment, persistence, and forage yield for use on dry, harsh, disturbed rangelands and pastures.
- Scientists at Logan, UT developed management tools that will enhance the ability of plant materials to establish and compete on rangelands dominated by invasive annual weeds (cheatgrass).
- Scientists at Logan, UT have developed molecular maps and markers characterizing plant spread, forage yield and quality, minerals, and seed shattering for future plant improvement work within the wheatgrasses.
- Orange peel oils significantly reduced fecal egg counts and worm burdens in sheep infected by barberpole worms, showing promise for inclusion in integrated control strategies for this gastrointestinal parasite.
- Rediscovered an old pasture grass (meadow fescue) with new value for managed grazing systems in the humid, northern regions of the U.S., combining superior drought tolerance, winter hardiness, and forage quality.
- Scientists at Mandan, ND developed a new tool that integrates geospatial and cattle nutritional information to estimate grazing capacity of northern prairie grasslands. The new decision tool helps managers select pastures that best meet livestock nutritional requirements resulting in more efficient use of forage and reduced feed costs.
- The Erosion Risk Management Tool aids land managers with risk assessment of post-fire erosion hazard and prioritization of land areas for post-fire mitigation and rehabilitation funding.
- Summer fire reduces non-native plants and pest grasshoppers. Rangeland productivity is maintained with 50% utilization following fire and livestock performance is greater with early growing-season than late summer use.
- We determined that moderate livestock grazing of sagebrush rangeland decreased the severity of wildfires and the risk annual grass invasion, thus protecting habitat for sage-grouse and other sagebrush obligate wildlife.



- ARS scientists and NRCS developed the Rangeland Hydrology and Erosion Model and used this tool to develop a map of non-federal rangeland soil loss rates for the 17 western states.
- Generated and analyzed differentially expressed genes in tall fescue clone pairs with and without endophyte for development of a common research resource for the study of biotic and abiotic interactions.
- ARS Tifton, Georgia released “TifQuik”, an improved fast germinating forage bahiagrass leading to faster establishment of pastures and for use by growers interested in sod-based rotation systems that decrease nematode and soil-borne diseases in peanut and cotton in the Southeast.
- Dubois scientists validated remote-sensing methods for quantifying postfire shrub recovery and then validated use of prescribed fires for harmonizing shrub cover with sage grouse habitat and livestock production.
- Scientists at Booneville, AR found that placing poultry litter applications below the pasture surface by employing the ARS Poultry Litter Subsurfer reduces nutrient losses, which lead to a reduction in odor, and air and water quality problems.
- Scientists at Booneville, AR developed methods of nematode parasite control for sheep and goats, reducing the reliance on chemical dewormers that worms have become resistant to. Methods include administration of copper oxide wire particles, feeding sericea lespedeza, and rotational grazing of pastures.
- Beltsville Area nematologists described several species of plant-parasitic nematodes that affect alfalfa, grasses, and forage crops, providing critical information needed for accurate identification of these pests and for recommendation of appropriate management practices.
- Developed a molecular marker to rapidly identify *Verticillium* in plant tissue and soil samples. The marker is also being used to quantify resistance levels during development of extremely resistant alfalfa cultivars.
- New methods were introduced to capture the landscape heterogeneity of N<sub>2</sub>O emissions in life cycle assessment of bioenergy feedstock production to better quantify their carbon footprint and evaluate mitigation strategies.
- Released three indiangrass cultivars for use in grassland production systems in the Central Plains or Midwest or in multi-species biomass energy production systems.
- Multidisciplinary research on poisonous plants and plant/animal factors that influence animal health, livestock grazing, plant population cycles and toxicity, has reduced animal losses to toxic plants while simultaneously enhancing rangeland utilization and management.
- A high biomass alfalfa was developed for use in biobased fuel production. This new alfalfa has doubled the cellulosic ethanol potential of conventional alfalfa under a biofuel management system.
- Scientists at College Station, TX recently released a more productive and persistent dallisgrass cultivar (Sabine) to better meet the needs of livestock producers in the southeastern U.S.
- Well managed rangelands sequester carbon dioxide, a green-house gas.





### **Mission Statement**

The Agricultural Research Service conducts research to develop and transfer solutions to agricultural problems of high national priority and provide information access and dissemination to:

- ensure high-quality, safe food, and other agricultural products;
- assess the nutritional needs of Americans;
- sustain a competitive agricultural economy;
- enhance the natural resource base and the environment; and
- provide economic opportunities for rural citizens, communities, and society as a whole.

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