Mitigating Hazardous Ammonia and Manure Odors in Chicken Housing Using Switchgrass Bedding

ID: 1458918
Link to share: https://projects.sare.org/proposals/1458918/6193/
Grant: 2027 Northeast SARE Research for Novel Approaches
Status: Not submitted
Amount Requested: $95,913.40
Applicant: Will Brandau

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Project Leader: Will Brandau

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Additional Editor: Amy Barkley

Livestock and Beginning Farm Specialist
Cornell University (1862 Land Grant)
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10980 Allen Road
East Concord, NY 14055
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Description for search results if funded: Manure gas odors from chicken bedding are a nuisance, and are undesirable. In particular, ammonia in these housing environments can be hazardous to both humans and chickens. This study will test to determine if switchgrass bedding reduces the release of ammonia gases.

General Information

Primary State

Pennsylvania

Primary Commodities

- **Agronomic**

        - grass (misc. perennial)
    - **Animals**
        - poultry
    - **Animal Products**
        - eggs
        - other

Primary Practices

- **Animal Production**
    - animal protection and health
    - manure management

Primary Benefits and Impacts

- **Economic Sustainability**
    - Improved income or profitability
- **Environmental Sustainability**
    - Improved soil quality/health
- **Production and Production Efficiency**
    - Improved livestock production and/or production efficiency

Project Start Date

April 1, 2027

Project End Date

May 1, 2029

Project Summary

Project Focus:
This project will investigate whether switchgrass bedding can improve air quality in poultry housing while maintaining bird health and supporting an expanded market for perennial warm-season grasses. All 6 participating farmers have experience raising chickens. Ammonia accumulation in poultry housing can be harmful to both birds and the

people caring for them. Farmers frequently use large ventilation fans to disperse ammonia and improve air quality, but operating these fans adds to production costs. It is not at all practical for a backyard chicken farmer to install such a fan.

Solution and Approach:

The potential for perennial warm-season grasses to improve poultry-house air quality warrants further investigation. In addition to possible benefits for poultry operations, increased use of switchgrass bedding could create an additional market for warm-season grasses, whose environmental benefits are well established. Anecdotal evidence suggests that switchgrass may reduce ammonia odor in poultry housing. (1,3) During Farmer Grant FNE17-865, Single-producer-scale preparation of warm-season grass for poultry bedding, switchgrass bedding was supplied for approximately 900 poultry cages at the Bloomsburg Fair, three county fairs, and approximately 800 poultry cages at the Harrisburg Farm Show. Staff at these locations reported reduced ammonia odor. However, few studies have used scientific instruments to directly compare air quality associated with switchgrass and pine-shaving bedding. This project will address that gap. Six farmers will participate. Each will receive a new chicken coop to avoid residual ammonia from previously used housing. Each coop will contain the same number of chickens receiving the same feed. Three coops will begin with pine shavings and three with switchgrass bedding. Farmers will use handheld air-quality meters to measure ammonia levels and manure odor before and after bedding changes and will report results to Will Brandau.

SARE's legislative priorities and how this project addresses each of them.

1. **Maintain and enhance the quality and productivity of the soil** - Wood waste in the discarded poultry manure will decompose producing acetic acid. Switchgrass in the manure wasted will not produce acid as it decomposes. Thus, being better for soil health. Other ways switchgrass can improve the productivity of the soil are by improving the carbon to nitrogen ratio, preparing the soiled bedding for composting and utilization as a nutrient amendment on farms.

2. **Conserve soil, water, energy, natural resources, and fish and wildlife habitat** - Poultry operations run fans to remove ammonia from their poultry house. Reduced ammonia will result in less use of the fans thus reducing energy requirements.

3. **Maintain and enhance the quality of surface and ground water** - Sources of switchgrass for bedding include riparian buffers put in place to filter run off water. It can be planted in fields not good for row crop production because it is perennial and does not require working the ground.

4. **Protect the health and safety of persons involved in the food and farm system** - Ammonia Gas is hazardous to humans. Eliminating or at the very least reducing ammonia levels would improve working conditions for farm personal.

5. **Promote the well-being of animals** - Ammonia Gas is hazardous to poultry. Eliminating or at the very least reducing ammonia levels would improve poultry house environments.

6. **Increase employment opportunities in agriculture** - If widespread adoption of switchgrass bedding is achieved through this project the increased demand for switchgrass will require increased planters, growers and distributors of the bedding.

Context

Farmer Interest and Involvement (400-word limit)

We will work with 6 backyard birders in Luzerne County. Participants were selected based on reliability, poultry experience, their ability to follow the project protocol and proximity to our distribution point of feed and bedding.

We will provide each identified farmer a new poultry coop. New because used wood coops can absorb and hold ammonia odor.(13) They will receive 15 pullets and enough food and bedding for four weeks, once a month. The farmers will also be asked to change the bedding once every 2 weeks the first year and then once a month the second year. In addition, each farmer will receive a handheld basic ammonia and manure odor tester purchased from Forensics Detectors. These will be calibrated so all six units are in sync. Farmers will be asked to measure ammonia odor before changing bedding and again after changing bedding. These readings will be conveyed to Will Brandau who will maintain on going records of the readings. Farmers will be required to come to the central distribution point, Trumbower Farm and pick up food and bedding as needed. Those farmers will not be paid. The new coop, the chickens, chicken feed and the eggs produced will serve as their compensation.

There are over 168,000 commercial poultry farms in the USA. (12) According to Axios Raleigh in a article entitled "The Flock to Backyard Chickens" there are over 11 million backyard chicken growers in the USA (2). If we can prove switchgrass reduces ammonia odor, we will open a massive market of switchgrass growers and potentially improve chicken house environments not only in the Northeast but nationwide.

Previous Work (500-word limit)

In April 2023, Penn State Extension published "Autodetecting Ammonia in Poultry Housing Using Inexpensive Instruments."; The article explains that when ammonia odor is clearly detectable upon entering a poultry house, concentrations may already exceed recommended levels. It also describes causes of ammonia accumulation and methods for measuring ammonia. (8) Switchgrass was not discussed.

Amy Barkley, while a graduate student, studied multiple poultry bedding materials, including switchgrass. Her study found no difference in ammonia levels between switchgrass and pine shavings under the conditions tested. In correspondence regarding the study, she explained that pine shavings and switchgrass, regardless of processed particle size below three inches, performed similarly in retaining ammonia when

evaluated by ammonia flux rate. (9)

FDCE Conservation and Bioenergy developed a switchgrass-based product called ABSORB and stated in its publication, "Switchgrass as a Poultry Bedding," that switchgrass provides improved moisture absorption, may reduce ammonia levels and associated health risks, and is a renewable material without chemical treatments. When contacted for supporting ammonia measurements, the company was unable to provide data. These mixed observations - favorable field reports but limited instrument-based evidence - demonstrate the need for a controlled, on-farm comparison.

Gaps - Research, Participation, etc.

Ammonia exposure can irritate or damage the skin, eyes, nose, throat, and lungs. The severity of health effects depends on concentration, duration, and route of exposure. (6) In poultry, excessive ammonia can damage the respiratory system, irritate the eyes, contribute to skin lesions such as hock burns, impair immunity, reduce production, and increase susceptibility to disease. Maintaining adequate ventilation and dry, clean litter is therefore
important for flock health. (7,11) Although anecdotal reports suggest that switchgrass bedding may reduce ammonia odor, objective on-farm measurements are limited. Determining whether switchgrass produces a measurable reduction in ammonia or other manure-related gases would provide useful information for poultry producers and switchgrass growers.

Citation List (no word limit)

1. Benefits of Native Warm Season Grasses as Poultry Bedding, awsgp.org/benefits
2. The flock to backyard chicken farming web article, February 20,2024, https://www.axios.com/local/raleigh/2025/02/24/the-flock-to-backyard-chicken-farming
3. Ad for Switchgrass Bedding, https://www.terrapousse.com/shop-our-products/p/switchgrass-bedding
4. Case Study of Switchgrass Bedding and Bioenergy Production, August 7,2024, https://extension.psu.edu/case-study-of-switchgrass-bedding-and-bioenergy-production
5. Top 30 Chicken Influencers in 2026, January 8, 2026, https://influencers.feedspot.com/chicken Instagram influencers/
6. Ammonia Chemical Fact Sheet, September 26, 2024 https://www.cdc.gov/chemical-emergencies/chemical-fact-sheets/ammonia.html
7. Ammonia Toxicity in Chickens, October 25, 2018, https://www.backyardchickens.com/articles/ammonia-toxicity-in-chickens.74475/
8. Detecting Ammonia in Poultry Housing Using Inexpensive Instruments, January 10, 2026, https://extension.psu.edu/detecting-ammonia-in-poultry-housing-using-inexpensive-instruments

9. Renewable alternative bedding for commercial broiler chicken production, December 31, 2017, https://projects.sare.org/sare_project/gne16-127/
10. Ammonia: The Hidden Danger in the Coop, Lucerne Farms, https://lucernefarms.com/ammonia-the-hidden-danger-in-the-coop/
11. Ammonia emissions in poultry barns and management strategies, December 6, 2022, https://en.engormix.com/poultry-industry/poultry-litter/ammonia-emissions-poultry-barns_a51613/
12. USDA National Agricultural Statistics Service, 2022, https://www.nass.usda.gov/Publications/Highlights/2024/Census22_HL_Poultry.pdf
13. Lucerne Farms https://lucernefarms.com/smelly-chicken-coop/
14. Cornell University Policy 3.11 https://policy.cornell.edu/sites/default/files/vol3_11.pdf

Optional: Farmer Testimonials (Upload)

Matt Pugh

Kali Winters

Jared Moss

Nicole Ourso

Rachel Pugh

Project Team

Project Team (300-word limit)

As the Project Leader, Will Brandau will oversee all research, implementation, and outreach activities. Retired school teacher. Will serves as the Chairman of the Association of Warm Season Grasses and brings over 20 years of dedicated experience in switchgrass cultivation. His expertise is bolstered by his participation in three previous SARE grants, including a project specifically focused on engineering machinery to process switchgrass into poultry bedding. Will helped Bruce Trumbower successfully launch a switchgrass bedding business. This practical experience ensures he is uniquely qualified to manage the production of bedding materials, coordinate and train poultry producers, and translate research findings into actionable, market-ready solutions for the farming community.

Bruce Trumbower 21 Bonham Road Hunlock Creek PA 18621 www.trumbowerfarms.com 272-436-2992 Bruce Farms over 60 acres of switchgrass. Using knowledge learned in a

previous SARE grant he developed a successful switchgrass bedding business distributing product to 10 local stores. He will store and distribute supplies and work with farmers.

Sue Nielsen Executive Director of Penn Soil RC&D Council 814-726-1441 and the Executive Committee of Penn Soil RC&D Council, an IRS approved 501-c-3 non-profit organization have agreed to our request to act as the fiscal agent for the grant should we be successful in securing SARE funding. Penn Soil RC&D Council has successfully served as the fiscal agent on 3 previously completed SARE project grants for AWSGP.

Amy Barkley, Livestock Specialist and Team Leader for the Cornell Cooperative Extension SWNY Dairy, Livestock & Field Crops, Drawing on her extensive poultry expertise and her background as a former SARE grant recipient researching switchgrass as poultry bedding(4), Amy will lead the statistical analysis of all collected research data.

Roger Cushwa, Chief Executive Officer CRC Biofuel Solutions of America, Inc. +1.804.801.8295 crcbiofuelsolutions.com His company developed a switchgrass poultry bedding. He will serve as an advisor.

Project Team Verification Form (Upload)

Barkley NortheastProjectTeamVerification

Bruce NortheastProjectTeamVerification

Roger NortheastProjectTeamVerification

Sue NortheastProjectTeamVerification 2027 SARE grant

Decision Making Process (200-word limit)

Will Brandau a retired school teacher will train all farmers in what is expected of them in this project. He will train them in the use of the ammonia meters. He will assist in establishing the coops and the chickens. He will coordinate with Sue Nielsen items to be purchased. All data will be reported to him. He will maintain that data in an Excel Spreadsheet for future analysis.

Sue Nielsen will order all items and pay all invoices

Amy Barkley will co-author the grant application and perform the statistical analysis of the collected data.

Bruce Trumbower will assist in the setup of the coops. He will store and distribute all supplies. He will periodically communicate with farmers and address their concerns and ideas.

Roger Cushwa will function as an advisor on the project. His company is in an ideal position to develop and distribute switchgrass poultry bedding should the project prove it is a more desirable bedding for poultry.

As Bruce and Will are the only two on the team in close proximity to each other, this team will meet remotely, bi-monthly to address any issues associated with the project. They will meet sooner if an issue requires it.

Accountability Plan (300-word limit)

This project establishes direct, farmer-led accountability through a participatory research model that ensures poultry producers actively shape implementation and evaluation.

Accountability Structures: We will utilize a farmer-advisory mechanism built into our testing network. Participating poultry producers are not merely trial sites; they are core partners whose hands-on feedback dictates operational adjustments.

Farmer Involvement: Farmers will be directly involved in establishing the switchgrass bedding trials within their backyard chicken houses, monitoring daily conditions, and operating ammonia meters under Will Brandau's guidance. Their day-to-day operational insights will ensure that the bedding performance is tested under realistic conditions.

Feedback Mechanisms & Learning: We will implement structured bi-weekly remote check-ins between Will Branda and participating farmers, complemented by open lines of communication with Bruce Trumbower for immediate supply and operational feedback. Data collected-including ammonia levels, labor requirements, and material handling ease-will be reviewed collaboratively. If farmers encounter unexpected challenges with moisture management or bedding distribution, protocols will be rapidly adjusted based on their ground-level experience.

Team-Farmer Relationships: Relationships between the project team (many of whom have extensive farming backgrounds, such as Bruce Trumbower and Will Brandau) and participating growers are rooted in mutual respect and peer-to-peer collaboration. By working closely and sensitively together, the team ensures that research outcomes directly translate into practical, economically viable, and farmer-approved solutions for the broader agricultural community.

Research and Outreach

Research Description (1,200-word limit)

Research Question or Hypothesis

Does switchgrass bedding control ammonia gas in a chicken house better than pine wood chips?

Design Approach

Data will be collected over two years to compare switchgrass bedding with kiln-dried pine shavings purchased from a local farm supply store. Six coops, each housing 15 laying hens of the same age and breed, will be located on six farms in and around Luzerne County, Pennsylvania. Participants were selected based on reliability, poultry experience, and ability to follow the project protocol. Each farmer will receive procedures for data collection and hen care so management is as consistent as practical across sites.

Standardized Project Materials:

Chicken coop and run: Each participant will receive a 7-foot-by-6-foot coop with an attached 7-foot-by-14-foot run. Standardizing the coop footprint and floor type will reduce housing-related variation. A new coop will eliminate carryover ammonia and manure odors from previous flocks. Coops will have wheels so they can be moved as needed, reducing manure buildup in the run and supporting hen welfare. Feeder and waterer: Standardized equipment will be used to reduce differences in feed waste and water spillage among sites. Fifteen production-type laying hens: Each site will receive 15 ready-to-lay hens from Hoover Hatchery (Moyers). Using hens of the same source, age, and production type will help standardize stocking density, fecal output, and manure consistency.

Feed: All flocks will receive the same laying-hen feed and supplemental oyster shell. Participants will be instructed not to provide other feed, treats, kitchen scraps, or garden waste.

Bedding: Participants will receive either baled kiln-dried pine shavings or baled switchgrass bedding in equivalent amounts. The three farms assigned to one bedding material in year one will switch to the other bedding material in year two.

Treatments:
The study will compare two bedding treatments: processed switchgrass and kiln-dried pine shavings.

Methods:
Each coop will house 15 birds. Feed, stocking density, equipment, bedding depth, and management instructions will be standardized as closely as possible. The primary treatment difference will be bedding type. Three coops will begin with pine shavings and three with switchgrass. Switchgrass will be processed to 1.5 inches or less in length and will be approximately 95% dust-free. Pine shavings will be purchased from the same local farm-supply source. Four inches of bedding will be applied after each cleanout. Before birds arrive, the assigned bedding will be placed in each coop and a baseline air-quality reading will be taken. Ammonia and manure-related gases will be evaluated using a Basic Ammonia Detector, an H2S meter from Forensics Detectors. During year one, bedding will be evaluated and replaced every two weeks. During year two, bedding will be evaluated and replaced monthly. At each scheduled interval, farmers will measure ammonia before bedding removal, score manure caking, replace the bedding, and measure ammonia again to establish a post-change baseline. To reduce disease transmission between

flocks, including avian influenza, routine check-ins will be conducted electronically after the initial in-person equipment training and coop setup. Feed and bedding will be available at a central pickup location.

Data Collection:
Data will be submitted remotely. Farmers will receive reminders about scheduled measurements and coop cleanouts, and assistance will be available to help ensure that bedding changes and meter use follow the project protocol. Air quality: Each farm will receive an ammonia meter that is calibrated and checked before distribution so the meters provide comparable readings. Farmers will be trained to take measurements at bird level and will follow a common testing and cleanout schedule.

Egg production and flock observations:

Farmers will report the total number of eggs collected each week and immediately report any hen losses. Egg counts will allow the project to examine whether production differs with ammonia conditions and will also provide a basic indicator of flock performance over time.

Data Analysis and Presentation of Results:
With three coops receiving each bedding treatment at any given time, the project will calculate and compare treatment averages for ammonia readings, and egg production. Amy Barkley will assist with evaluating the data to determine whether statistically significant differences exist between treatments. Results will also be graphed to examine possible seasonal patterns.

To effectively evaluate the efficacy of switchgrass bedding, we will compare ammonia concentrations in switchgrass-bedded coops against those utilizing kiln-dried pine shavings. Regulatory and animal welfare standards indicate that ammonia levels exceeding 25 ppm are hazardous to poultry, with concentrations above 10 ppm potentially causing significant respiratory irritation(8). Therefore, our primary success metric is a statistically significant reduction in mean ammonia levels within the switchgrass treatment groups compared to the pine shavings control group. Data analysis will further validate these findings by correlating ammonia reduction with egg production trends and seasonal environmental variables.

Dealing with a failing participant

To ensure robust data integrity, Will Brandau will actively monitor participant compliance by tracking reporting consistency and timeliness. In the event of non-compliance-such as irregular data submissions or failure to adhere to the project protocol-Mr. Brandau will initiate a two-step intervention process. First, he will conduct an on-site visit to address the issues directly with the participant and provide remedial training. If non-compliance persists, he will terminate that specific partnership, relocate the coop and poultry, and re-establish the site elsewhere to ensure the continuity and reliability of the data set.

Steps to Adoption of the Novel Approach
If the study demonstrates that switchgrass controls ammonia or other manure-related gases more effectively than pine shavings, the results will be shared with poultry

producers so they can make informed decisions about bedding selection. Switchgrass bedding is commercially available from several sources and it can also be produced by growers. Switchgrass can be grown on marginal land and is a perennial, drought-tolerant warm-season grass with a deep root system. These characteristics may make locally produced switchgrass bedding an additional market opportunity for growers.

Measuring Success (300-word limit)

To facilitate the widespread adoption of switchgrass bedding, the project must address the current gap between regional production and the poultry industry. While Bruce Trumbower has successfully established a local distribution network, scaling this approach requires a more robust infrastructure. We identify three primary barriers to adoption: initial access to processed material, the lack of standardized industrial infrastructure, and the need for a national distribution supply chain.

To overcome these, we propose the following strategic implementation steps:

Essential Resources and Infrastructure:
The primary requirement is the establishment of a national processing center equipped with industrial-grade hammer mills for grinding and trommel mills for dust extraction and bagging. Such technology is already proven; for example, Ken Mills Engineering produces specialized units designed for this purpose. A facility utilizing this technology is currently operational in Canada (https://www.empireswitchgrass.com/), which our team has visited to validate the production process.

Path to Implementation:
1. Infrastructure Replication: We aim to encourage the development of similar processing facilities within the Continental United States to reduce transportation costs and carbon footprints.
2. Distribution Networks: By partnering with existing agricultural distribution companies, processed switchgrass can be integrated into standard supply chains, making it as accessible to poultry producers as traditional wood shavings.
3. Economic Scalability: As demand increases, the transition from local sourcing to a national distribution model will allow producers to leverage economies of scale, making switchgrass a cost-competitive and sustainable alternative for the poultry industry.

By bridging the gap between existing warm-season grass growers and the poultry market through standardized processing and established distribution channels, this research provides the roadmap for a commercially viable, bio-based solution to ammonia management in poultry housing.

Should we not prove our original premise, switchgrass will still be used by backyard poultry growers because of local availability and wide acceptance as an easy to use bedding.

Outreach and Dissemination (300-word limit)

Outreach and Dissemination

Study results will be disseminated through multiple channels. Final findings will be emailed to approximately 300 members of the Association of Warm Season Grass Producers. Throughout the two-year project, we will share regular announcements and updates via poultry-focused and Switchgrass-focused Facebook and Instagram groups, inviting interested producers to follow our progress and findings. To further broaden our reach, the project team will connect with influencers identified through Feedspot's poultry-focused networks, while targeted outreach to community Facebook groups will ensure the study reaches backyard and small-scale poultry producers. Our goal is to ensure the study methods, observations, and final results remain accessible and actionable for both poultry producers and warm-season grass growers.

Lancaster Farming Publication will be used to reach poultry folks about switchgrass bedding. Tom Venesky has written several articles for the publication on switchgrass. He has demonstrated an interest in switchgrass projects in the past.

We will pass our results onto Penn State University Poultry Team. It may be something to continue looking into for the commercial industry housing. While larger production facilities aren't or are of focus, this may open the door to potential future research.

Optional: Other Relevant Research Information (Upload)

Farmers participating in project

Budget

Spreadsheet / Budget Justification and Narrative Template (Upload)

NortheastSAREBudgetJustificationandNarrativeTemplateforFullProposals AWSGP

Other Funding Sources (200-word limit)

The primary expense in this proposal is the acquisition of six new chicken coops. Because existing coops are typically constructed from wood-a material known to absorb odors-relying on the farmers' pre-owned structures would introduce significant variables in coop size and baseline ammonia saturation, potentially compromising our data integrity. To ensure consistency across all test sites, we are purchasing new equipment for all six participating farms. These farmers are donating their time and labor to the project; in exchange for their participation, they will receive the coops, chickens, and necessary supplies at no cost for the two-year duration of the study, after which they will retain full ownership of all provided assets.

The project benefits from significant in-kind contributions, including the donated time and

labor of all participating farmers, who will facilitate study activities at no additional cost. Furthermore, Amy Barkley will perform the statistical analysis of the collected data on a pro bono basis. Per Cornell University Policy 3.11, as a university employee, she is prohibited from receiving additional compensation for grant-related work outside of her standard job responsibilities. These contributions are essential to the project's successful execution and data integrity.

Total Direct Costs Requested

87,194.00

Total Indirect Costs Requested

8,719.40

Total SARE Request

95,913.40

Host Organization

Authorized Official Contact Information

Sue Nielsen

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FDP Clearinghouse Information

- No



US Department of Agriculture

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Phone interview with Matt Pugh

All right, Matt. Matt Pugh, What is your address?
3268 Main Road, Honlock Creek, PA, 18621.

Phone number?
570-466-2250.

And your email?
mpugh124@gmail.com.

Okay, and how long have you had chickens?
Close to 17 years.

Wow, 17 years. That's great.
Why do you want to participate in the project?
Because I'm always interested in new ideas to take care of my flock and to make sure they live long, happy lives.

Excellent. And do you have two years that you'll be able to complete the study?
Yep, absolutely.
God willing?

Yep, God willing.
Yeah. All right. Thank you, Matt.

Phone interview with Kali Winters

Your name is Kali Winters your address is 28 Bloomingdale Road Shickshinny, PA 18655 phone number 570-417-6569 email kwinter93@outlook.com

How many chickens do you have?
16

How long how long have you had chickens?
Two years

Why do you want to participate in the project
I think it is a wonderful opportunity to get more information out there about the switchgrass which works great in our chicken coops

Will you be able to complete the two-year study with assistance from the team
Absolutely

Thank you very much
You're very welcome

Phone interview with Jared Moss

All right. Your name is Jared Moss. What is your address?
332 Spring Hill Drive, Hunlock Creek, PA.

And your phone number?
570-840-3416.

And your email
Jared3388@AOL.com.

Okay. And how long have you had chickens, Jared?
Roughly.
15 years.

Okay. And why do you want to participate in the study?
To see if what you have is better for their health.

Excellent. And you'll be able to complete two years of this study?
Yes.

In unforeseen circumstances?
Yes.

All right. Well, thank you very much.

Phone interview with Nicole Ourso

Hello Nicole, Nicole Ourso

What is your address?
113 Lakeview Drive, Sweet Valley, PA 18656

Phone number?
570.852.0765

And your email?
tyleigh417707@gmail.com

How long have you had chickens?
I've been raising chickens 8 years.

Super
Why do you want to participate in the project?
I've been using switchgrass bedding already and I love it. I want to help in any way I can.

Do you have two years that you'll be able to complete the study?
Yes, for sure.

All right. Thank you, Nicole

Phone interview with Rachel Pugh

When, what's your address, Rachel?
333 Whitehaven Road, Bear Creek, Pennsylvania.18602.

Phone number?
570-550-1500.

Email?
rpugh,13@gmail.com.

And how long have you had chickens?
I've had chickens since 2022.

Okay, and why do you want to participate in the research project?
Because I think that this could be beneficial to chickens. It could be beneficial to our environment. And I like more natural products. So if I could introduce more natural products to my chickens and help others do the same, then I'm glad to participate.

And do you believe you'll be able to participate for the full two years?
Yes, I do.

Thank you very much, Rachel.
You're welcome, Bruce.

Project Team Verification Form

For the following Northeast SARE grant programs:
Professional Development Program
Research and Education
Research for Novel Approaches
Farming Community

Date:10/2/26

I, Full Name: Amy Barkley, confirm my commitment to the project titled:

> ***Project Title**:* Mitigating Hazardous Ammonia and Manure Odors in Chicken Housing Using Switchgrass Bedding

This proposal is submitted to Northeast SARE's 2027 Novel Approaches
by Will Brandau, Association of Warm Season Grass Producers

As a *Role/Position, e.g., Researcher, Farmer Collaborator, Advisor, etc.*: I will be an advisor on this project and have reviewed the full proposal, including the plan of work and budget, and support the objectives and approach outlined in the application.

I understand my role in the project and agree to participate as described in the proposal.

Project Team Member Signature: _____*Amy M. Barkley*_____

Date: ____10/2/26_____

Project Team Member:

Printed Name: _Amy Barkley_____
Organization (if applicable): ___Cornell University, Cornell Cooperative Extension_
Email: ____amb544@cornell.edu_____
Phone:__716-640-0844_____

Instructions:

1. **Applicant**: please complete fields in Blue. Provide your project title, name and share with your project team member with a due date to return to you. Northeast SARE recommends providing a link to your proposal directly in the letter for transparency. Account for time needed to add this form to your proposal, as it is due at the time of the proposal submission.

2. **Project Team Member:** please complete all fields in yellow, sign the document, and return to the applicant. A digital signature is OK.

3. **Applicant Submission / Upload Instructions:** Please ensure the project team member completed their required fields. PDF uploads are preferred for system usability, though photo files / images will be accepted. Please ensure uploaded PDF files are unprotected and accessible. Letters must be uploaded with your proposal **and** submitted by the proposal deadline.

Project Team Verification Form

For the following Northeast SARE grant programs:
Professional Development Program
Research and Education
Research for Novel Approaches
Farming Community

Date:10/19/2026

I, Bruce Trumbower: , confirm my commitment to the project titled:

Project Title: Mitigating Hazardous Ammonia and Manure Odors in Chicken Housing Using Switchgrass Bedding

This proposal is submitted to Northeast SARE's 2027 Novel Approaches

As a *Researcher, Farmer Collaborator and Advisor* , I have reviewed the full proposal, including the plan of work and budget, and support the objectives and approach outlined in the application.

I understand my role in the project and agree to participate as described in the proposal.

Project Team Member Signature: *Bruce Trumbower*

Date: _____10/19/2026____

Project Team Member:

Printed Name: _Bruce Trumbower
Organization (if applicable): AWSGP
Email:trumbowerbruce@gmail.com
phone:_272-436-2992

Instructions:

1. **Applicant**: please complete fields in Blue. Provide your project title, name and share with your project team member with a due date to return to you. Northeast SARE recommends providing a link to your proposal directly in the letter for transparency. Account for time needed to add this form to your proposal, as it is due at the time of the proposal submission.

2. **Project Team Member:** please complete all fields in yellow, sign the document, and return to the applicant. A digital signature is OK.

3. **Applicant Submission / Upload Instructions:** Please ensure the project team member completed their required fields. PDF uploads are preferred for system usability, though photo files / images will be accepted. Please ensure uploaded PDF files are unprotected and accessible. Letters must be uploaded with your proposal **and** submitted by the proposal deadline.

Project Team Verification Form

For the following Northeast SARE grant programs:
Professional Development Program
Research and Education
Research for Novel Approaches
Farming Community

Date: October 2, 2026

I, Full Name: Roger Cushwa, confirm my commitment to the project titled:

Mitigating Hazardous Ammonia and Manure Odors in Chicken Houses using Switchgrass

This proposal is submitted to Northeast SARE's 2027: Novel Approaches by Will Brandou, Association of Warm Season Grass Producers

As an Advisor, I have reviewed the full proposal, including the plan of work and budget, and support the objectives and approach outlined in the application.

I understand my role in the project and agree to participate as described in the proposal.

Project Team Member Signature: *Roger Cushwa*

Date: October 2, 2026

Project Team Member:

Printed Name: Roger Cushwa
Organization (if applicable): CRC Biofuel Solutions of America, Inc.
Email: roger.cushwa@crcbiofuelsolutions.com
Phone: +1 (804) 801 - 8295

Instructions:

1. **Applicant**: please complete fields in Blue. Provide your project title, name and share with your project team member with a due date to return to you. Northeast SARE recommends providing a link to your proposal directly in the letter for transparency. Account for time needed to add this form to your proposal, as it is due at the time of the proposal submission.

2. **Project Team Member:** please complete all fields in yellow, sign the document, and return to the applicant. A digital signature is OK.

3. **Applicant Submission / Upload Instructions:** Please ensure the project team member completed their required fields. PDF uploads are preferred for system usability, though photo files / images will be accepted. Please ensure uploaded PDF files are unprotected and accessible. Letters must be uploaded with your proposal **and** submitted by the proposal deadline.

Project Team Verification Form

For the following Northeast SARE grant programs:
Professional Development Program
Research and Education
Research for Novel Approaches
Farming Community

Date: 10/11/2026

I, Full Name: Sue Nielsen, confirm my commitment to the project titled:

> ***Project Title**: Mitigating Hazardous Ammonia and Manure Odors in Chicken Housing Using Switchgrass Bedding*

This proposal is submitted to Northeast SARE's 2027 program name : 2027 Northeast SARE Research for Novel Approaches

by Applicant Name and/or Organization: Will Brandau, Association of Warm Season Grass

As a *Role/Position, e.g., Researcher, Farmer Collaborator, Advisor, etc.*:
I have reviewed the full proposal, including the plan of work and budget, and support the objectives and approach outlined in the application.

I understand my role in the project and agree to participate as described in the proposal.

Project Team Member Signature: _____Sue Nielsen_____

Date: ____10/22/2026_____

Project Team Member:

Printed Name: ____Sue Nielsen_____
Organization (if applicable): __Penn Soil RC&D Council___
Email: ___pennsoilrcd@wcconservation.net_____
Phone:_____814-726-1441_____

Instructions:

1. **Applicant**: please complete fields in Blue. Provide your project title, name and share with your project team member with a due date to return to you. Northeast SARE recommends providing a link to your proposal directly in the letter for transparency. Account for time needed to add this form to your proposal, as it is due at the time of the proposal submission.

2. **Project Team Member:** please complete all fields in yellow, sign the document, and return to the applicant. A digital signature is OK.

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Farmers participating in project:

1. Kali Winter 570.417.6569, 28 Bloomingdale Rd, Shickshinny, PA 18655, kwinter93@outlook.com
2. Nicole Ourso 570.852.0765, 113 Lakeview Drive, Sweet Valley, PA 18656, tyleigh417707@gmail.com
3. Jarod Moss, 570.840.3416, 332 Spring Hill Drive, Hunlock Creek, PA 18621, jarod3388@aol.com
4. Matt Pugh, 570.466.2250, 3268 Main Road, Hunlock Creek, PA, 18621, mpugh124@gmail.com
5. Rachel Pugh, 570.550.1500, 333 White Haven Road, Beaver Creek, PA 18602, rpugh13@gmail.com
6. Britt Trumbower, 570.814.7024, 5 Bonham Road, Hunlock Creek, PA, 18621, deerbritt@aol.com