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Organic Livestock and Grazing Management: Insights from Research

Presenter:

Rebecca Champagne, PhD | Conservation Scientist, Organic Farming Research Foundation

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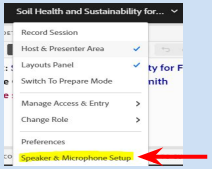

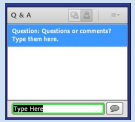

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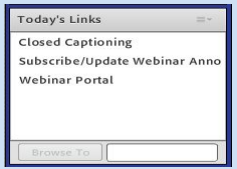
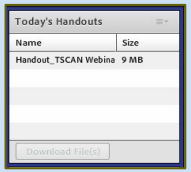




ORGANIC FARMING RESEARCH FOUNDATION

Organic Livestock and Grazing Management: Insights from Research

Rebecca Champagne, PhD, Conservation Scientist

February 17, 2026, 2pm EST

NRCS
Natural Resources Conservation Service

Rebecca Champagne, PhD

Conservation Scientist

Terminology Overview

- Livestock - domesticated animals raised for food, fiber, or labor.
- Ruminant - animals with a four-chambered stomach that digest fibrous plant material (cattle, sheep, goats).
- Forage - plant material grazed by livestock or harvested for feed.
- Concentrates - nutrient dense animal feed such as grains and oilseed meals.
- Gestation - pregnancy period in livestock.
- Weaning - transitioning young animals from milk to solid feed.
- Cow - mature female bovine that has given birth.
- Heifer - young female bovine that has not given birth.

Animal Living Conditions

- Bedding strategies
- Living condition effects on lameness
- Reducing flies in living conditions

NOP Rules

205.239 - General rules for all livestock include:

- Living conditions meeting the needs of animal's health and natural behavior
- Year-round access to: outdoors, shade, shelter, exercise areas, fresh air, clean water for drinking, sunlight
- Appropriate clean, dry bedding
- Yards, feeding pads, and feedlots must be well-drained with frequent removal of waste
- Shelter must follow stocking densities; have suitable temperature, ventilation, and air circulation
- Continuous confinement prohibited. Temporary confinement allowed for inclement weather, health conditions, breeding, 4-H/FFA events, shipping/sales

Resource Concerns Addressed

- Animal RCs: Inadequate livestock shelter, Inadequate livestock water quantity, quality and distribution

- Air RCs: Objectionable odor

Applicable Conservation Practice Standards

- CPS 380 Windbreak
- CPS 381 Silvopasture
- CPS 382 Fence
- CPS 561 Heavy Use Protection Area
- CPS 576 Livestock Shelter Structure

Bedding Strategies

- Mastitis - common bacterial infection of the udder. Reduces milk quality and yield
- Bedding and animal housing can impact mastitis prevalence *(Leso et al., 2020)*
- Vermont dairy farms - compared udder health, milk quality parameters *(Andrews et al., 2021)*
  - Freestall, tiestall, bedded pack compared during non-grazing season (winter)
  - Mainly Holsteins and Jerseys
- No differences found between the 3, but bedding depth was important
  - Deeper bedding → better udder health and hygiene, reduced mastitis incidence, better milk quality

Living Condition Effects on Lameness

- Pain in leg/foot; foot lesions
- Causes changes in gait/locomotion; increases animal stress
- Can decrease milk production
- Housing and bedding have shown impacts on prevalence of lameness
  - Loose, deep bedding decreases risk *(Cook et al., 2016)*
  - Continuous exposure to mud, rocks, uneven surfaces in pastures increases risk *(Endres, 2017)*
  - Laneways from barn to pasture affect lameness prevalence *(Krebill, 2023)*

Reducing flies in living conditions

- Horn and stable flies bite and draw blood
- Cause irritation, stress, and may vector pathogens
- Manure management is one important fly control aspect
- Vacuum fly trap - CowVac is organic approved
  - Brushes and blows flies off cows; vacuums into chamber
  - Reduced fly density on cows by 44% *(Kienitz et al., 2018)*

Animal Health

- Sheep and goats
- Cows
- Poultry
- Calf rearing health

NOP Rules

205.238 - General rules for all livestock include:

- Preventive health care, including: species selection, sufficient feed to meet nutrition, housing, freedom of movement
- Physical alterations for identification purposes only
- Operations must have a parasite prevention plan
- Prohibited: antibiotics, growth hormones, synthetic parasiticides, withholding appropriate medical treatment to preserve organic status

Resource Concerns Addressed

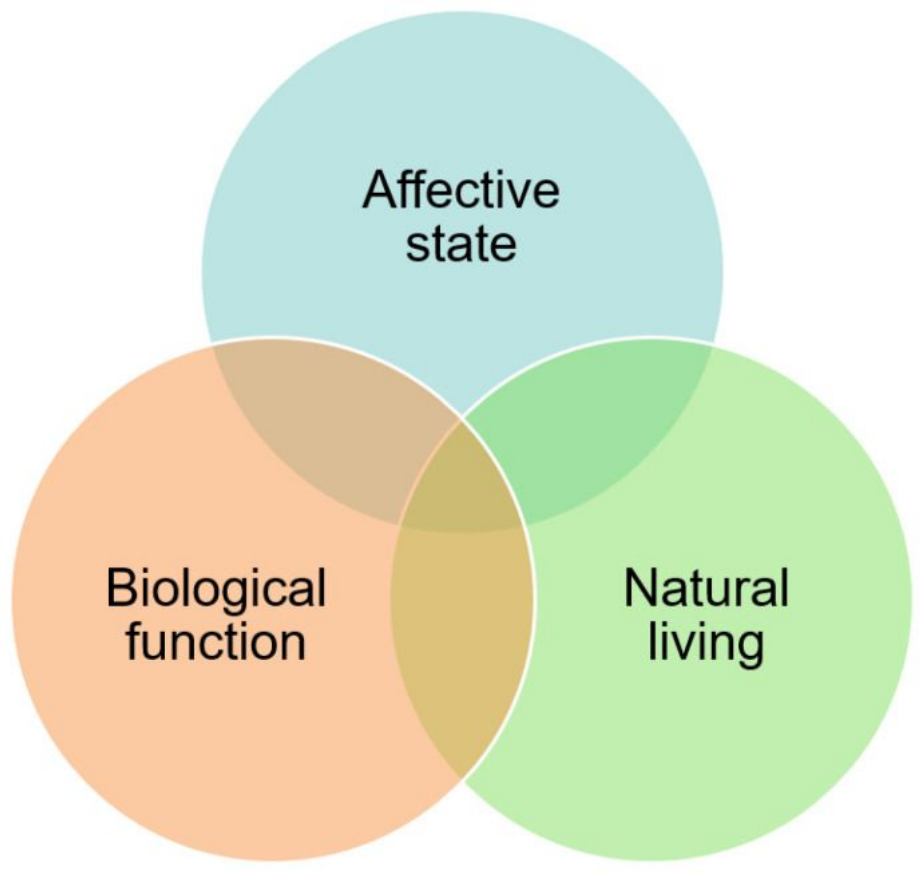
- Animal RCs: Feed and forage balance; Inadequate livestock shelter

Applicable Conservation Practice Standards

- CPS 371 Air Filtration and Scrubbing
- CPS 512 Pasture and Hay Planting
- CPS 528 Grazing Management
- CPS 590 Range Planting
- CPS 592 Feed Management
- CPS 595 Pest Management Conservation System

Animal Welfare Framework (Fraser et al., 1997)

Free of negative emotional states



Sound health & physiology

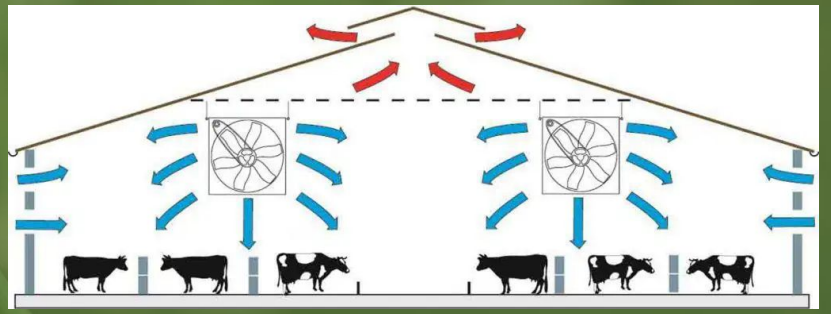
Experience natural living conditions

Parasite Management in Sheep

- Control of gastrointestinal nematodes (GIN)/parasites is important early in life
  - Specific genetic loci and gene DIS3L2 had greater GIN resistance in Katahdin sheep, based on fecal egg counts *(Becker et al., 2020)*
  - Winter born lambs require more supplemental feed due to lower quality forage; greater parasite prevalence
  - Fall born lambs have more access to cool season grasses and had less parasites *(Murphy et al., 2024)*
  - Young sheep and goats grazing birdsfoot trefoil (high tannins) had lower parasite infection and improved weight *(Mata-Padrino et al., 2019)*

Disease Management in Cows

- Producer approaches: outdoor access, balanced diet, animal & environmental cleanliness *(Brock et al., 2021)*
- Best management practices: good barn ventilation, vaccinations, high quality feed (low dust), antibiotics as a last resort to prevent suffering (and removal from organic) *(Tikofsky, 2013, eOrganic)*
- Other management *(Tikofsky, 2013, eOrganic)*:
  - Gradual access to legume pasture to reduce bloat
  - Ask for health records when purchasing animals & implement quarantine time
  - Minimize ways for wildlife to access livestock feed (birds, rodents)



Pathogen Management in Poultry

- Potential for natural plant extracts as supplements in feed to reduce pathogen colonization in 14-21 d old broiler chicks *(Kollanoor-Johny et al., 2012)*
  - Campylobacter, salmonella colonize in the gastrointestinal tract & cecum
  - Trans-cinnamaldehyde (cinnamon) and eugenol (clove) extracts both reduced pathogen prevalence
  - Extracts did not affect body weight, feed consumption, or changes to the liver

Calf Rearing Health

- Common practice - individually house dairy calves in their own pen for the first several weeks of life to monitor and feed *(205.239 (a)(7) and 205.239(c)(2))*
- Research to compare individual vs. group vs. paired vs. calves w/ cows on pasture *(Heins and Endres, 2020)*
  - At 60 days of age, calves w/ cows on pasture had greater body weight and heart size
  - No differences in hygiene parameters
  - Dam-calf separation right after birth decreased immunoglobulins (proteins produced by immune system to neutralize pathogens)

Crop & Livestock Integration

- Benefits of crop-livestock integration
- Poultry
- Sheep
- Dairy / Beef

NOP Rules

205.203 - Soil fertility and crop nutrient management

- Raw animal manure can be applied. Must be composted UNLESS:
  - Applied to land used for a crop not intended for human consumption
  - Incorporated into the soil not less than 120 days prior to the harvest of a product whose edible portion has direct contact with the soil surface (90 days if it does not)

NOP Rules

205.239 - living conditions

- The producer of an organic livestock operation must manage manure in a manner that does not contribute to contamination of crops, soil, or water by plant nutrients, heavy metals, or pathogenic organisms and optimizes recycling of nutrients and must manage pastures and other outdoor access areas in a manner that does not put soil or water quality at risk.

Resource Concerns Addressed

- Water RCs: Pathogens and chemicals from manure, biosolids or compost applications transported to surface water

Applicable Conservation Practice Standards

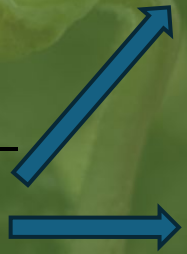
- CPS 328 Crop Rotation
- CPS 340 Cover Crop
- CPS 381 Silvopasture
- CPS 512 Pasture and Hay Planting
- CPS 528 Grazing Management
- CPS 590 Nutrient Management
- CPS 592 Feed Management

Benefits of Crop-Livestock Integration

- Specialized and separated crop and livestock production:
  - Biodiversity decline, water pollution, frequent soil disturbance, reliance on external inputs, waste accumulation
- Integration offers ecological synergies *(Franzluebbers and Martin, 2022)*
  - Internal (on-farm) nutrient cycling
  - Weed and insect management through grazing
  - Cover crops potential for annual forage grazing
  - Perennial forages for soil health and biodiversity

Integrating Poultry into Vegetable Systems

- Integration of poultry with cover crops - potential to decrease fertilizer needs & increase on-farm nutrient cycling
- A study in Iowa integrated broiler chickens with cover crops and organic vegetables (*Carey et al., 2025*)
  - control (vegetable double crop – winter cover crop)
  - V-P-CC (spring vegetable crop – poultry – winter cover crop)
  - V-CC-P (spring vegetable – summer cover crop – poultry – winter cover crop)



Control (summer veg): butternut squash, bell pepper, sweet potato

Spring veg: spinach, leaf lettuce, broccoli

Summer cover crop: cowpea plus teff

Winter cover crop: cereal rye plus Austrian winter pea

Poultry, continued

- Poultry integration resulted in the following:
  - Spring N +88%, P +30%, K +29%
  - Earthworm populations +109%
  - Infiltration rate (hydraulic conductivity) +108%
  - Spinach and broccoli yields similar
  - Lettuce yields 86-96% higher
- Realizes ecosystem services of cover crops and decrease need for additional fertilizer
- Potential for excess nutrient build up over time - requires future research

Organic Sheep Integration

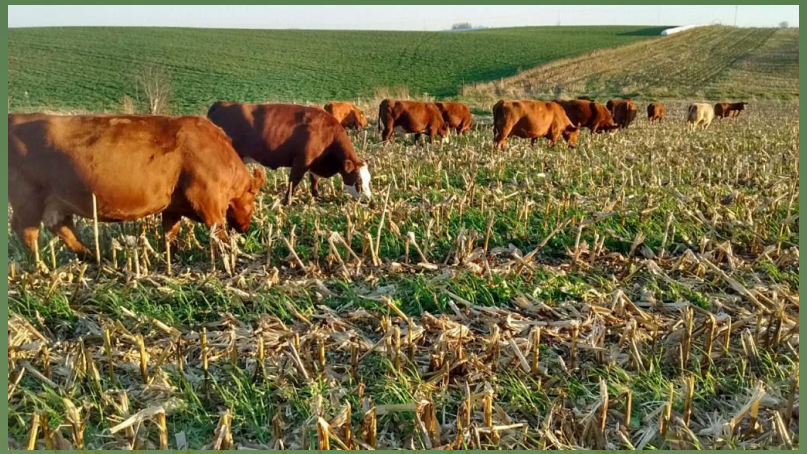
- 5 year study in Montana *(Larson et al., 2021)*
  - Conventional no-till vs. tilled organic vs. sheep-grazed organic
  - Rotation of safflower, sweet clover, winter wheat, lentils, winter wheat
  - Sheep grazed cover crop and post-harvest crop residues
- Sheep grazing showed higher weed biomass and greater weed species diversity, but helped reduced reliance on tillage
- Sheep grazing should not be sole weed management strategy

Sheep, continued

- Cover crop termination, sheep weight gains, and winter wheat emergence and yield examined in Montana *(Westbrook, 2016)*
- Rotational or continuous grazing
  - 77% winter pea termination
  - No weight gains difference
  - Higher winter wheat emergence after continuous grazing; no yield difference
- Grazing yellow blossom sweet clover did not provide effective termination with one group
  - second group with greater stocking density added; achieved sufficient termination

Dairy / Beef Integration

- Cows can graze perennial or annual pasture, cover crops, or grain crop residues *(Sulc and Tracy, 2007)*
- Benefits to soil health, land use efficiency, nutrient cycling, pest management *(Hilimire, 2011)*
  - Plots with cover crops grazed by cattle showed 9% higher soil microbial biomass in top 2.5” of soil *(Franzluebbers and Stuedemann, 2008)*
- Benefits to animal health, too!
  - Beef cattle and sheep grazed together improved animal body condition score and weight; reduced amount of supplements needed in diet *(Prache et al., 2023)*



Livestock Feed & Nutrition

- Naked oats
- Seaweed
- Forages
- Flaxseed

NOP Rules

205.237 - livestock feed

- Ration of pasture and forage, produced and handled organically
- Ruminant animals shall graze no less than 120 days per calendar year (may not be continuous due to weather/climate)
- Not less than 30% of dry matter intake from grazing
- If grazing where crops will be produced - mindful of the 90/120 day manure to harvest time rule

Resource Concerns Addressed

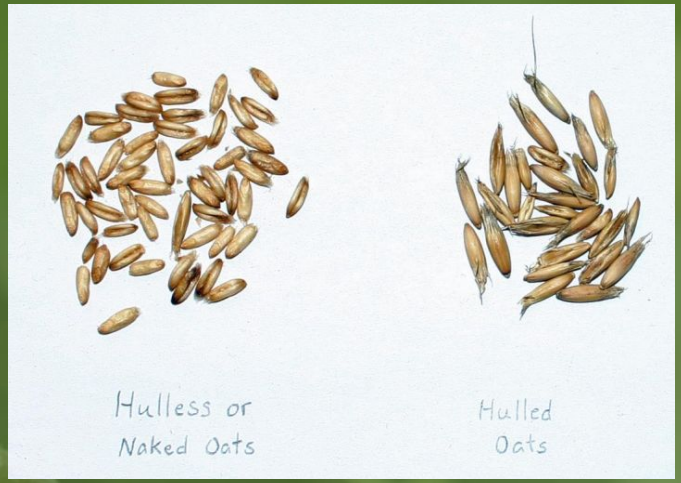
- Animal RCs: Feed and forage balance

Applicable Conservation Practice Standards

- CPS 340 Cover Crop (forage species)
- CPS 512 Pasture and Hay Planting
- CPS 513 Annual Forages for Grazing Systems
- CPS 528 Grazing Management
- CPS 592 Feed Management

Naked Oats for Poultry Diets

- Organic poultry diets can be expensive - need a lot of protein → supplements needed for balanced diet (typically soybean meal)
- Naked oats offer higher protein content - potential for poultry feed inclusion to balance out pasture raised diet of broilers
- Research in Ohio - 65-75% naked oats is optimal *(Lilburn et al., 2017)*
    - Supported good body and breast weight
    - 85% ration saw a decrease in weight
    - Naked oats supported steady growth and similar end weight of heritage broilers (slower growing than commercial breeds)



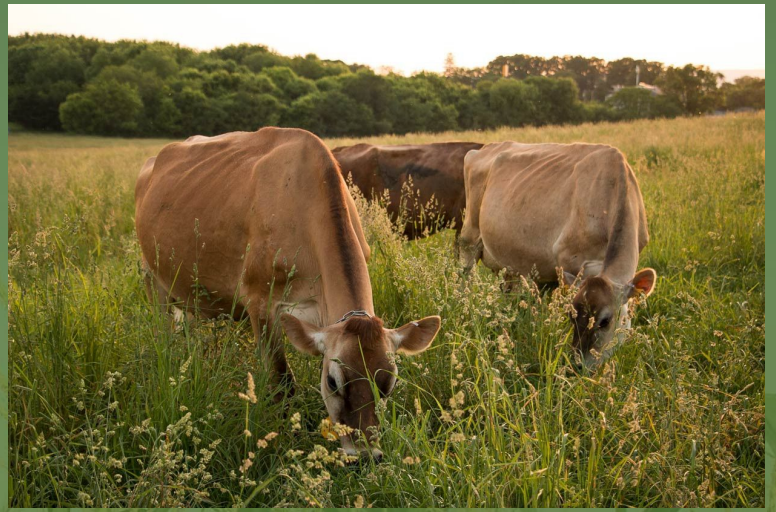
Seaweed for Ruminants

- Enteric methane (CH_4) from ruminants contributes to greenhouse gas emissions (GHGs)
- Seaweed has antimethanogenic activity - CH_4 production suppression potential
- Organic dairy cows in New England fed *Chondrus crispus* (0% control vs. 6% dry matter) *(Reyes et al., 2023)*
  - 6% DM decreased enteric CH_4 by 13.9%
  - Did not affect milk yield, milk fat, or protein content
- Seaweed in diets may also reduce climate impacts of manure *(Arndt et al., 2023)*
  - CO_2 emissions reduced 11% and 19% with 3% and 6% dry matter kelp meal supplementation, respectively

Kelp meal

Forages for Dairy Cows

- Extending grazing season a challenge in northern climates
- Addition of annual forage crops in pasture can lessen reliance on supplemental grain
- Summer annual pasture with millet, teff, buckwheat, oats, and vetch grazed by lactating Jersey cows *(Juntwait et al., 2016)*
  - No differences in milk yield compared to perennial pasture
  - Milk fat and protein content increased → improved nutrient utilization
  - Milk and plasma urea-N decreased → greater N use efficiency



Flaxseed for Dairy Cows

- Transition from summer pasture → winter feeding results in decreased milk production and lower omega 3s and linoleic acids (important for human health)
  - Flaxseed oil is a rich source of these and provides energy

- Organic Jersey cows in New Hampshire fed with 3% flaxseed oil showed greater milk yield, milk fat, and feeding efficiency *(Brossillon et al., 2018)*
  - Did not affect dry matter intake
  - Mixing with ground corn vs. cracked corn was better for omega 3s and linoleic acids

Grazing & Pasture Management

- Grazing considerations
- Effects of grazing on soil quality
- Nutrient management effects
- Pasture species selection

NOP Rules

205.240 - pasture practice standard

- Pasture plan must be included in Organic System Plan
- Meet pasture feed requirements (≥30% DMI) and grazing season length (120 days)
- Management to ensure sufficient pasture quality and quantity
- Provide areas of shade and drinking water
- Fencing cannot be treated (pressure treated)
- Take soil fertility into consideration
- Erosion control and protection of natural wetlands and riparian areas

Resource Concerns Addressed

- Soil RCs: Erosion, Compaction
- Plant RCs: Plant structure and composition
- Animal RCs: Feed and forage balance

Applicable Conservation Practice Standards

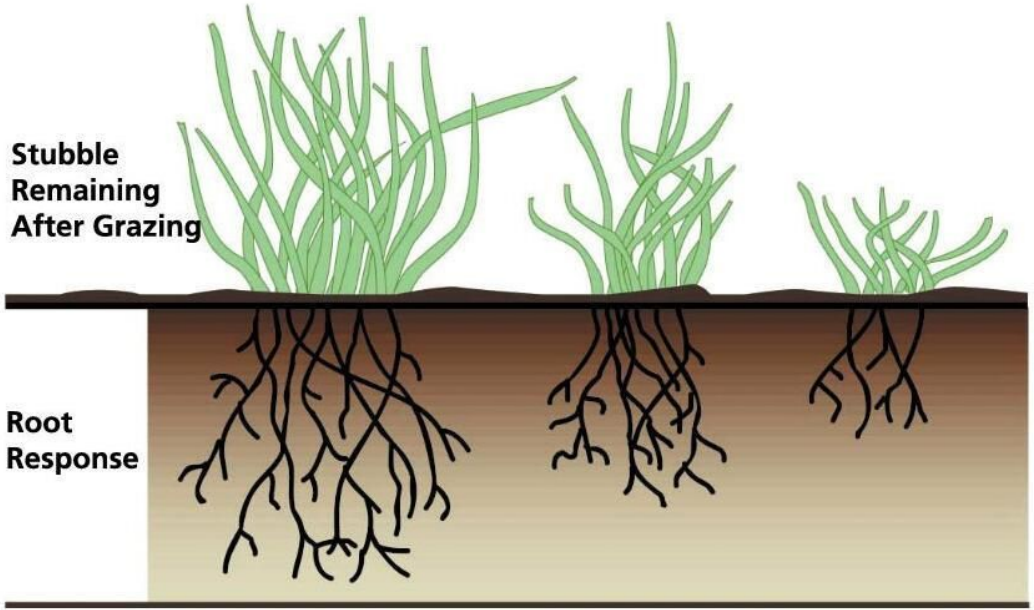
- CPS 381 Silvopasture
- CPS 512 Pasture and Hay Planting
- CPS 528 Grazing Management
- CPS 550 Range Planting
- CPS 590 Nutrient Management

Grazing Considerations

From Hartman et al. (2023), Penn State Extension:

- Soil type and drainage ability
- Water supply production and water quality
- Pasture species and composition
- Grazing habits of different livestock and pasture species preference

Stubble/Pasture Health



Grazing Period	Short	Long	Continuous
Recovery Period	Long	Short	None

Fery et al. (2020), Oregon State University Extension

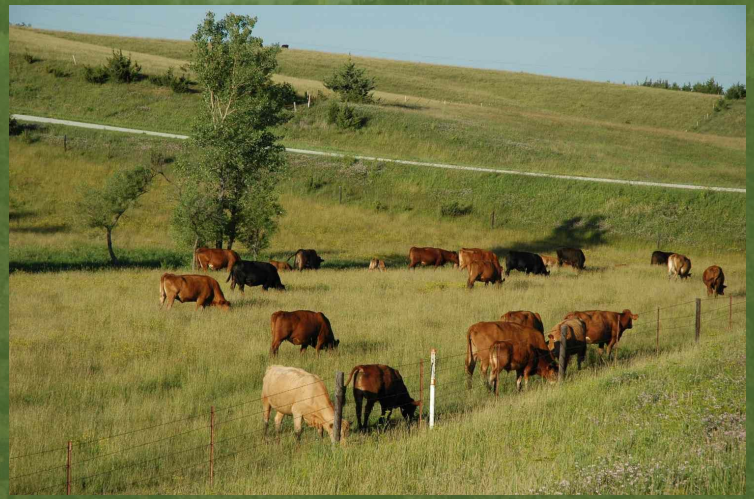
Effects of Grazing on Soil Quality

- When comparing grazed vs. ungrazed organic crop-dairy systems in Northeast England *(Zani et al., 2020)*:
  - Higher topsoil macronutrients
  - Higher topsoil microbial biomass
  - Introducing a ley crop (ryegrass+clover) into the rotation increased aggregate stability compared to just annual cash crops

- Benefits also observed in pasture-cover crop-corn/soy-pasture systems in Minnesota and Pennsylvania *(Galindo et al., 2020)*:
  - Compared to no grazing, grazed systems had higher macro- and micro-nutrients, SOM, CEC, and microbial activity

Nutrient Management Effects

- As grazing intensity increases, grazed cover crop root biomass decreases - can decrease cover crop ability to scavenge and hold nutrients *(Santos, 2021)*
- In grazing trials in Florida using Angus heifers and Jersey steers, grazing cover crops resulted in 12 lb/ac N leaching per season vs 26 lb/ac in ungrazed treatments *(Santos et al., 2023)*
- Grazing can also affect SOC - depends on plant species and climate *(Abdalla et al., 2018)*
    - C3 vs C4 plants
    - Dry climates



Pasture Species Selection

- Cool season perennials like Kentucky bluegrass and bromegrass experience a “summer slump” *(Hudson et al., 2010; Moore et al., 2004)*
  - Decreases growth, affecting livestock grazing
- Research in Minnesota analyzed cool season perennial pasture vs. pasture with warm- and cool-season species *(Ritz et al., 2020; 2021)*
  - Greater overall forage yield in warm+cool season species pasture
  - Milk production, fat, protein content similar between pasture systems

Pasture Species Selection, continued

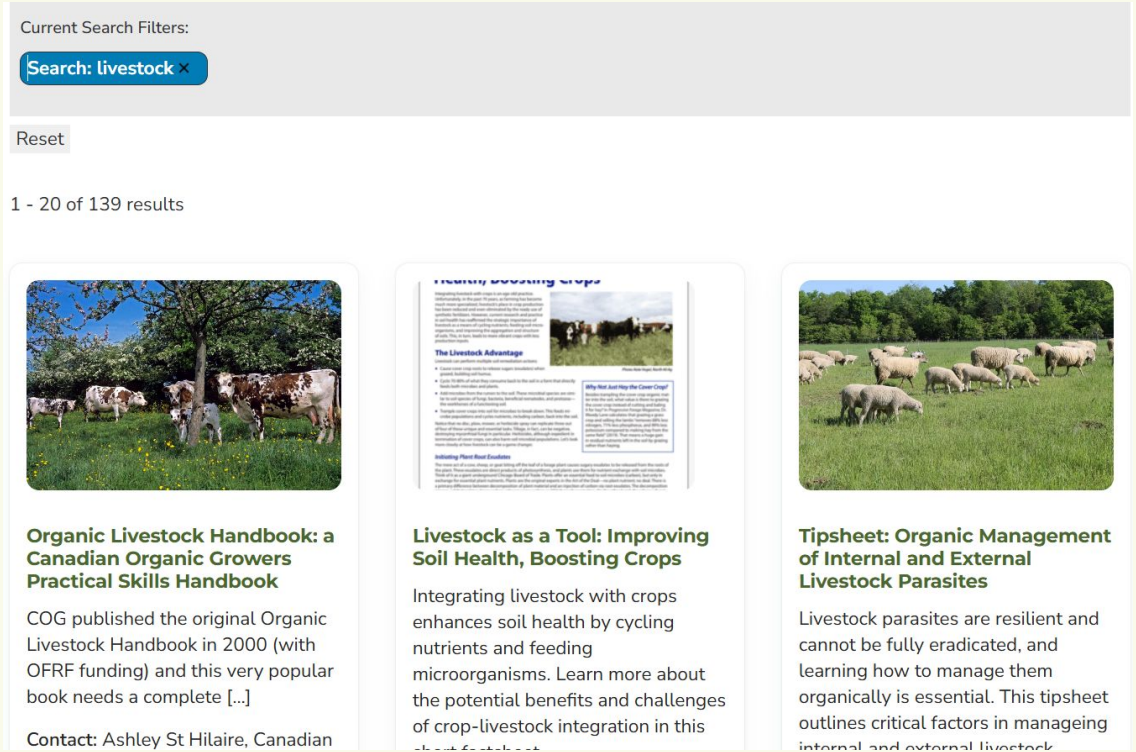
- Research using organic Jersey heifers in Utah to address replacement and weight gain *(Hadfield et al., 2021)*
  - Pasture monocultures (bromegrass, orchardgrass, perennial ryegrass, tall fescue) vs. each monoculture + birdsfoot trefoil (BFT)

- Grass+BFT pastures resulted in:
  - Increased body weight gain and ending weight
  - Increased economic return despite greater establishment cost
  - Less fertilizer required to maintain pasture (feather meal)

Helpful Resources

- eOrganic.org
- attra.ncat.org
- Local extension

Check out OFRF's Organic Research Hub!



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Questions?
Thank You!

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