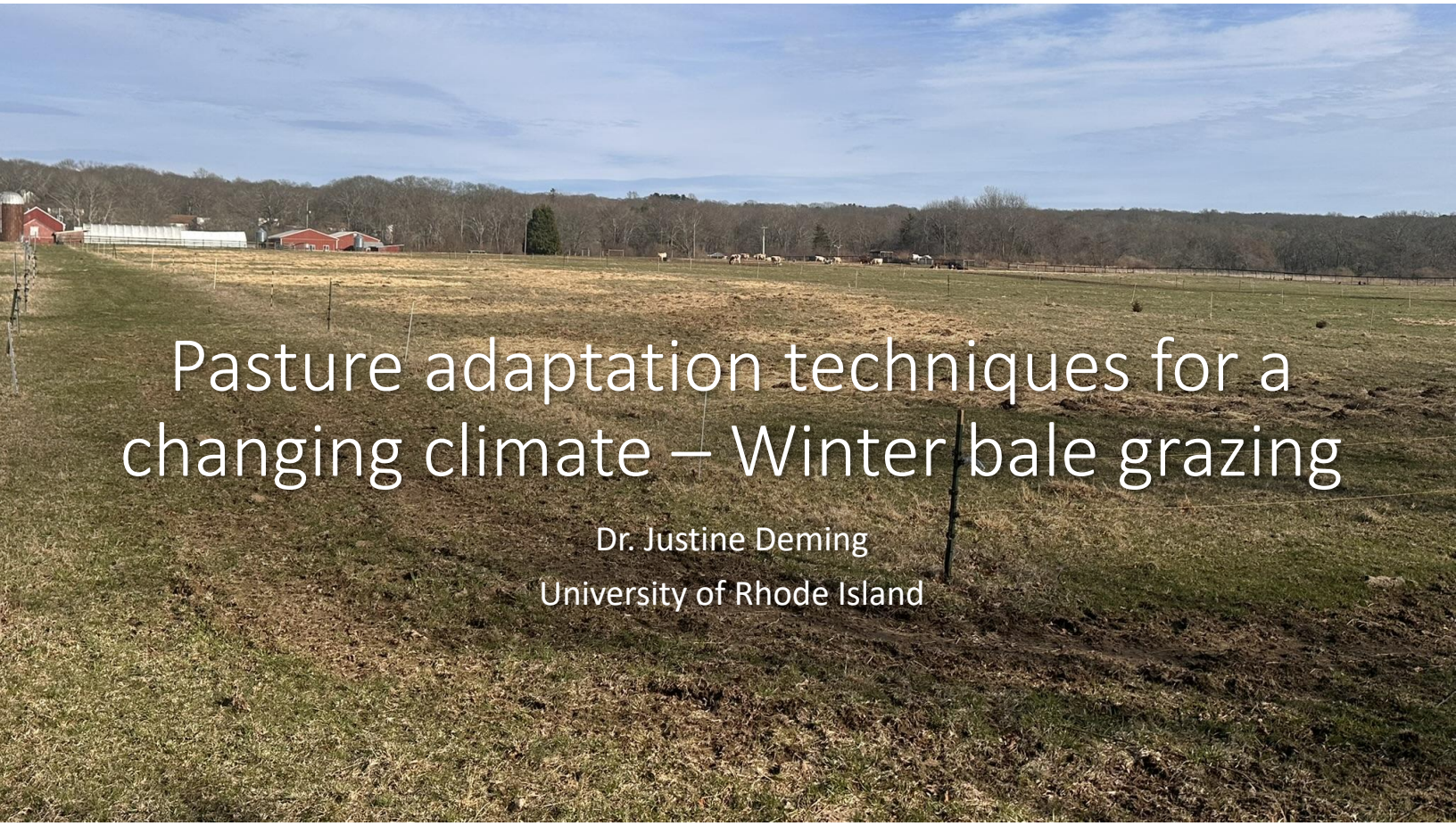


Pasture adaptation techniques for a changing climate – Winter bale grazing

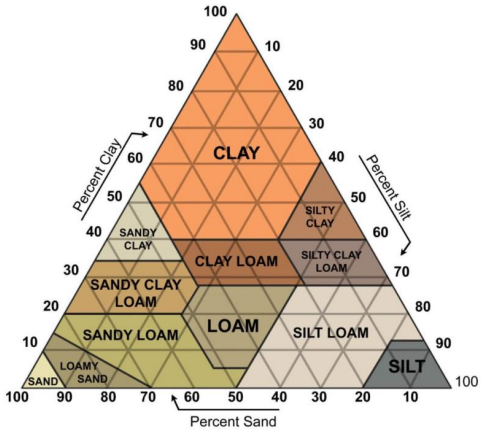
Dr. Justine Deming
University of Rhode Island

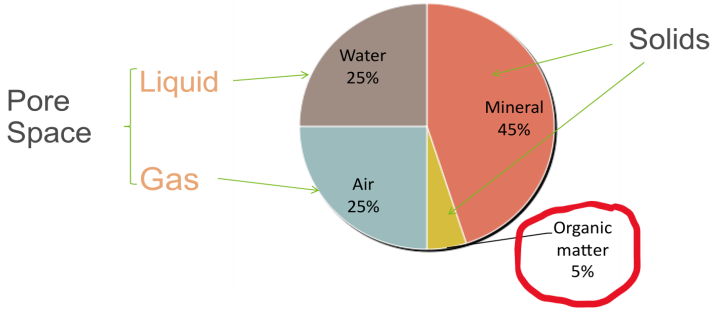
Outline

- Soils review
- What is bale grazing?
- Why bale graze?
- When to bale graze?
- How to bale graze?
- Summary

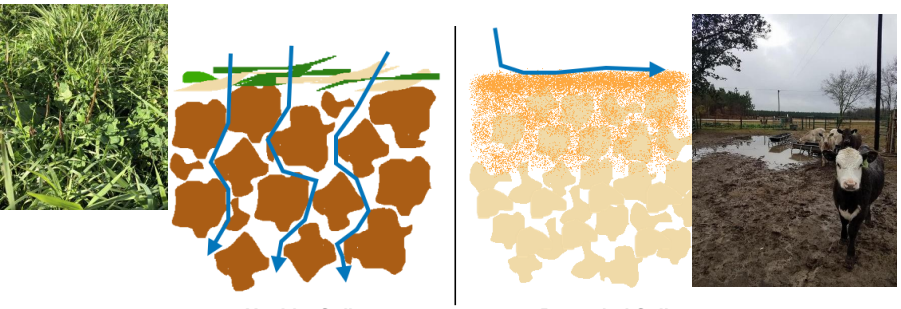
Characteristics of soil health

- Soil *texture* fundamental property
  - Cannot be altered by humans
  - Coarse textured soils drain quickly
  - Finer textured soils hold water for longer periods of time (good and bad)
  - Coarse textured soils naturally maintain less organic matter than fine textured soils and have less microbial activity
- Soil *structure*
  - CAN be altered by humans
  - Idealized model - ~50% solids ~50% pore space
  - Water carries ions (+/-)
  - Permeability of soil important to nutrient transfer





Characteristics of soil health



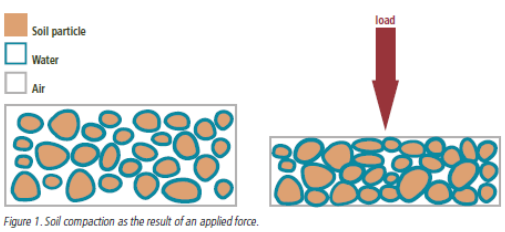


Figure 1. Soil compaction as the result of an applied force.

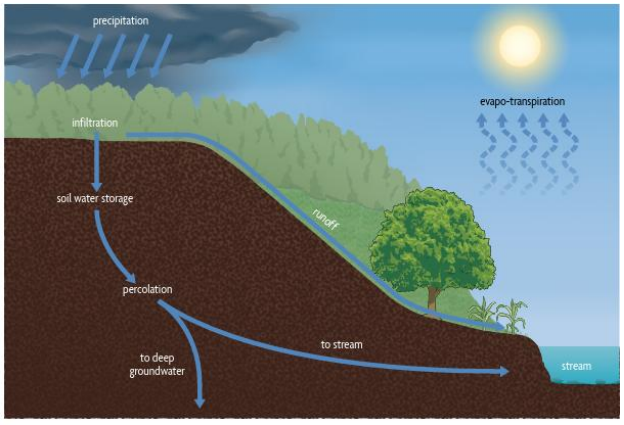


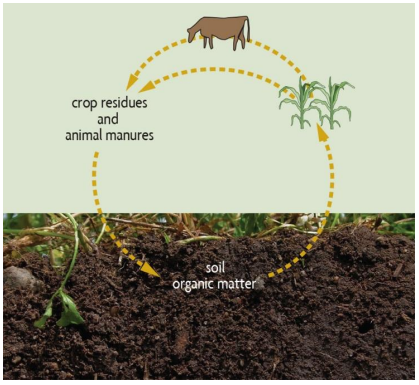
Figure 5.8. The infiltration capacity of the soil determines whether water infiltrates or runs off the surface. Illustration by Vic Kulihin.

https://lasacequias.org/2018/05/24/soil-health-for-storing-water/

What is bale grazing?

- Feeding out bales (wrapped/wet or dry) throughout the winter on pasture, hay land, and/or crop land
  - **Inevitably, feed ends up being left on the land and results in increased *organic matter***
  - Can eliminate the need for a sacrifice lot and allow for consistent distribution of manure and urine directly onto land
- Can be performed on its own or with stockpiled forages
- Most commonly done with cattle but can be effective with other species as well

Why bale graze?



- Remediation of land where soil quality has been depleted
  - Pastures, hay fields, crop land
  - Excellent way to increase ***soil organic matter***
- **Organic matter** increases the availability of nutrients in soil for plants
  - Plant decomposition → nutrients converted to forms other plants can use directly
  - Improves soil structure
  - Enhances root growth into more permeable soil
  - Better plant health and allows more movement of nutrients to the roots
- Improve herd health (keep animals outdoors for respiratory reasons or to keep them off poorly drained sacrifice areas → hoof health)
- Reduced labor costs, machinery, maintenance, fuel, and fertilizer costs
- Work/life balance!

Source: SARE – Building Soil for Better Crops (2021)

If we can measure it, we can manage it!

UMass Extension

Soil and Plant Nutrient Testing Laboratory
203 Paige Laboratory
161 Holdsworth Way
University of Massachusetts
Amherst, MA 01003
Phone: (413) 545-2311
e-mail: soiltest@umass.edu
website: soiltest.umass.edu

Soil Test Report

Prepared For:
Justine Deming
University of Rhode Island
Kingston, RI 02881

justine_deming@uri.edu

Sample Information:
Sample ID: Sheep Pasture

Order Number: 58088
Lab Number: S211124-126
Area Sampled: 6.5 acres
Received: 11/23/2021
Reported: 12/6/2021

Results

Analysis	*Value Found*	*Optimum Range*	*Analysis*	*Value Found*	*Optimum Range*
Soil pH (1:1, H2O)	6.3		**Cation Exch. Capacity, meq/100g**	9.2	
Modified Morgan extractable, ppm			**Exch. Acidity, meq/100g**	4.4	
Macronutrients			**Base Saturation, %**		
Phosphorus (P)	4.6	4-14	Calcium Base Saturation	34	50-80
Potassium (K)	45	100-160	Magnesium Base Saturation	17	10-30
Calcium (Ca)	621	1000-1500	Potassium Base Saturation	1	2.0-7.0
Magnesium (Mg)	190	50-120	**Scoop Density, g/cc**	1.11	
Sulfur (S)	8.7	>10	**Optional tests**		
Micronutrients *			Soil Organic Matter (LOI), %	3.5	

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Soil Test Report

Prepared For:
Justine Deming
University of Rhode Island
127 Woodward Hall
Kingston, RI 02881

justine_deming@uri.edu

Sample Information:
Sample ID: Sheep 6-10

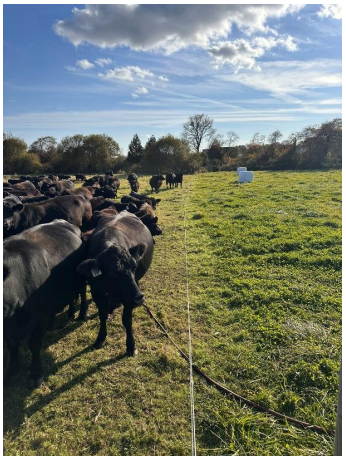
Order Number: 76685
Lab Number: S241016-126
Area Sampled: 3 acres
Received: 10/16/2024
Reported: 10/24/2024

Results

Analysis	*Value Found*	*Optimum Range*	*Analysis*	*Value Found*	*Optimum Range*
Soil pH (1:1, H2O)	6.2		**Cation Exch. Capacity, meq/100g**	9.8	
Modified Morgan extractable, ppm			**Exch. Acidity, meq/100g**	4.8	
Macronutrients			**Base Saturation, %**		
Phosphorus (P)	4.3	4-14	Calcium Base Saturation	37	50-80
Potassium (K)	50	100-160	Magnesium Base Saturation	12	10-30
Calcium (Ca)	734	1000-1500	Potassium Base Saturation	1	2.0-7.0
Magnesium (Mg)	149	50-120	**Scoop Density, g/cc**	1.08	
Sulfur (S)	8.7	>10	**Optional tests**		
Micronutrients *			Soil Organic Matter (LOI), %	4.8	

When should bale grazing occur?

- Typical to start bale grazing at the end of the growing season
- Majority occurs during the fall on dry soils (well-drained) or during winter on frozen soils
  - Minimal physical impact on the soil surface and on perennial plants
- Does not have to be limited to the winter (non-grazing) months
- Can be used to supplement pasture rich in protein to help slow digestion rates



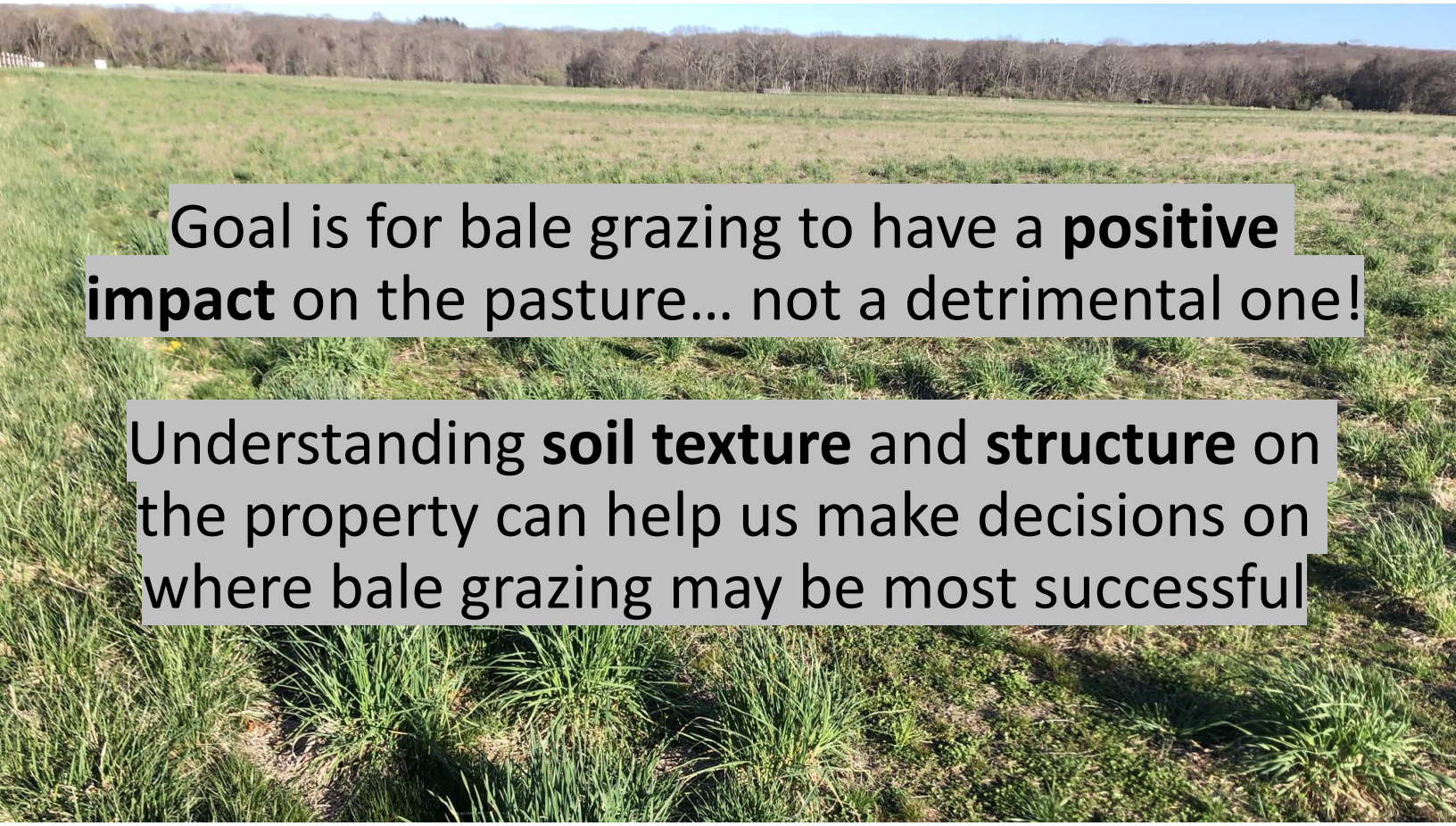
When should bale grazing occur?

- Important to PULL ANIMALS OFF pasture and put on a sacrifice lot at first sign of green-up in the spring
- When bale grazing occurs during spring thaw, there is potential for hoof damage (pugging) to the soil surface
  - Producers should monitor this situation and have alternative plans until the soil surface is able to support livestock traffic
  - Can cause issues with re-growth following spring…

POV: You're grass

How to bale graze: Planning for bale grazing

- Determine areas on farm that **make sense** to try bale grazing
  - Soil testing
  - Areas where pasture needs to be established, or quality could be improved
  - Adequate fencing
  - Easy access to water
    - Is there a plan for winter water?
  - Access to shelter?



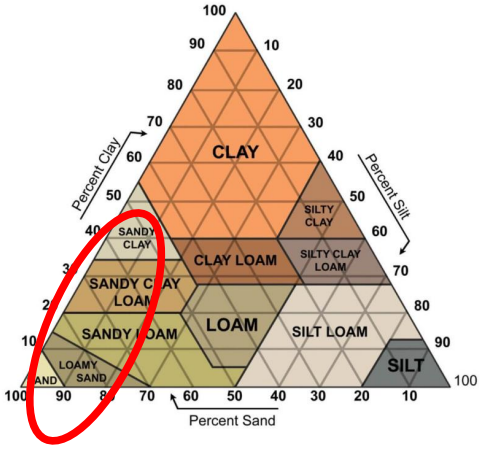
Goal is for bale grazing to have a **positive impact** on the pasture… not a detrimental one!

Understanding **soil texture** and **structure** on the property can help us make decisions on where bale grazing may be most successful

Note on soil textures (types) in relation to agriculture

- **Sandy**
  - Large particles, light in color, coarse, excessively drained
  - Increasing soil organic matter can improve quality
- Advantages:
  - Warms up quickly in spring
- Disadvantages
  - Dries out quickly in summer
  - Nutrients and water often leech away especially with rainfall
  - Often acidic
  - Not ideal for most pasture or hay plants

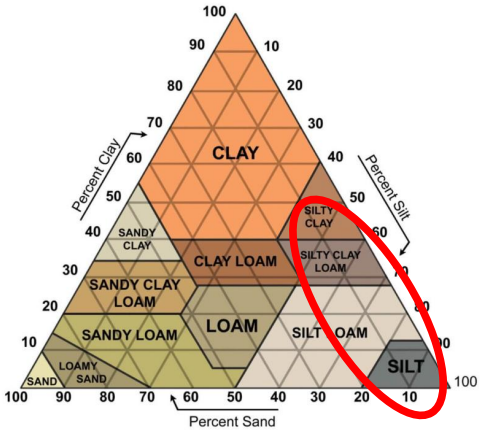
Good option for bale grazing!



Note on soil textures (types) in relation to agriculture

- **Silty**
  - More fertile than sandy soils, it is an intermediary between sandy and clay
  - Increasing soil organic matter can improve quality
- Advantages
  - Fertile soils that hold onto nutrients better than sandy soils
  - Better water holding capacity than sandy soils
  - Easier to work with than clay soils
- Disadvantages
  - Water filtration can be poor
  - Has a tendency to form a crust
  - Can become compact and hard

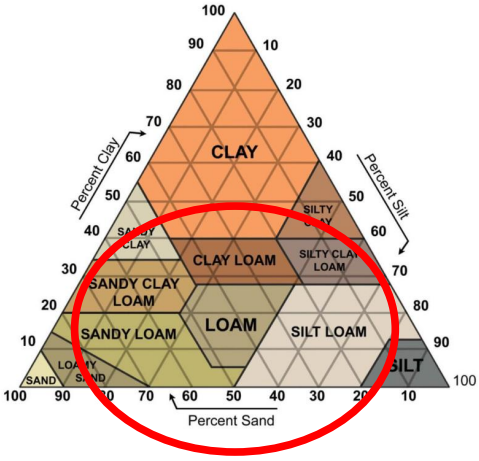
Good option for bale grazing with attention to thawing ground



Note on soil textures (types) in relation to agriculture

Good option for bale grazing with attention to thawing ground and low points

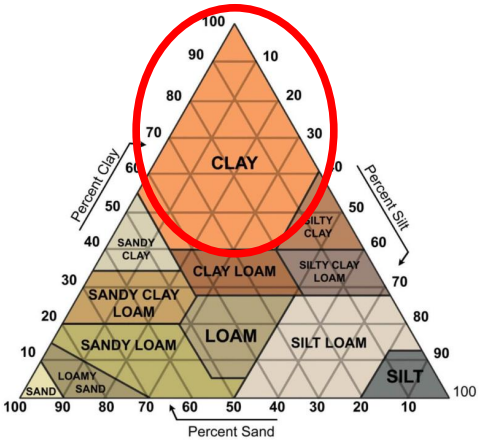
- **Loamy**
  - Combination of sandy, clay, and silt particles
  - Clay and silt particles improve moisture retention while sand minimizes compaction and improves drainage
  - Excellent for most agricultural uses
- Advantages
  - Drought resistant due to water-holding capacity
  - Faster to warm up in spring than clay
  - Can hold nutrients making soils fertile
  - Good infiltration of air and water
- Disadvantages
  - May contain stones which could negatively impact harvesting of some crops



Note on soil textures (types) in relation to agriculture

Poor option for bale grazing…unless ground is completely frozen

- **Clay**
  - Heaviest soil types and often considered the hardest to work with
  - Particle sizes very small and hold onto water
- Advantages
  - Hold onto nutrients so generally very fertile
  - Well-suited to plants that require a lot of water
- Disadvantages
  - Take longer to warm up in spring (due to water storage)
  - Soil compaction and cracking risks
  - Tends to be alkaline
  - Holds on to water, slow to drain



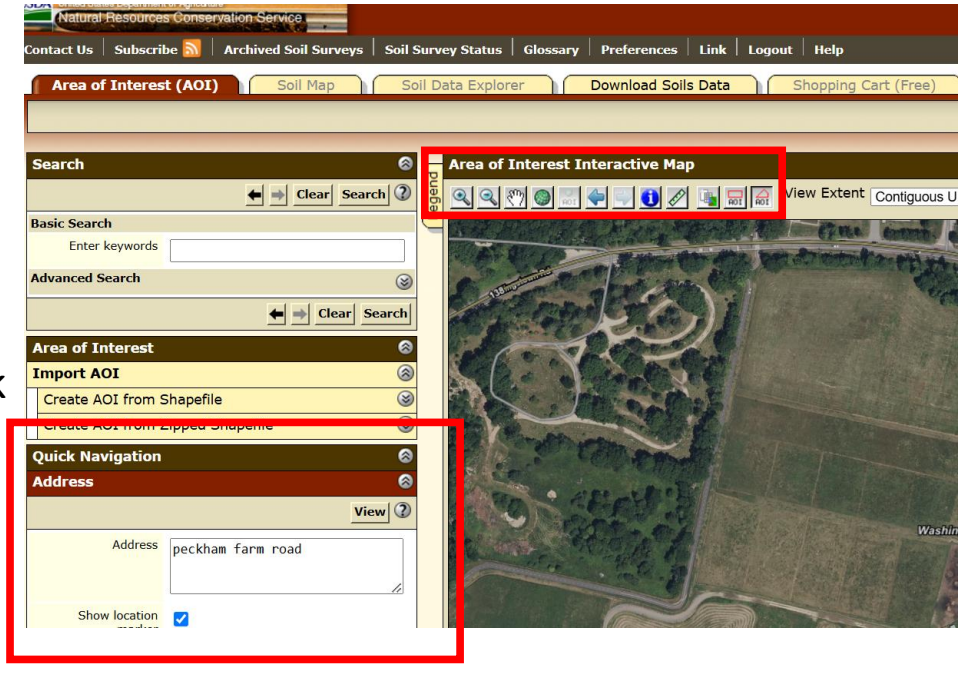
How to bale graze: Planning for bale grazing

- If producers are unsure of what soil types they have
- Identifying locations on the farm to try bale grazing while preserving soil structure
- Public and free tool that can help assess soil characteristics on any farm

How to bale graze: Planning for bale grazing

<u>Navigation of Web Soil Survey</u>

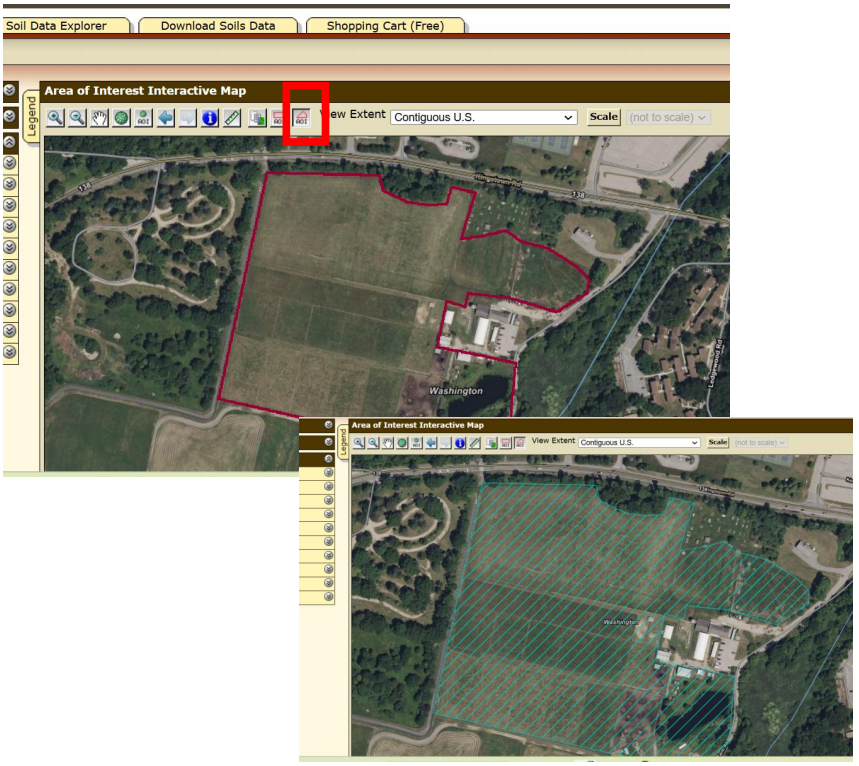
- Type in an address or navigate on the map
- To zoom in and out click the + and – icons
- To move the map around, click the hand icon



How to bale graze: Planning for bale grazing

<u>Defining the area</u>

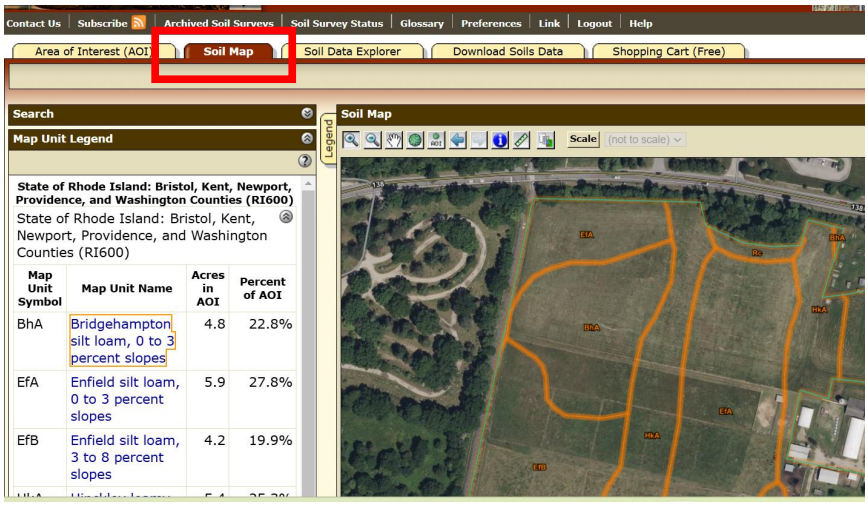
- Use the ‘AOI’ (area of interest) button to create your map
- Drop points on map to create the most accurate map of your area
- Double click when you have completed the mapped area



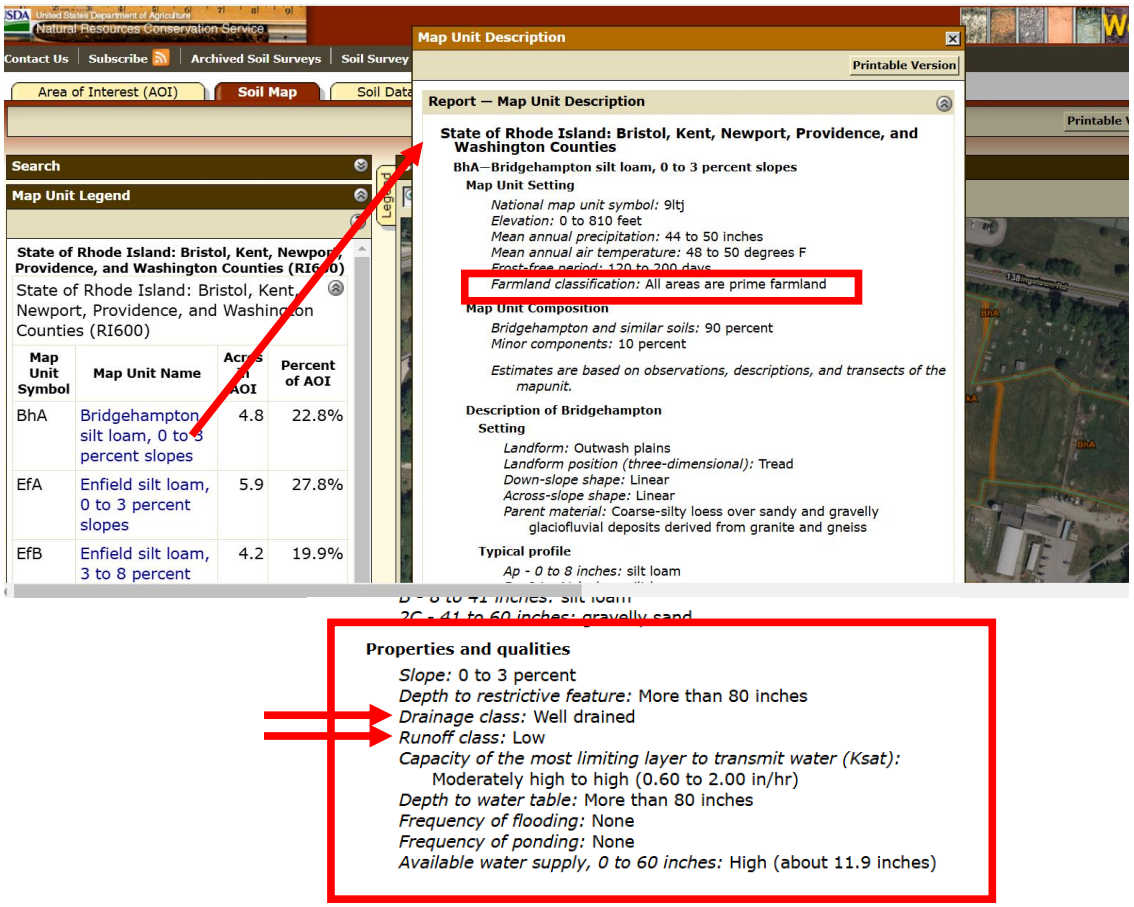
How to bale graze: Planning for bale grazing

<u>What type of soils are on the farm?</u>

- Click on ‘Soil map’
- Legend on left will indicate what the abbreviations mean on the map and tell you the proportion of the AOI that is each soil type
- Knowledge on soil type can inform how you plan to manage



- Click on soil type and scroll down to ‘properties and qualities’
- Likely several soil types on same property
- Important to know drainage properties and likelihood of nutrient runoff



Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.9 inches)

Providence, and Washington Counties (RI600)

State of Rhode Island: Bristol, Kent, Newport, Providence, and Washington Counties (RI600)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BhA	Bridgehampton silt loam, 0 to 3 percent slopes	4.8	22.8%
EfA	Enfield silt loam, 0 to 3 percent slopes	5.9	27.8%
EfB	Enfield silt loam, 3 to 8 percent slopes	4.2	19.9%
HkA	Hinckley loamy sand, 0 to 3 percent slopes	5.4	25.3%
Rc	Raypol silt loam	0.2	1.0%
Sb	Scarboro mucky fine sandy loam, 0 to 3 percent slopes	0.7	3.1%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
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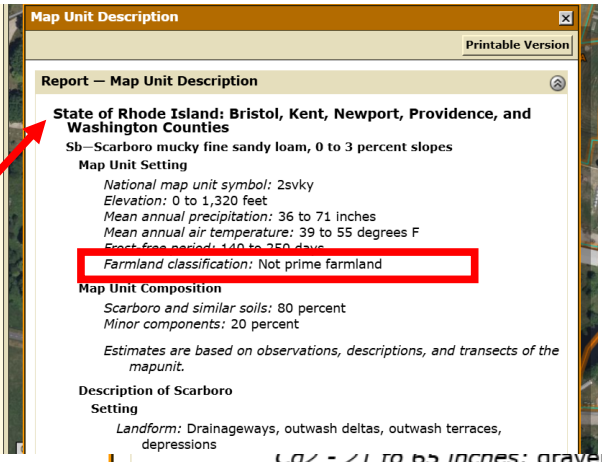
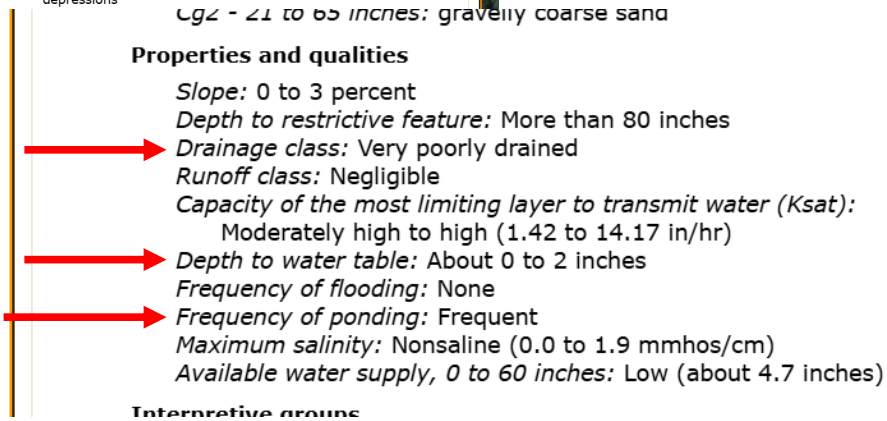
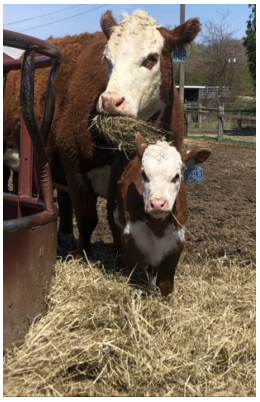




How to bale graze: Planning for bale grazing

- "if we can measure it, we can manage it"
- Nutrient testing on bales
- "I'd rather be looking at it than looking for it"
  - Ensuring we have ENOUGH winter feed requires planning and crunching numbers
- Calculating needs of the animals when preparing
  - 2.5-3.5% BW in DM daily typical (depending on physiologic state)
  - Need to know approximate weights of animals
- An assumption of what % fed will be 'wasted'
- Length of winter-feeding period

How to bale graze: Planning for bale grazing



Calculating animal needs:

- % BW DM/d dependent on stage of production, BCS, weather
- Maintenance (not 'working') 2-2.5%
- Growing, 2.5-3%
- 'working' (lactating or intact male pre-breeding season) 3-4%
- In inclement weather, plan on increasing 0.5% BW DM/d allotted

Word of caution…

- Youngstock, thin cows/ewes/does, and dams that are nursing → higher levels of energy and management than mature dry animals
- Supplemental feed and shelter may need to be provided when weather conditions dictate
- Adjust ration supplementation as needed during harsh winter
- Crude protein (CP) and energy requirements for mature pregnant animals increase during the second and third trimester…

How to bale graze: Planning for bale grazing

Considerations when making decisions

- Estimate the % fed each day that will be '**wastage**'
  - Likely upwards of ~60% 'wastage' when bale grazing (40% being eaten)
- Determine (and potentially overestimate) **length** of winter-feeding period

- ALWAYS keep an eye on animals' BCS to ensure their needs are being met

- Take the time to do the math well before implementation!!

How to bale graze: Planning for bale grazing

How to make your calculations

1. Estimate weight of your animals, desired %BW DM fed based on physiological status, number of animals. This will give you your weight of dry matter (DM) needed everyday to feed your herd/flock
   Animal weight x % BW DM fed x # animals in group = lbs fed DM/d for that group

- Weight tapes or real scale
- Determine stage of production, BCS, what your goals are for this period
- How many animals are in this particular group we're feeding?

How to bale graze: Planning for bale grazing

How to make your calculations

2. Will you be feeding dry hay or baleage? They contain different amounts of moisture, and thus, this needs to be accounted for when determining how much will be fed to the animals. This is called the **'as fed'** weight/d

- Multiply the number you calculated in step 1 by the % moisture of your desired feed (ex: if you're feeding 15% moisture hay, you would multiply your lbs DM from step 1 by 0.15) and **add this number** (lbs of water) to your lbs DM needed/d and this gives you your 'as fed' weight/d
- Remember, if you're feeding baleage, you would multiply it by the higher moisture content percentage (knowing the % moisture is crucial to make accurate calculations)

How to bale graze: Planning for bale grazing

How to make your calculations

3. We need to assume that there will be some wastage (in the case of bale grazing, this may be a significant part of the goal! Perhaps 60% 'wastage')
Take the number you got for step 2 and multiply it by your assumed % wastage and add that to your step 2 number

This is now your **true 'as fed' lbs/day with wastage accounted for**

How to bale graze: Planning for bale grazing

<u>How to make your calculations</u>

4. Determine how many days bale grazing will occur over the winter period and this will tell us how many bales (of that particular feed) we need in total

Multiply the 'as fed with waste accounted for' number determined in step 3 by the number of days in the winter feeding (or bale grazing) period

This is now the **total pounds of feed needed** to perform bale grazing for the winter (or determined period)

How to bale graze: Planning for bale grazing

<u>How to make your calculations</u>

5. How many bales do I need total?

- Determine the weight of the bales that have been made or are being purchased and divide your winter feed need (number in step 4) by the bale weight to find out how many bales you need to make or buy to feed your herd/flock

How to bale graze

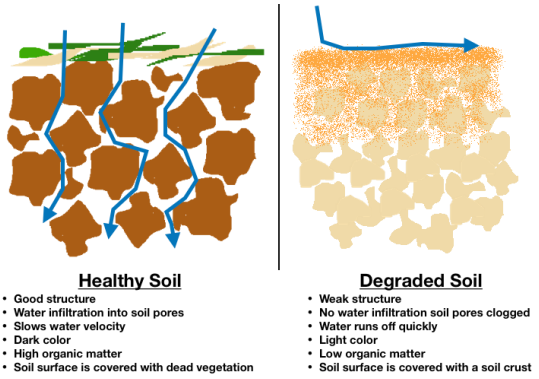
- Set bales on their round sides, 35 to 40 feet apart
- Remove twine or net-wrap prior to allowing cattle access to the area
- Others will roll bales out more evenly
  - Manually or with tractor implements
- Most effective when animals have controlled access by electric fence
- Strip grazing provides a more uniform nutrient intake
- The amount of feed required per day (accommodating for % moisture and weight of the bale, needs of the animals, and assumed ‘wastage’) was determined in Step 3 and you can figure out how many bales that is per day by knowing the weight of your bales!

How to bale graze

- The number of days producers choose to allow their cattle access to a pod of bales will depend on
  - how many bales are placed
  - quality of the feed
  - body condition score of the animals
  - Weather
  - the farmer’s personal goals and management style
- Some producers will move cattle every two to five days, while other producers will allow cattle access for 20 or 30 days of feed at a time, or even longer
- After a season or two of trying it, soil sample again!

Bale grazing summary

- Build soil organic matter and improve soil structure while reducing winter labor demands
- Planning is the key to success
  - Site location, availability of resources, species and breed of animals, and knowledge of BCS and physiological state of animals important
- Management of agricultural soils using practices that promote the buildup of organic matter can build resilience in an unpredictable future of climactic changes



Source: SARE – Building Soil for Better Crops (2021)

Thank you, questions?