NIAA 2015: WATER AND THE FUTURE OF ANIMAL AGRICULTURE

- “The conversation NIAA is pursuing at the Annual Conference, about water quality, quantity and the operating environment, will be dynamic and complex.”

- “Water. Without doubt the most important and controversial environmental issue on our planet.”
  - “How can production agriculture be as sustainable as it can be?”
  - “How is animal agriculture impacting water quality?”
  - “Is fracking affecting water quality for animal agriculture?”
  - “What water regulations need to be in place or changed?”
SMALL RUMINANT GRAZING: A WATER-FRIENDLY PRODUCTION SYSTEM

- From a SR-grazing, semi-arid/arid, and landscape-use perspective...
  - SR production and water quality
  - Need for water regulations???
  - “Water” and sustainability of SR grazing
WATER USE AND QUALITY: WATER USE...A FUNCTION OF NEED AND ACQUISITION

- **Water retention/conservation: GI**
  - Sheep void feces at 50% DM vs. cattle at 30%
    - *Fecal water loss can account for >55% of TWI in cattle*

- **Water retention/conservation: Renal**
  - Goats and sheep can excrete twice the solute concentration than cows
**WATER USE AND QUALITY: WATER USE...A FUNCTION OF NEED AND ACQUISITION**

- **Water replenishment**
  - **Free water**
    - **Solute concentration:** Sheep can consume water with nearly 40% more solutes compared with cattle.
    - **Water loading, which is a function of GI and solute regulation**
      - Bedouin goats consumed 30% of dehydrated BW (Choshniak and Shkolnik, 1978), which is > sheep > cattle.
      - Rumen-reticulum water can provide > 50% of dehydration need in sheep and goats; < 50% in cattle (Silanikove, 1994)
Water use and quality: Water use...a function of need and acquisition

- Water replenishment
  - Forage water
    - As grasses dry, ruminants tend to shift to browse, which is highly preferred by goats.
    - Ability of goats and sheep to rapidly shift to forbs and shrubs provides an added advantage in water acquisition over cattle.
    - Goats and sheep can graze nearly twice as long without access to free water compared with cattle.
When free water is limiting, SR can continue to persist and produce better than cattle under grazing conditions:

- More flexible/adaptive physiology
  - Water conservation
  - Diet selection (and don't forget snow/ice)

Physiology allows SR to utilize rangelands differently than strict grazers, which keeps SR out of political trouble...most of the time
WATER USE AND QUALITY: WATER QUALITY...A FUNCTION OF LANDSCAPE USE

- Under normal grazing conditions, SR are amenable to grazing extensive and difficult landscapes as opposed to congregating in areas due to water availability
  - Cattle “hold” close to daily watering holes.

- Sheep and goats will avoid riparian bottoms and utilize hillsides and ridgetops for grazing and bedding
Sheep bedding sites
- No effect on vegetation and did not result in an increase of annuals or exotics (Seefeldt and Leytem, 2011)
- Immediate increase in nutrient depots, but after 1 year, soil was similar to non-bedded sites (Leytem and Seefeldt, 2008)

Stream crossings sites
- Disturbed suspended-solids and bacteria were at background levels less than 1 hour after crossing or 500 m downstream (Clark et al., 2012)
Small Ruminant Grazing: Water Use and Quality

- Small Ruminants require less water to produce.
- Small Ruminants are not as dependent upon free water as cattle.
- Small Ruminants avoid riparian and stream-bank areas.
- Small Ruminants can utilize landscapes and forages not available to cattle.
- Small Ruminants utilized landscapes in a way that results in minimal to no negative impact on water quality.
A CALL FOR WORLD-WIDE SHRUB CONSUMPTION

- Estell et al. (2012): “Increasing Shrub Use by Livestock in a World with Less Grass”
  - World meat demand continues to rise
  - Grasslands are converted to croplands
  - Woody encroachment continues
  - Yet world livestock numbers are increasing

Answer: Increase shrub consumption!
Wyoming Agricultural Lands

- **Animal Units (millions)**
  - \( y = -0.0037x + 8.3932 \)
- **Acres (millions)**
  - \( y = -0.1102x + 252.86 \)

- Peaks around 1930s
- Peaks around 1960s
A CALL FOR WORLD-WIDE SHRUB CONSUMPTION

- Estell et al. (2012): “Increasing Shrub Use by Livestock in a World with Less Grass”

So...what does this have to do with “SR Grazing: A Water-friendly Production System”???
Anti-agriculturalists and wildlife preservationists seek to bypass the Executive and Legislative branches (i.e., branches of the people) and use courts to stop livestock grazing on public (and private) lands

- Assumed water contamination
- Assumed destruction of wildlife habitat
- Assumed direct effect on ES
Special interest groups are creating a situation that threatens proven sustainability of SR production. Much litigation and challenges are based on water and watersheds.

Of all livestock production systems, SR grazing is most optimized for minimal use of fossil fuels.
SMALL RUMINANT GRAZING: DEMAND FOR SMALL RUMINANT PRODUCTS

- Huge world demand, as demonstrated with increased SR numbers (sustainability of SR production on "troublesome" landscapes)
- US demand is huge, sustainability is proven, yet SR production in the US lags. Why? Even when SR guarantees
  - Premium nutritious foods and the best clothing
  - Low-impact agriculture yielding clean water
  - Woody plant management and clean water
  - Minimal use of fossil fuels and clean water
  - Wide-open-spaces and wildlife habitat preservation