Animal Welfare and Grazing Management in Silvopasture

Diane Mayerfeld
Animal Welfare 5 Freedoms and grazing systems

- **FREEDOM FROM HUNGER AND THIRST** Ready access to fresh water and diet to maintain health and vigor.
- **FREEDOM FROM FEAR AND DISTRESS**
- **FREEDOM FROM PAIN, INJURY OR DISEASE**
- **FREEDOM TO EXPRESS NORMAL BEHAVIOR**
- **FREEDOM FROM DISCOMFORT** Provide an appropriate environment including shelter and a comfortable resting area.
Thermal comfort options in grazing systems

Bring animals to a barn
Bring shelter to the pasture
Trees
Silvopasture
Silvopasture is not 1 tree in the pasture or cows in the woods
Silvopasture welfare goal

Provide shade and/or shelter for livestock while:

- Protecting soil and water quality
- Providing good forage
- Minimizing damage to trees
- Maintaining animal health

Supplementary welfare goals?

- Scratching or rubbing resources
- Medicinal or nutritional benefits of woodland plants?
Management considerations

- Welfare goal
  - Grazing timing & duration
  - Arrangement of trees
  - Aspect & Wind direction
  - Type of trees
  - Forage and fodder
  - Water
  - Other goals
Lancaster silvopasture research

Research questions:
• What is the value of the shade?
• How does silvopasture affect vegetation and soils?

4 treatments:
• Open pasture
• Silvopasture
• Grazed woods
• Woodland control (ungrazed woods)
Establishment

- Thinned woods to 72 ft$^2$ basal area
- Cleared slash
- Planted forage in Silvopasture understory
Grazed Woods
Silvopasture
Access to shade & welfare

• Did cows choose to access shade?
• Did access to shade reduce heat stress?
When do cows seek shade?

Location of Cows in Relation to Temperature Changes

- Green: Number of Cows in Silvopasture and Edge
- Blue: Temp (SP-OP)
Heat stress scoring

- **Panting scores as a measure of heat load in cattle** (Mader et al. 2006; Gaughan et al. 2008)
  - 0  Normal respiration / no panting (~60 to 90 breaths/minute (bpm))
  - 1  Elevated respiration (~80 to 110 bpm) mouth closed, no drool, easy to see chest movement
  - 2  Moderate panting and/or presence of drool (~100 to 130 bpm), no open mouth
  - 2.5 As for 2 but occasional open-mouth panting, tongue not extended
  - 3  Heavy open-mouthed panting; saliva usually present (~120 to 140 bpm), neck extended, head held up
  - 3.5 As for 3 but with the tongue out slightly and occasionally fully extended for short periods
  - 4  Severe open-mouthed panting with protruding tongue and excessive salivation; usually with neck extended forward
  - 4.5 As for 4 but head down and breathing from flank. Drooling may cease
Shade

- Cows in the open pasture more likely to show signs of heat stress
Edge 1 = 0.98 acres  
Edge 2 = 0.56 acres  
Edge 3 = 1.40 acres  
2.94 acres total
### Beef Cattle Temperature Humidity Chart

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<tr>
<th>Temperature (°F)</th>
<th>Relative Humidity (%)</th>
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**Temperature Humidity Index (THI)**
- **Normal** < 75
- **Alert** 75-78
- **Danger** 79-83
- **Emergency** > 84
Toxic plants
Heat Stress Factors

- Temperature
- Radiation (shade)
- Humidity
- Wind
Edges
Soil compaction?

Change in soil resistance spring to fall 2017

Change in resistance KPa

Depth

0cm  2.5cm  5cm  7.5cm  10cm  12.5cm

-400  -300  -200  -100   0   100   200

Ctl
SP
GW
Silvopasture vs Grazed Woods
• Grass in the understory slows the spread of species such as thistles, white snakeroot, and pokeweed.
• Grass in silvopasture holds up better to cattle impact than the species in grazed woods, but not as well as the open pasture.
Silvopasture

Can improve animal welfare (esp. thermal comfort), but requires thoughtful management of grazing to prevent environmental damage:

- Manage grazing timing to maintain good forage layer
- Re-seed high traffic areas
- Manage shade to maintain good forage layer
- Ensure animals always have access to good forage
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Questions?
Forage quality comparable among treatments

July 2017 forage quality

August 2017 forage quality