USDA, ARS, US Sheep Experiment Station (USSES)

RESEARCH REPORT
National Wool-Sire Evaluation

Goal: Provide wool producers with updated information on available genetics that can be used to enhance the profitability of wool-type flocks

Objective: Evaluate the Nation’s current wool rams for genetic merit to improve wool, reproductive efficiency, and lifetime productivity in commercial wool flocks

Design: Nation-wide sampling of Targhee, Rambouillet, and Merino rams (12 – 18 rams per breed). Mate rams to Rambouillet and Targhee ewes. Follow lifetime productivity (e.g., wool, reproduction, lambs weaned, health and survivability, flock persistence) of ewes.

Principal investigator: D. Notter, Virginia Tech

Partner: W. Stewart, Wool Lab-Montana Sheep Institute, Montana State University
National Terminal-Sire Evaluation

**Goal:** Provide sheep producers with updated information on available terminal-sire genetics to enhance the profitability of terminal offspring

**Objective:** Evaluate the Nation’s current meat-type rams for genetic merit to improve growth performance and efficiency, health and survivability, and carcass yield and quality

**Design:** Nation-wide sampling of Suffolk and Siremax, and sampling of USSES test composite. Mate rams to Rambouillet, Targhee, and Polypay ewes. Evaluate terminal offspring lambs for growth rate and efficiency (birth to finish), health and survivability, carcass yield and quality, primal-cut weight, retail-cut tenderness.

Principal investigator: D. Notter, Virginia Tech

Partner: B. Hess, Agricultural Experiment Station, University of Wyoming
Test Terminal-Sire Composite Breed Development

Goal: Develop a “test” terminal-sire composite line and explore the utility of a Suffolk-Texel-Columbia terminal sire to increase overall lamb product yield from range-sheep production systems.

Objectives: (1) Develop various crosses of Suffolk, Columbia, Texel, and industry-available Texel composite breeds for evaluation. (2) Evaluate the effect of myostatin mutation on lamb growth rate and efficiency, carcass yield, and retail-cut quality.

Project Overview:

- Various Texel composites are available for terminal-cross mating. Limited work has been conducted to evaluate the utility of these composites in range production settings.
- From a nation-wide sampling of Texel, Suffolk, and Columbia rams, we have developed a test composite (TC). We will evaluate the TC and other Texel composites in the National Terminal-Sire Evaluation project.

Principal investigator: D. Notter, Virginia Tech
Genetic and Epigenetic Factors That Influence Ewe Lifetime Production and Product Quality

- **Overall focus:** Using historical data (>40,000 records) from the ARS-Dubois Sheep, Climatic, and Rangeland databases:
  - Determine the normal birth weight, mature weight, and lifetime productivity (e.g., lambs birthed and weaned, flock persistence, disease incidences, products generated) profiles for various breeds,
  - Estimate the environmental and genetic factors that most influenced lifetime productivity and flock persistence,
  - Test for generational epigenetic effects of environmental factors, and
  - Publish recommendations on breeding and flock management that will result in overall improvement lifetime productivity and product-quality output of the U.S. sheep flock.

- Principal investigator: B. Taylor, USSES
- Partners: K. Vonnahme, North Dakota State University; A. Brown, Wingate University
Lamb Health and Disease Persistence in Shed-lambing Systems

- **Goal:** Develop affordable, easily-applied, and safe non-antibiotic products/solutions to reduce the incidence of enteric pathogens in neonatal lambs

- **Objectives:** Test the effectiveness of chlorate salts to reduce shedding of *E. coli* in shed-lambing systems to reduce enteric diseases in neonatal lambs and improve lamb performance from birth to weaning.

- **Project Overview:** Currently, we are evaluating a chlorate-salt product, applied in the drinking water at lambing, on subsequent lamb growth and health through weaning. We have previously demonstrated a 99% reduction in ewe and lamb fecal *E. coli* under experimentally controlled conditions. This strategy is inexpensive and will not result in bacterial resistance. Use of this product in the industry is subject to FDA review.

- Principal Investigator: B. Taylor, USSES
Post-fire Shrub Recovery Models

Goal: Transfer to the stakeholder accurate and ready-to-apply models and information to predict post-fire shrub recovery in mountain big sagebrush ecosystems

Overview:
- In January 2015, we published a paper in Journal of Arid Environments (114:116-123), titled “Postfire shrub cover dynamics: A 70-year fire chronosequence in mountain big sagebrush communities.” In this publication, we estimate post-fire shrub recovery to occur 1.5- to 2.0-times faster than what was previously estimated in the literature.
- To date, the Bureau of Land Management and US Forest Service have recognized this publication as relevant and applicable for use in drafting land management plans relating to sagebrush and sage grouse habitat.

Principal Investigator: B. Taylor, USSES
RANGELAND RESEARCH AND MONITORING

Fire Size and Mountain Big Sagebrush Recovery

- **Goal:** Transfer to the stakeholder information that describes how size of fire impacts the rate of mountain big sagebrush recovery.
- **Objective:** Estimate the effect of various fire sizes (10 to 1,000 acres) on the rate that mountain big sagebrush recovers from natural reseeding after a fire.
- **Overview:**
  - In 2002, 2003, 2005, and 2008, prescribed burns were conducted on USSES property in mountain big sagebrush-dominated communities. Within each year, multiple burns, ranging from 10 acres to 1,000 acres were conducted within a site. Data were collected on sagebrush plant numbers and size-age class at various intervals from the burn edge to the center of the burn.
  - Data are begin analyzed to determine if distance from the burn edge, where mature sagebrush plants are producing seed, is related to the reappearance of sagebrush seedlings in the burned area.
  - This information is necessary for land-management agencies to determine allowable fire size in areas that are overdue for a burn.

- Principal Investigator: B. Taylor, USSES
Sage Grouse Persistence in a Livestock Grazing System

**Goal:** Describe the effects of historic and current rangeland management, wildfire, and climate variables on the historic and the current USSES sage grouse population.

**Objective:** (1) Compile a complex dataset, which includes a 65-year fire, grazing, climatic, and vegetation histories and a 40-year sage grouse lekking survey history on USSES lands. (2) Using the dataset, determine which factors most influenced historical and current sage grouse activity on USSES lands.

**Overview:**
- The USSES has records of most management, climatic, and fire activities since 1922. In the early 70s, the USSES began recording the number of sage grouse males and females that occupied lekking areas (i.e., mating grounds) in the spring.
- We believe that the amount of data is sufficient to determine what factors (e.g., grazing, climate, wildfire) most likely influence year to year sage grouse population trends on USSES property.

**Principal Investigator:** B. Taylor, USSES
THANK YOU

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USDA, ARS, Animal Disease Research Unit and USDA, ARS, U.S. Sheep Experiment Station

Collaborative research to improve sheep health

Summary provided by: Dr. Maggie Highland
Sheep Genetics Research Projects

+ Specific host genetics and/or production traits associated with Ovine Progressive Pneumonia Virus (OPPV)
+ Characterizing red blood cell genetic loci
+ Marker-assisted selection within the USSES flock
  ADRU Primary Investigators: S. White, M. Mousel

Sheep genotype and nasal shedding of *Mycoplasma ovipneumoniae*
  ADRU Investigators: S. White, M. Mousel, M. Highland

Impact of *Mycoplasma ovis* infection on domestic sheep and lamb health and production in the United States
  + Also involves 2001 & 2011 NAHMS sera samples: prevalence and distribution
  ADRU Primary Investigators: D. Knowles, M. Highland

*Coxiella burnetti* (“Q-fever”)
  ADRU Primary Investigators: S. White, D. Knowles
Additional ADRU Research Projects benefit from USSES sheep and samples:

- **Malignant Catarrhal Fever Research**
  ADRU Investigators: H. Li, N. Taus, C. Cunha

- **Scrapie Research**
  ADRU Investigators: D. Schneider, K. O’Rourke
THANK YOU

On behalf of everyone at the ADRU in Pullman, WA, including the investigators listed within this presentation as well as all of the support staff and collaborators that make the research happen.

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