

The American Solar Grazing Association



The American Solar Grazing Association

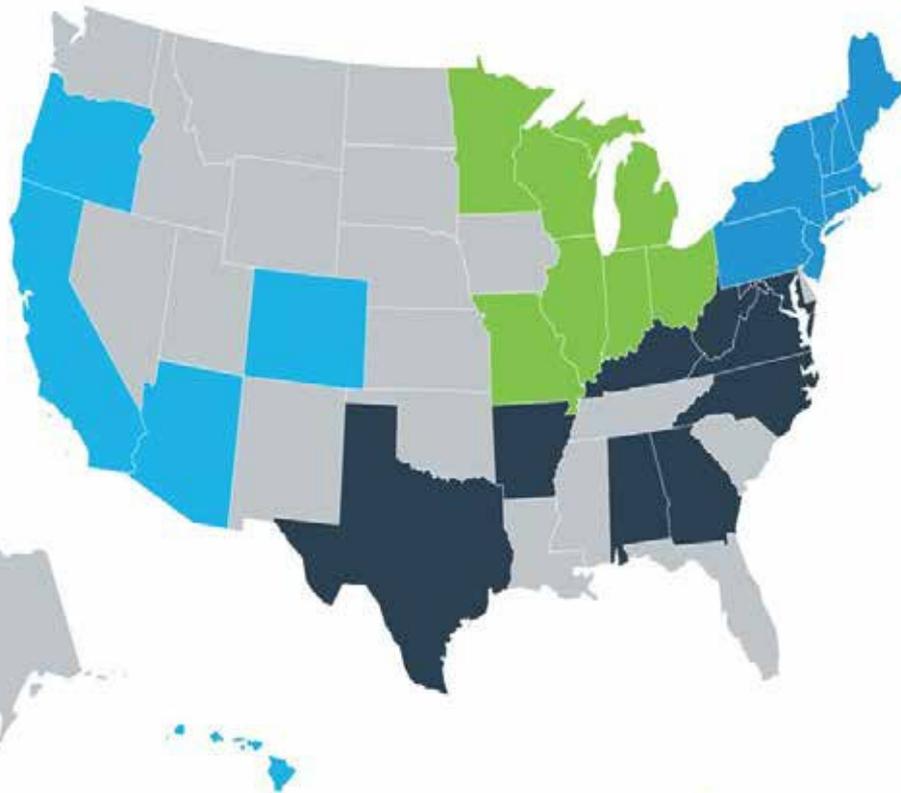
Farmer-founded and **farmer-led** organization with **1400+ members** and growing. Since 2008, we've provided:

- In-depth technical assistance & training for farmers and solar
- Set standards and best practices
- Help farmers and solar developers become effective partners
- Promote solar grazing
- A partner to groups, like The Nature Conservancy, NREL, American Farmland Trust, NYSERDA, Cornell, and Virginia Tech.
- Driving solar grazing workforce development, certifications, education, technical assistance, and outreach.



The world leader in solar grazing.

How Big Is It? Let's Talk Numbers...



30 States Currently Solar Grazing

MIDWEST

6,852 Acres
13,254 Sheep
148 Sites

NORTHEAST

4,600.5 Acres
13,274 Sheep
145 Sites

WEST

30,728.25 Acres
24,541 Sheep
104 Sites

SOUTH

87,080 Acres
61,981 Sheep
109 Sites



ACRES = 129,260.75 total

MIDWEST

6,852

min: 7 | max: 2,000

NORTHEAST

4,600.5

min: 5 | max: 2,074

SOUTH

87,080

min: 2 | max: 32,650

WEST

30,728.25

min: 25 | max: 19,904

Texas: 68,626 total

California: 21,750 total

RAPID GROWTH



129,000 ACRES
113,050 SHEEP
500 SOLAR SITES

The majority of
active solar graziers are

30-59 YEARS
OF AGE

40%

of respondents **graze**
utility-scale solar sites.

1/3 of respondents
FEMALE

2/3 of respondents responsible for
managing vegetation via methods
additional to sheep grazing

Largest motivators = **Financial & Environmental Benefits**

Educational Programming

- Virtual workshops presented by solar graziers, experts, extension specialists, academics
- 6-year webinar library
- Example event series
 - USDA Lamb Board
 - Grazing with Cam
 - 1:1 Mentoring Calls



ASGA Training Programs: Graziers & Solar Firms

Solar Grazing Certification for Farmers

In-person orientation to solar grazing and safety standards.

ASGA Certification for Solar Firms

On-site training and mentoring provide a day-to-day picture of sheep grazing on a site.



 **Sept. 23, 2025**
Crystal Hill Solar
Virginia
<https://solargrazing.thrivecart.com/asga-solar-company-training-virginia/>



 **Oct. 23, 2025**
Horizon Solar
Texas
<https://solargrazing.thrivecart.com/asga-solar-company-training-texas/>



The American Solar Grazing Association's new Solar Industry Professionals Certification program is a one-day workshop designed for site operations and management teams, developers, asset managers, sustainability teams, and solar company employees. An in-depth orientation will provide a clear picture of day-to-day life with sheep on site. Workshops will take place on a grazed solar site following classroom instruction. Participants will receive a Level 1 Solar Grazing Management certification from the American Solar Grazing Association (ASGA).

WHAT YOU'LL LEARN AT THE TRAINING:

- Benefits of using sheep
- What a grazed site looks like
- Sheep safety & welfare
- Sheep behavior and terminology
- How sheep are managed at solar
- Livestock herding and protection dogs
- Sheep equipment used at sites
- Operational site expectations and strategies
- Principles for effective farmer partnerships



Contact: Kevin Richardson, ASGA Senior Director, ourweathersolargrazing.org

MEANS AND METRICS: The Standard Checklist for Solar Grazing



Means and Metrics: The Standard Checklist for Solar Grazing

Research surrounding the science and practice of agrivoltaics and solar grazing systems continues to grow, and the need to understand the means of successful implementation and metrics for evaluating these multi-use systems compared to their single use counterparts is increasingly important for graziers, developers, and managers. The following comprehensive checklist is derived from a full report that describes in detail each checklist section. The purpose of the checklist is to provide useful record-keeping tools to support project planning, monitoring, and evaluation of solar grazing stakeholders. Each checklist section includes columns formatted for relevance to section subject matter, including space to log descriptive information, make note of the responsible party, or provide a time stamp of completion.

These checklists are not meant to be interpreted as "requirements" for solar grazing, rather, they are intended to offer a holistic suite of considerations, which can serve as a template that can be further prioritized at the discretion of the partners of a solar grazing project. We recommend that solar grazing stakeholders access the services of land grant universities, extension agencies, local Natural Resource Conservation Services (NRCS) offices, and conservation districts for further assistance.



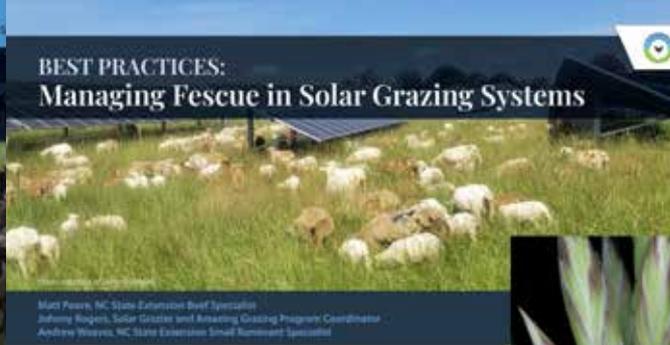
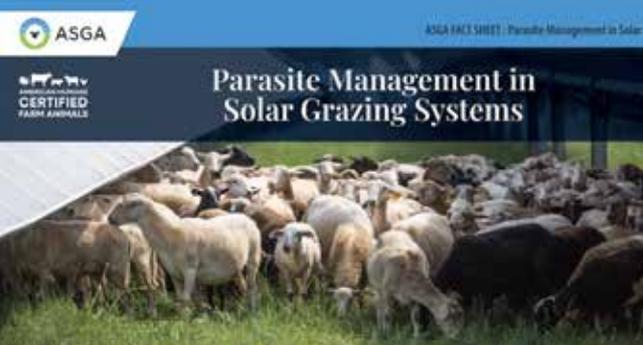
The American Solar Grazing Association (ASGA) provides educational programming and resources for farmers, establishes professional standards and best practices for solar grazing, and educates the general public and key stakeholders on the economic, social, and environmental benefits of solar grazing. A wide variety of resources are available for their membership network. For more information, please visit ASGA's website: solargrazing.org

Name of Site: _____ Solar Operator: _____
Grazier(s): _____ Date: _____

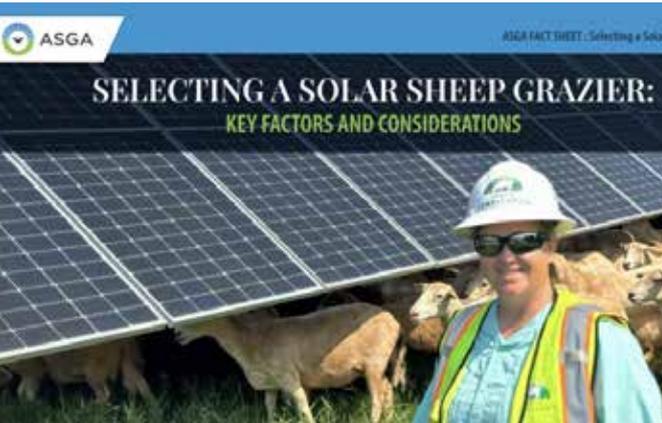
SOCIAL FACTORS

Item	Yes	No	Describe
Does the site provide economic opportunities for the local community and farmers?			
Is the site located on public property?			
Does the site and management plan maintain local interests?			
Does the management plan for the site promote a fair and just distribution of economic benefits across the local community?			
Will products be used/sold locally?			
Do local supply chains benefit from agrivoltaic products (e.g. honey, meat, wool, etc.)?			
Does the site incorporate multi-use?			
Are socio-geographic factors considered in the site design (e.g. viewshed obstruction, perimeter fence type)?			
Are cultural factors considered for site planning and management?			
Are there aesthetic issues that need to be addressed, like panel washing, fencing, tidiness, vegetation management, etc.?			
Are there plans to provide opportunities for community outreach and engagement before and during operations?			





Solar Grazing Fact Sheets





CASE STUDY



Solar Grazing Story: Ryan Indart, Indart Solar Sheep Grazing

Solar Grazing Case Study: Ryan Indart, Indart Solar Sheep Grazing



CASE STUDY



Solar Grazing Story: Jonathan and Jen Northrop, Northrop Farms

Solar Grazing Case Study: Jonathan and Jen Northrop, Northrop Farms



CAS



Solar Grazing Story: Chad Raines, Key Farms, Inc.

Solar Grazing Case Study: Chad Raines, Key Farms

CASE STUDY



Solar Grazing Story: Lewis Fox and Niko Kochendoerfer, Agrivoltaic Solutions

Solar Grazing Case Study: Lewis Fox and Niko Kochendoerfer, Agrivoltaic Solutions

A Quick Guide to Agrivoltaics Monitoring & Research Design

This publication provides guidance for monitoring and research of the agricultural and ecological aspects of agrivoltaic systems. The goal is for data across space and time to be meaningful, usable, and comparable. Agrivoltaics co-locates agricultural and solar energy production. This field functions as a novel ecosystem and behaves differently from natural landscapes. Without standardization, disparate efforts to study the ecological impacts of agrivoltaics cannot be compared or synthesized into a cohesive source of understanding.



Monitoring and Research Importance

Monitoring and research for agrivoltaics builds upon a long lineage of biological and ecological sciences:

- Monitoring tracks change over time and provides continuous feedback.
- Research discovers new information and brings understanding to complex interactions.

Variables of Interest

Setting contextualized goals will help determine the variables of interest and the monitoring and research plan (Table 1).

- Using Specific, Measurable, Achievable, Relevant, and Time-Bound (SMART) goals is best practice. Then consider the following:
 - » What methods will be used to measure the variables of interest?
 - » Is laboratory analysis needed? Consider local options and available tests.
- In 2024, The Nature Conservancy surveyed ranchers to better understand their interests for monitoring and provided recommendations to make monitoring more useful and meaningful for management and decision-making* (Table 1).
- To assist with goal setting and determining variables of interest, refer to ASGA's *Means and Metrics: The Standard Checklist for Solar Grazing*, for example questions on social, economic, ecological, livestock, grazing management, and site design factors¹.

Table 1. Common variables of interest in agrivoltaics ecosystem monitoring and research. Asterisks represent variables indicated by ranchers in The Nature Conservancy's study¹.

*SOIL	CROPS / VEGETATION	*WATER	*WILDLIFE	LIVESTOCK
Inorganic / organic carbon	Yield	*Infiltration / hydroconductivity	Ex. mammals, birds, invertebrates, amphibians, "butterflies"	Weight gain
Nitrogen	Water stress	Soil moisture	Species presence	*Body condition
Microbiotic communities	Photosynthesis	Burnoff / erosion	Species abundance	Disease incidence
Microinverteils	Ground cover	*Irrigation efficiency	Indicators of reproduction	Shade impact
Organic matter	*Biodiversity	Evapotranspiration	Fatality patterns	Water consumption
*Stability	Species composition		Foraging behavior	Interaction with infrastructure
Aggregation	Species frequency		Agricultural services	*Feed supplement size
Compaction	*Forage quality			*Stocking rate
Temperature	Background			Animal health and welfare
Metals	Productivity / biomass			Honey production
Residual chemicals				

Design Considerations

The five basic features of monitoring and research design described in the next section are needed to capture site diversity, for statistical significance, and to produce meaningful information. Consistency in sampling location, size, timing, spacing, depth, and plot design is paramount. Replication of monitoring and research methods on other solar sites, either within or beyond similar geographical regions, could greatly improve learning and applicability. For further support and technical assistance, we recommend working with a soil health expert, and accessing the services of land grant universities, extension agencies, local Natural Resource Conservation Services offices, and conservation districts.

Solar Site & Sampling Safety

Before sampling, contact the asset management team for permission and to understand the location of buried cables and equipment. Contact the health and safety team for protocol and flagging, and call "811" before digging.

1 STRATIFICATION

On a solar module scale:

4 microzones (western drip edge, underneath, eastern drip edge, and between) characterize distinct areas where repeated and patterned sun-shade dynamics have a microclimatic effect on the vegetation and soil below (Figure 1). In the case of fixed tilt systems, drip edge configuration may be different and should be addressed appropriately.

On a solar landscape scale:

This encompasses the area within the solar site. Spatial sampling designs of the solar landscape include systematic (grid), random, stratified random, and clustered (Figure 2).

For all cases:

Landscape and microzone stratification ensures that results are representative of the whole agrivoltaic ecosystem.

Figure 1. The four microzones in a solar array.

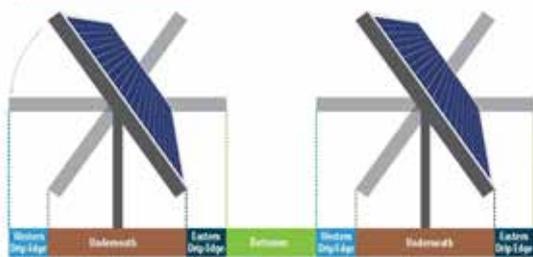
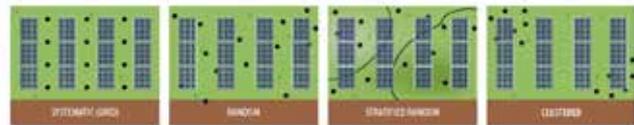


Figure 2. Examples of spatial sampling designs on a solar site.



2 PLOT DESIGN

Within what kind of plot design (linear transect, square, hoop, or key area) should each variable be sampled?

- » Consider: Degree of heterogeneity, variables of interest, and solar infrastructure layout.

A reference/control area provides a comparison to baseline or reference case conditions, which facilitates interpretation.



3 TIMING

Monitoring or research goals and variables of interest will dictate the appropriate temporal (time) and spatial (space) scales of design. Questions to consider include:

- Frequency: How often will sampling be performed?
 - » Consider: Timing of grazing, variables of interest, and long-term versus short-term effects.
- Seasonality: During which season(s) will it be relevant to sample the variables of interest?
 - » Consider: Grazing influences, season-sensitive variables, and climate zone.



4 SAMPLE SIZE

For monitoring: Enough samples are needed to capture the relevant landscape or herd/flock diversity across the area of interest.

For research: Statistical significance derived by a "power calculation"² is needed to define the sample size.

For all cases: Sample size is directly proportional to the degree of variability or diversity across space or sample population.



5 SPACING AND SOIL DEPTH

Spacing: Should sample locations be more dense/frequent or dispersed?

- » Consider: Spatial scale of inquiry, degree of variability, and macro-scale versus micro-scale variables.

Soil Sampling Depth: What sampling depth is appropriate for the variables of interest?

- » Consider: Rate of change, root zone, and sensitivity to aboveground activities.

Please refer to <https://doi.org/10.3390/agriculture12030307> for references, authorship, and updated information.



ASGA Solar Grazing & Soil Health Research

Purpose: collect in-field data on forage quality, soil health, and economics

Results: Overall, solar sheep grazing helps to create a beneficial environment.

Solar-grazed sites tended to have higher soil organic matter.

Soil pH was significantly higher in grazed sites.

Crude protein significantly higher in under-panel areas for all seasons.

Pasture condition scores increased, suggesting that sheep grazing can improve solar site pasture quality over time.



Sheep Grazing Impacts on Soil Health and Pasture Quality at Northeast Solar Sites

Alyssa C. Andrew, Leah Hain, Jonathan Karter, Zachary A. Goldberg, Wilson Daniels, Kevin Antonicelli, Alyssa White, and Cary Russell

INTRODUCTION

As solar energy technologies proliferate, utility-scale solar farms are being developed on agricultural lands. These solar farms can provide a source of revenue for landowners and create jobs. However, the impact of solar farms on soil health and pasture quality is not well understood. This report examines the impact of solar farms on soil health and pasture quality at three sites in the Northeast. The sites are located in New York, Pennsylvania, and Virginia. The report includes data on soil health indicators such as soil organic matter, soil pH, and soil nitrogen. It also includes data on pasture quality indicators such as crude protein and pasture condition scores. The results show that solar farms can have a positive impact on soil health and pasture quality. This is likely due to the grazing of sheep under the solar panels, which helps to maintain soil health and pasture quality.

RESULTS

Soil organic matter, soil pH, and soil nitrogen were significantly higher in grazed sites compared to non-grazed sites. Crude protein and pasture condition scores were also significantly higher in grazed sites. These results suggest that solar farms can have a positive impact on soil health and pasture quality. This is likely due to the grazing of sheep under the solar panels, which helps to maintain soil health and pasture quality.

CONCLUSIONS

The results of this study suggest that solar farms can have a positive impact on soil health and pasture quality. This is likely due to the grazing of sheep under the solar panels, which helps to maintain soil health and pasture quality. These findings are important for landowners and utility companies who are considering solar farms on agricultural lands. They suggest that solar farms can be a viable option for generating renewable energy while also maintaining soil health and pasture quality.

Panel to Plate Recipes



Margarita Lamb Taco Salad with Mango Salsa

Serves 6 | Cook Time: 20 min. | Recipe courtesy of Nick & Kathy Forrest, American Lamb Board

INGREDIENTS:

- 2 lbs ground lamb
- 2 packets taco seasoning
- ¼ cup diced onions
- Juice from 1 lime
- ½ cup of margarita mix (like Chi-Chi's)
- Choice of toppings and base (diced tomato, cheese, olives, lettuce, chips, etc.)

For the mango salsa (optional):

- 2 mangoes, diced
- ½ red bell pepper, diced
- ½ red onion, diced
- 1 jalapeño, seeded and finely diced (optional)
- ¼ cup cilantro, chopped

DIRECTIONS:

1. Combine ingredients for the mango salsa. Cover and refrigerate until serving.
2. In a large pan over medium heat, saute the diced onion for 5-7 minutes until soft.
3. Add ground lamb to the onions, and break the meat into smaller pieces.
4. Add margarita mix, lime juice, and taco seasoning to the onion and lamb mixture. Cook until lamb is cooked through, about 5-7 minutes.
5. Remove taco mixture from heat and assemble salad mixture. This can be on a bed of lettuce, or in a small chip bag (like Doritos or Fritos) as a walking taco. Top the taco salad with toppings of choice and mango salsa.

Panel to Plate Recipes



MOM'S LAMB STEW

Serves 8 | Prep Time: 30 min. | Cook Time: 1 hr 10 min. | Recipe courtesy of: Lucinda Owens, Dairy Farm

INGREDIENTS:

- 2 lbs boneless lamb kabobs (mutton also works, just slower to cook)
- 1 medium onion, chopped
- 3 cloves garlic, chopped
- 2 cups potatoes, cubed
- 2 cups carrots, sliced
- 1 cup celery, chopped
- 1 quart meat stock (lamb best, but beef or chicken will do)
- 1 tbsp. parsley, chopped
- 1 tbsp. rosemary, chopped
- Olive oil or lard

To dredge the meat:

- 1 cup flour
- 1 tablespoon salt
- 1 tsp pepper
- 2 tsp paprika

DIRECTIONS:

1. Lightly saute onions and garlic in oil or lard in a large deep pot (Dutch oven or casserole pot)
2. Dredge the lamb in the flour mixture, add to pot, brown on all sides
3. Add meat broth, simmer for 1 hour (longer if using mutton)
4. Add the vegetables, fresh rosemary, parsley, salt to taste
5. Cook till veggies soft
6. For a thick stew, put 2 tablespoons of corn starch in a separate dish, mix in small amount of cold water to make a slurry, stir into the stew and allow a few minutes on low or residual heat.

Panel to Plate Recipes



LAMB BURGERS

Serves 6 | Prep Time: 10 min. | Cook Time: 8 min.

INGREDIENTS:

- 1 slice white bread, crust removed and cut into ¼-inch pieces
- 2 tablespoons milk
- ½ cup finely chopped shallots, from 1 to 2 shallots
- 2 cloves garlic, minced
- 3 tablespoons finely chopped fresh mint
- 1 teaspoon dried oregano
- ½ teaspoon salt
- ½ teaspoon freshly ground black pepper
- ½ pounds ground lamb

DIRECTIONS:

1. Preheat the grill to high heat.
2. Combine the bread pieces and milk in a medium bowl. Mash with a fork until a paste forms. Add the shallots, garlic, mint, oregano, salt, and pepper; mix well. Add the lamb, then use your hands to mix until well combined. Form the meat mixture into 6 oval-shaped patties about ½-inch thick.
3. Grill the patties, covered, until nicely browned on the first side, 2 to 4 minutes. Flip the burgers and cook for a few minutes more until desired doneness is reached. Place burgers on a tray and cover with foil while you warm pita rounds on the grill.
4. Top; you can make your own sauce or top with any cheese of your choice!

Panel to Plate Recipes

Panel to Plate Recipe – Margarita Lamb Taco Salad with Mango Salsa

With short days and chilly weather ahead, it's the perfect time for a quick and fun meal. Try our new...

Panel to Plate Recipe – Mom's Lamb Stew

With Fall upon us, it's time for a comfort meal. Try out Mom's Lamb Stew, our latest Panel to Plate recipes...

Panel to Plate Recipe – Lamb Burgers

Looking for a new meal idea? Try our first Panel to Plate Recipe, Lamb Burgers! Thank you to Jess Gray for...

Solar Grazing: A New Opportunity. This 5-minute short film illustrates the incredible opportunities solar grazing is creating for farmers across the United States.



THE AMERICAN SOLAR GRAZING ASSOCIATION PRESENTS:

Pastures and Panels: The Power of Solar Grazing



THE AMERICAN SOLAR GRAZING ASSOCIATION PRESENTS:

Texas Solar Shepherds

Please Join Us!
Membership details on our website
Subscribe to our newsletter via QR and homepage

THANKS!
See Ewe Later!



www.Solargrazing.org

Drop me a line: stacie@solargrazing.org