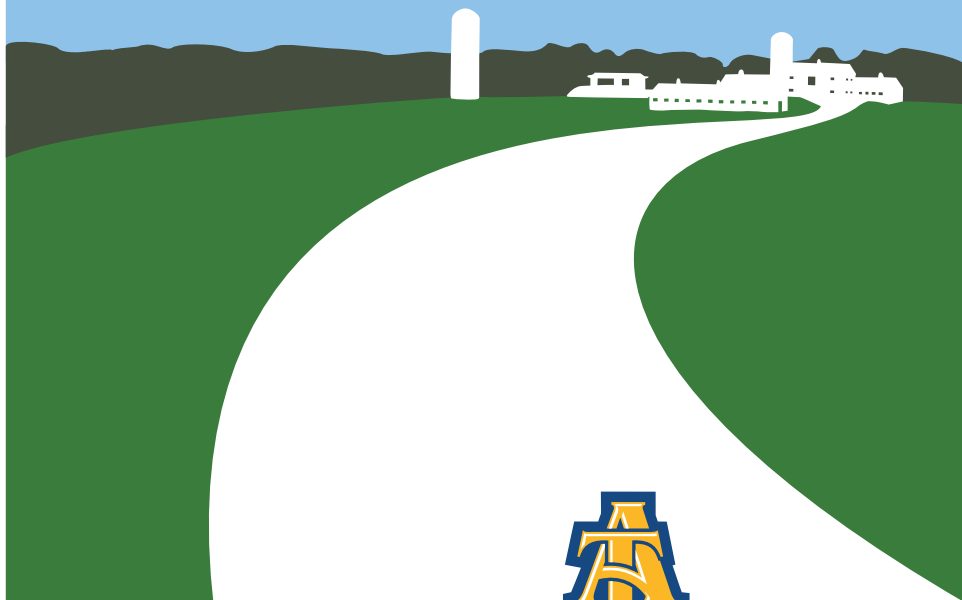


# Small Farms Field Day

Thursday, July 16, 2009



North Carolina A&T State University  
**UNIVERSITY FARM**

School of  
Agriculture & Environmental Sciences

# The Eighth Annual Small Farms Field Day

Thursday, July 16, 2009

N.C. A&T State University  
School of Agriculture and Environmental Sciences  
University Farm

8 a.m. – [Registration](#)

8:30 a.m. – [Welcome / Opening Remarks](#)

**Dr. Donald McDowell**, interim dean  
School of Agriculture and Environmental Sciences

**Dr. M. Ray McKinnie**, associate dean & administrator  
The Cooperative Extension Program

**Dr. Richard Robbins**, interim associate dean  
Research Program

**Dr. Keith Baldwin**, program leader/horticulture specialist  
The Cooperative Extension Program

8:45 a.m. – [Load shuttles](#)

9 a.m. – [Tours begin. Tours will rotate.](#)

## **TOUR A**

- Pastured hogs
- Pastured chickens

## **TOUR B**

- Specialty vegetables on different mulches
- Amaranth greens
- Asian eggplant
- Scotch bonnet hot pepper

11 a.m. – [Goat demonstration](#)

Noon – [Lunch provided](#)

## Pastured Poultry 101: Lessons Learned, Earned and Turned

**RESEARCHERS** – Dr. Willie Willis, and Anthony Hooks and Rick Holness

**OBJECTIVES** – To demonstrate the basic and applied lessons of producing meat chickens on pasture

**OPPORTUNITY** – Small farmers are constantly looking for ways to generate products more economically to better supply the market demands and stay in business. For small farmers producing pastured poultry, the market advantage is based on products being locally produced, and of offering poultry that is high quality, better tasting, healthier, and environmentally friendly. To meet these standards, small farmers must change and update their skills as research and outreach becomes available on this alternative production system.

**METHOD** – One hundred twenty, three-week old commercial Cornish cross broiler chickens will be placed on pasture in two separate houses after receiving some natural feed supplements to assess their influence on body weight, feed utilization and health. In one housing unit, supplemental feed will not be available at all times, only when the chickens return for overnight stays. The birds and pasture demonstration reflects the following considerations when designing and managing pastured poultry for profits: 1) Improved genetic stock; 2) Supplemental feed and pasture forages; 3) Shelter and shade; 4) Predator control (hawks, foxes, domestic dogs, others); 5) Biosecurity (disease, health); 6) Hot-weather management (fresh water, shade, dust baths); 7) Product safety (Salmonella, Campylobacter).

**DISCUSSION** – The healthiest pasture environment for birds is one that provides access to a variety of foods each day. Native plants, insects, seeds and vegetable crops are all worthy offerings. Because birds do not sweat, they must be provided shade, fresh water and dust bath soil conditions for cooling themselves in extreme heat during the summer. Protection from predators is also an ongoing consideration.

To keep the birds safe and healthy, use prebiotics or probiotics for digestive health and to keep out other harmful pathogens. We have successfully demonstrated how well probiotics work on birds at the A&T University Farm and also by using mushroom extract or fungus-myceliated grain to enhance the health of birds. Both mushroom extract and fungus-myceliated grain have been successfully used at this site to demonstrate this process.

## Kids Need Care: Evaluating Natural Resistance to Infection and Disease in Meat Goat Breeds

**RESEARCHERS** – Drs. M. Worku, R.C. Noble; and Yasser Ahmed, Hamid Mukthar and Garry Summers

**OBJECTIVES** – To address challenges faced by small scale meat goat producers in North Carolina by evaluating natural resistance against parasitic infections (and other disease states) in goats.

**OPPORTUNITY** – Meat goat production is one of the fastest growing agricultural production systems in the United States. This increase is the result of the rising demand for goat meat, low start-up costs, minimal labor requirements, the ability to use the animals for brush control and multi-species grazing, in addition to their prolific nature. This growth has created opportunities for producers, especially small-scale farmer looking for a profitable alternative enterprise to integrate into their existing production system. With this project, we hope to help small-scale farmers address challenges associated with breed selection, animal health and optimal production, when considering the development of a successful meat goat enterprise with emphasis on sustainability.

**METHODS** – Natural resistance to parasitic infection in Boer, Spanish and their crossbreeds was assessed. Data for health and infection indicators from 28 yearling and adult Boer x Spanish cross goats were analyzed. The utility of the FTA, easy to use “card” system for collection and storage of goat DNA for molecular analysis was evaluated to look at expression of natural resistance genes following natural parasite infections. Comparisons were made to FAMACHA scoring, body condition scoring and packed cell volume (PCV).

**DISCUSSION** – No significant differences were observed between cross-bred and Spanish goats in natural resistance to nematode infections. Adult goats had better body condition scores, heavier body weight and greater resistance to internal parasites than yearlings. Age specific management practices should be followed to ensure improvements in the health status of yearling goats. Collection and storage of caprine blood on FTA cards was simple and produced usable DNA for PCR. The process has been started to identify genes necessary for genetic diversity associated with susceptibility and resistance of goats to parasitic and inflammatory diseases. Natural resistance genes are expressed in naturally parasite-infected goats.

## Heritage Swine Breeds: Their Environmental Performance and Marketability for Niche Pork Production Systems

**RESEARCHERS** – Drs. S.H. Oh, C. Raczkowski, N. Whitley and R. Noble; and T. Barrios of N.C. A&T State University; and Drs. J. Green, D. Hanson, M. Morrow, T. See of N.C. State University

**OBJECTIVES** – Determine types of vegetation, growth characteristics and carcass characteristics of heritage crossbred hogs raised in hoop barns.

**OPPORTUNITY** – This project will help determine the sustainability of outdoor pork production systems utilizing a systems-based approach to better understand: 1) the potential for different grass species to best withstand grazing by gestating sows, 2) types of heritage breeds that are best suited for deep-bedded, hoop-barn production systems, and 3) taste characteristics and consumer preferences for heritage breed pork products.

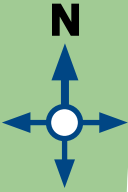
**METHODS** – Because of their extensive rooting behavior, gestating sows raised outdoors cause the greatest disturbance to soil. Research is being conducted to determine which grass species (native, Fescue varieties, Bermuda grass and mixtures) planted in outdoor production systems can best protect soil integrity.

Market opportunities for heritage breeds of swine (i.e., Berkshire, Large Black and Tamworth) and those bred to antibiotic free Yorkshire gilts (obtained from the Center for Environmental Farming Systems-CEFS) will be examined along with feed intake and growth patterns. An automated Feed Intake Recording Equipment (FIRE) system is in use to evaluate feed consumption parameters.

Offspring from the hogs will be randomly selected for slaughter to evaluate their carcass and meat-quality traits (i.e., weight, back fat thickness, muscle depth, loin eye color, firmness and marbling). Consumer taste panels will subsequently be conducted at the farmer’s market in Raleigh.

**DISCUSSION** – This project is investigating an opportunity for niche pork production systems in North Carolina. We are addressing marketability of heritage breeds produced in alternative production systems. We are also assessing concerns about natural-resource conservation, with a specific focus on maximizing vegetative ground cover and nutrient distribution in pastures.

Several wholesale buyers are offering North Carolina growers twice the current market price to supply this demand. The majority of niche pork buyers require pigs raised outdoors on pasture or in deep-bedded, hoop-barn systems. In North Carolina, outdoor production systems have raised concerns on nutrient loading, soil loss, and water quality impacts. Consumer interest in heritage breed pork continues to rise and we will be examining their taste characteristics and production potential in these alternative systems.



McCONNELL ROAD

Specialty Veggies  
Amaranth/Scotch Bonnet

Asian Eggplant

Organic  
Vegetables

Pastured Poultry

Goat  
Demonstration

Pastured Hogs

McCONNELL ROAD

LEE ST.



North Carolina A&T State University  
**UNIVERSITY FARM**  
3136 McConnell Road

## Ethnic Vegetable Trials of Amaranth and Scotch Bonnet Hot Peppers on a Plasticulture System

**RESEARCHERS** – Dr. Keith Baldwin and Rickie Holness

**OBJECTIVES** – To evaluate yield performance and commercial potential of ethnic vegetables in the Southeastern United States.

**OPPORTUNITY** – There is a sustained demand for tropical produce in the United States, such as amaranth and Scotch Bonnet peppers. This demand is driven by the growth in ethnic populations who want product diversity within the produce section in grocery stores. Amaranth (callaloo) has the advantage of providing tasty, leafy vegetable and seed of high nutritional quality, while supplementing a wide range of nutrients such as amino acids, protein, minerals and vitamins that aren't found in many other vegetables. Amaranth is a good choice in crop rotations.

Like other hot peppers, Scotch Bonnet peppers are cholesterol-free, low in calories, low in sodium and high in fiber. They provide more vitamin A than any other food plant and provide an excellent source of vitamins C and B.

**METHODS** – Vegetable amaranths are usually seed-propagated. However, seedlings can be used for transplanting. Planting depth is usually one-eighth to one-fourth of an inch; the seeding rate is 12-to-15 seeds per foot; plant spacing after thinning is 6 inches to 12 inches; and row spacing is 24 inches to 36 inches. The number of days from planting to first harvest ranges from 40 days to 47 days. The harvest season lasts from three-to-six months and a 1-acre field can yield an average of 11,000 pounds to 18,000 pounds, total. Amaranth has a high nutrient requirement, particularly for nitrogen, and so requires fertile soils for abundant growth. Good drainage helps to alleviate problems with root rot, which may be minimized by using raised beds.

Scotch Bonnet pepper seed should be started in a greenhouse six-to-eight weeks before field planting (after the last chance of frost). Plant spacing should be to 24 to 36 inches, with row spacing of 36 to 60 inches. The ideal soil type is a sandy loam with good drainage. Using drip irrigation with a plant population of 3,000 plants per acre generates an average yield of 800 pounds of fruit per week for three-to-four months. Higher yields may be obtained with more plants per unit area, but the plant population should not exceed 5,000 plants, per acre.

**DISCUSSION** – Amaranth (callaloo) can be grown in both tropic and temperate zones. Humid, sunny conditions are advantageous but not essential for growth. Because there is a wide range of variability within the group of plants called vegetable amaranth, growers should be prepared to try a number of different types and chose those most suited to their specific soil, management practices and weather conditions.

Scotch Bonnet is a habanero-related chile pepper that has a Scoville heat rating of 80,000-to-300,000 units, making it one of the hottest peppers that exists. It is also known as the most pungent, yet aromatic, flavored hot pepper. Scotch Bonnet growers should use high-quality seeds, and produce transplants in greenhouses and nurseries where good management practices are always observed. Seedlings must be transplanted only at the correct stage of growth: when they are not leggy, have not set fruit or started to flower, the stem is not extremely long compared to the rest of the plant, and the plant has at least three or four sets of true leaves. Growers should be strict about proper site selection, land preparation, and about the timely application of fertilizer and irrigation water. Appropriate pest and disease control techniques must be used, whether utilizing chemical and non-chemical methods.

## Specialty Eggplants for Crop Diversification

**RESEARCHERS** – Drs. M.R. Reddy, R. Ravella; and K. Taylor and A. Eloheid

**OBJECTIVE** – To evaluate alternative crops of high value for diversification.

**OPPORTUNITY** – Specialty eggplants have good market potential in supermarkets and ethnic markets, and also as an alternative crop for North Carolina farmers. In light of the declining tobacco cultivation in the state, opportunities to introduce new and alternative enterprises have engaged farmers looking for ways to diversify their production. Eggplant is also a moderate-cost crop, and its bush-type growth – which doesn't require staking (support) – makes it a comparatively easy vegetable to harvest and process.

**METHODS** – The specialty eggplant was produced in rotation with winter cover crops. Black plastic mulch and drip irrigation were used.

**DISCUSSION** – Most of the specialty eggplants that are marketed and consumed in North Carolina are currently produced and shipped from Florida and other places. These vegetables have a great potential as a specialty crop to be grown within our own state. Although limited information is available on the nutrient requirements and cultural practices of these vegetables under Piedmont conditions, the research at the University Farm continues in an attempt to resolve and address these questions. Already research has determined that it is best to grow specialty eggplant on fields where crimson clover and rye have been planted in the fall and grown until spring, making the land a more fertile site with enriched soil. During spring planting, the winter cover crops are turned into the soil, which provides a nitrogen-rich base for the eggplant. Cover cropping also prevents soil erosion.

## Alternatives to Plastic Mulch for Organic Vegetable Production

**RESEARCHERS** – Dr. Keith Baldwin and Rickie Holness

**OBJECTIVES** – The Cooperative Extension Program at A&T in collaboration with Sunshine Paper Company, an affiliate of WeedGuardPlus, Aurora, Colo. is working to evaluate degradable mulch products that can be used as effective and affordable alternatives to standard plastic mulch in organic vegetable production systems. The research also evaluates mulch products for durability, weed control and effect on crop yield.

**OPPORTUNITY** – Black plastic is widely used by farmers to control weeds, increase plant growth and shorten time to harvest. Though effective and affordable, plastic mulch has become an environmental concern due to disposal issues. The purpose of this trial was to identify degradable products that can be effective and affordable mulch alternatives to standard black plastic and have a better environmental impact.

**METHODS** – Black plastic, white plastic, landscape fabric and alternative brown paper mulches were tested in an organic vegetable production system. The mulches were evaluated for durability, weed control and effect on crop yield. Bell peppers (Tequila, Big Bertha, Gourmet, Early Sensation, Camelot, Snapper, Islander, Aristotle, Ariane, Valencia, Aladdin) and tomatoes (Mountain Glory, Applause, Celebrity, Finish Line) were planted in the different mulches. Bell peppers were planted in double rows at 24-by-48 inches and tomatoes planted in single rows at 18-by-60 inches. The plots were drip irrigated, with drip tape laid beneath the mulch prior to planting. Assessment of mulch durability, weed pressure and crop yield is ongoing and will be completed at the end of the 2009 cropping season.

**DISCUSSION** – The greatest benefit from plastic mulch is that the soil temperature in the planting bed is raised, promoting faster crop development and earlier harvest. Black plastic mulch can provide for an earlier harvest by some seven-to-14 days, while clear plastic mulch may advance the harvest date by as much as 21 days. A major problem with plastic mulch is removing it for proper disposal from the field after the cropping season. Plastic mulches, especially black plastic, do not break down and should never be disked or incorporated into the soil.

On the other hand, paper mulch can be safely disked or incorporated into the soil, thereby improving the organic matter of the soil's content. Preliminary results indicate that there is acceptable weed suppression with the paper mulch when compared to the other mulches. However, with the high frequency of rainfall this season degradation of the paper, particularly at the soil line, was evident, thereby resulting in easy removal of the paper by moderate wind storms. General plant health seemed similar across mulch treatments, with yield components and other parameters to be evaluated throughout the production cycle.

## Other Research at the A&T University Farm

Considered A&T's largest classroom, the 490-acre University Farm features active livestock and horticultural production. As a research and working farm, the facility provides the training ground where students interact with skilled agricultural experts to amass the knowledge they need to keep A&T, farmers and the community on the forefront of agricultural production and innovation. In addition to the demonstrations being showcased during the 2009 Small Farms Field Day, the University Farm is the site for various other ongoing research including:

**WETLANDS/WASTEWATER** – Dr. G.B. Reddy, a researcher in the Department of Natural Resources and Environmental Design, works with man-made wetlands that filter waste out of swine lagoon water. The system he has at the farm can remove 60 percent to 70 percent nitrogen and up to 45 percent phosphorus in the first five-to-six years of use. Overall, his research shows that swine-farm operators can use less land to spread the water coming from wetlands than if they were spreading wastewater directly from the lagoon. This key research finding is crucial because many swine operations in North Carolina do not have substantial acreage. Reddy also works on laboratory technologies that may help to reduce nutrients in swine wastewater and he is testing them at the farm.

**AGROFORESTRY** – Dr. Joshua Idassi, of The Cooperative Extension Program, is conducting agroforestry research that has the potential to boost alternative enterprises for farmers. Idassi has planted 1,000 Eastern black walnut seedlings from two regional nurseries, in the farm greenhouse. Next year, the young trees will be grafted with mature scions from Missouri – from where the bulk of black walnuts originate – to develop a native North Carolina variety of the tree and to prompt early, high-meat yield. Walnuts usually take 10-to-30 years to bear nuts, but Idassi's research is designed to jumpstart production to within five years – offering farmers a quicker return on their investment. Idassi is also determining how best to use the 15 mature chestnut trees at the farm in demonstration projects. He has also contributed 200 white oak seedlings for truffle research with Dr. Omoanghe Isikhuemhen.

**MUSHROOMS** – Dr. Omoanghe (Omon) Isikhuemhen, a researcher in the Department of Natural Resources and Environmental Design, maintains an edible mushroom culture bank at the University Farm. He uses the facility to conduct research about mushroom breeding and strain improvement, and also researches medicinal and functional food properties and the application of white rot fungi to help solve issues with agricultural and mining wastes. Isikhuemhen is also researching inoculation, propagation and monitoring of three types of truffles of economic importance.

**WATER RESOURCES ENGINEERING** – Dr. Godfrey Gayle conducted research on how water moves in two soil types at the University Farm by using various approaches. Gayle, who is also a researcher in the Department of Natural Resources and Environmental Design, is evaluating a low-cost irrigation system

under high tunnels for the irrigation of vegetable crops. He is also interested in developing efficient irrigation systems for small and limited-resource farmers and helping farmers become better land stewards who will use good conservation practices to supply safe, locally grown produce to consumers.

**SOIL SCIENCE** – Dr. Charles Raczkowski is conducting research to look at the effect of compost, cover crops and no tillage (or combinations of these practices) on soil quality. The goal is to determine what combination of practices most improves soil conditions and vegetable yield compared to conventional practices. Some results show that cover cropping increases rain infiltration, reduces runoff and soil erosion, conserves soil moisture, suppresses weeds, reduces soil compaction and increases nutrient availability. Yearly additions of compost increase soil organic matter and increase the capacity of the soil to retain nutrients. Results also show that vegetable production is possible under no-tillage management and that the mulching effect of the rolled winter cover crop over the soil can produce more and better quality vegetables.

**ANIMAL SCIENCES** – The research program in the Department of Animal Sciences primarily focuses on the needs and issues of small livestock farmers. The studies relate to the:

- Genetic selection, nutritional requirement and respiratory impact of hogs raised outdoors;
- Management and genetic control of health parameters of meat goats, and of beef cattle management;
- Needs of non-professional horse owners and the food safety of poultry.

These studies are in various stages of completion. Their results will be available in future Small Farm Field Days.

For more information about these projects, contact:

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