

Meat Goat Health Monitoring

Dr. Mulumbet Worku



Golden LEAF Field Day

Objective

The specific objectives of the project are to establish a demonstration meat goat herd at North Carolina A&T, conduct a survey of parasite management practices in small ruminants, and to provide parasite monitoring services and enterprise evaluation support.

Opportunity

More than 700,000 people immigrate to the United States each year. The rising immigrant population has led to increased demand for goat meat, and made meat goat production a potential alternative enterprise for North Carolina farmers. The state's meat goat breeding stock inventory is estimated at 122,000 animals, with a value of over \$12 million. As the state's immigrant population grows over the next decade, these numbers are expected to increase dramatically.



Dr. Mulumbet Worku

Method

We are demonstrating a technique to detect parasites in meat goats. The McMaster technique will be used to count the numbers of eggs per gram (epg) of feces for each parasite species. This technique, which is used by universities and pharmaceutical companies to field test the efficacy of different drugs prior to federal approval, will allow quantitative assessment of the degree of parasitism.

Discussion

Gastrointestinal parasites are costly problems for goat producers. Among the associated costs are deworming drugs, parasite-related deaths, unthriftiness, stunted growth, decreased fertility and increased susceptibility to diseases.

Approaches such as short-term deworming or strategic deworming following clinical signs are commonly used to manage parasites. Testing procedures, such as fecal flotation, indicate the presence of parasitemia, but do not quantify the extent of parasitism, as the McMaster technique does.

Upscale Pork for Small-Scale Hog Producers

Dr. Charles Talbott



Golden LEAF Field Day

Objective

The project is designed to help small-scale, limited-resource farmers find new markets and higher profit margins by raising swine in ways that may enhance the flavor of pork.

Opportunity

Many tobacco farmers also raised swine in earlier years, but abandoned that enterprise as prospects for small-scale pork producers dimmed. But because many of these farmers are familiar with raising swine, they are apt to be successful raising upscale pork. In addition, they will have a ready market in Niman Ranch, Inc., a very successful retailer of upscale meats, who is participating in a small-scale hog producer project in NC. Niman hopes to have NC pork producers serve their East Coast markets.

Method

Farm advocacy groups are helping A&T identify potential project participants. Among the criteria considered were a history of growing tobacco and raising hogs, farm income, and a willingness to participate in both on-farm research and the training of future participants. Once chosen, farmers will receive technical assistance from North Carolina A&T State University's Cooperative Extension and Agricultural Research programs. In

particular, growers will learn how to raise hogs according to Niman's standards.

Ten project farmers will receive 12 gilts and 2 boars in each of the first three years of the project. Each farmer is expected to sell more than 200 market animals per year to Niman Ranch or through their own marketing network. By the end of year three, producers will market 6000+ hogs/year.

Discussion

Small-scale producers cannot compete on the same level with large, commercial farms, but may be able to produce a unique product that appeals to an upscale market. Therefore, emphasis will be focused on marketing the potential strengths (such as quality) that the small-scale producer can control.

The average cost of production for Niman Ranch pork is \$35.00/cwt. If live-weight prices average \$45.00/cwt or \$55.00/cwt, then producers are expected to net from \$5000/A to \$7000/A, respectively.

Using the Certified Angus Beef (a breed noted for intramuscular fat) program as a model, small-scale farmers can promote a unique "upscale" pork by using breeds and production methods that enhance pork flavor.

Specialty Melon Production

Drs. M.R. Reddy and Carl Niedziela



Golden LEAF Field Day

Objective

The project is designed to evaluate the potential of a number of specialty melons as alternative enterprises.

Opportunity

Production of specialty melons following legume cover crops has the potential to reduce both fertilizer input and the cost of production, while adding organic matter and building the soil for the long term. Cover crops will also control soil erosion and reduce weeds, diseases and pests.

Method

Twelve varieties of specialty melons were planted in May. The specialty melon types in the field trial include French/Charentais, galia, honeydew, muskmelon, Spanish, and yellow canary.

A cover crop (crimson clover + rye) was planted in fall, 2001, and allowed to grow until spring. In the spring, the cover crop was disked in and transplants (grown in the greenhouse for four weeks) were transplanted to

field plots. Prior to planting, 400 pounds per acre of 10-10-10 fertilizer was broadcast, applied and incorporated. For weed control, six quarts of Prefar plus eight quarts of Alanap were applied (on a per acre basis) and incorporated prior to planting.

The rows are 20 feet long with two feet between plants within the row. Following transplanting, rainfall was limited, and beginning two weeks after transplanting overhead irrigation was initiated. A sidedressing of 28 lbs N and 40 lbs K per acre was applied. Evaluations of melon quality and cost of production are planned.

Discussion

Relative yields of the melons and the quality will be determined and evaluated. The quality parameters that will be measured include sugar content, color, texture, and water content. The specialty melons will be test marketed at the Triad Farmers Market and selected supermarkets. Desirable melons will be chosen for future specialty crop diversification studies. A similar melon demonstration on raised beds and black plastic is in place in Duplin County.

Specialty Fruit Production

Dr. Keith Baldwin



Golden LEAF Field Day

Objective

We are studying the potential of a number of tree fruit species to determine their potential for growth in the North Carolina Piedmont and for organic production.

Opportunity

Specialty fruit crops can be viable enterprises for growers seeking alternatives to tobacco. This is especially true for fruit crops grown organically. Currently, there are few organic, small and tree fruit products in local markets. While information on general cultural practices for fruits (such as planting, pruning, training, etc.) is readily available from Cooperative Extension, organic production essentially excludes the use of many inputs associated with conventional agriculture. Currently, little is known about organic production practices and alternative organic inputs for North Carolina conditions.

Method

Very little is known about pawpaw production practices, pollinators, and expected yields. The ongoing evaluation of five cultivars (NC-1, Sweet Alice, Rebecca Gold, Wells, and Mango) at the North Carolina A&T State University Farm will help to answer many of these questions.

We have also planted four peach cultivars (China Pearl, Intrepid, Challenger, and Contender) to assess the potential for local peach production and the need for frost protection on Northern Piedmont farms.

Five fire blight resistant pear cultivars (Magness, Harrow Delight, Potomac, Harvest Queen, and Warren) have also been planted to determine whether pears can be grown organically in central North Carolina.

Discussion

Organic fruit can bring a premium over conventionally grown fruit in certain markets.

However, many organically grown fruits are susceptible to insects and diseases that are difficult to control with organically certified pesticides. This is particularly true for pears, which are very susceptible to fire blight, a disease that can kill standard pear cultivars quickly.

The pawpaw (*Asimina triloba*) has great potential for commercial development and may be a viable enterprise for small-scale farmers who grow for a local market. Pawpaws grow best in areas with hot summers and cold winters. They are hardy and relatively pest-free, making the possibility of organic production possible. Pawpaws are tolerant to shade, making them suitable for intercropping with other trees. Unfortunately, the amount of time that must be invested before the first fruit crop (five years or longer) is a deterrent to many would-be producers.

Peach production is generally restricted to areas with milder temperatures than the Northern Piedmont. In other areas, frost protection by overhead irrigation, an expensive proposition requiring a large volume of water and specialized equipment, is required in most years to produce a good crop.

Mulch Demonstration

*Dr. Keith R. Baldwin,
Grace Summers, and
Biancia Rolle*



Golden LEAF Field Day

Objective

The purpose of this demonstration is to compare mulches and determine how they differ in the benefits described below.

Opportunity

The term “plasticulture” is now used to describe an integrated system that includes — but is not limited to — plastic mulches, drip irrigation, and row covers. Some benefits of a comprehensive plasticulture system include: earlier crop production (seven to 21 days earlier); higher yields per acre (two-to-three times higher); cleaner, higher-quality produce; more efficient use of water resources; more efficient use of fertilizer inputs; reduced soil and wind erosion (though erosion may increase in un-mulched paths between rows); potential decrease in disease; better management of certain insect pests; fewer weeds; reduced soil compaction and elimination of root pruning; and the opportunity for efficient double or triple cropping.

Method

The mulches in this demonstration were laid down with a mulch layer, and drip irrigation lines were installed at the same time. Twenty different varieties of tomatoes, primarily heirloom types, were set with a water wheel transplanter.

The demonstration includes black, green, red, and blue plastic mulches. Black plastic is probably the most commonly used by commercial growers. Infrared-

transmitting (IRT) mulches warm up the soil like clear plastic, but provide the weed control properties of black mulch. Selective Reflecting Mulch (SRM-Red™ has the advantages of black mulch, and when used with tomato crops, SRM-Red™ has been shown in USDA tests to increase production of first-quality early tomatoes from 12 to 20 percent, relative to black mulch. This increase results from the film reflecting far-red light up into the plant. We are also demonstrating landscape fabric. Landscape fabric is more costly than plastic mulch but can be used more than one season. It is also permeable to rainwater or overhead irrigation, yet prevents weed growth.

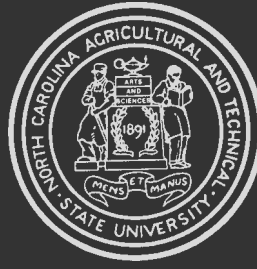
Discussion

Use of paper mulch can provide benefits similar to plastic, but without the disposal problems, as paper is biodegradable. An innovative group in Virginia carried out on-farm experiments to explore alternatives to plastic. They compared soil temperatures and tomato growth using various mulches, including black plastic, Planters Paper™ and recycled kraft paper. Plastic, paper, and organic mulches all improved total yield of tomatoes grown in the trials, when compared to tomatoes grown on bare soil.

We are demonstrating a “kraft” paper and Planters Paper™. To retard degradation, some growers have oiled the kraft paper, although we didn’t try this technique in our demonstration. Planters Paper is made from recycled carbon black draft paper containing a resin binder and an antimicrobial agent to stop decomposition at the paper/soil interface. It is porous to water.

Season Extension Demonstration

Dr. Keith R. Baldwin, Grace Summers, Bianca Rolle



Golden LEAF Field Day

Objective

We intend to test the feasibility of late planting cantaloupes and watermelons for later entrance to the market, and to use row covers to extend our tomato season into the late fall.

Opportunity

Season-extending techniques often lead to late-market price advantages.

Method

The recommended spring planting dates for main season cantaloupe and watermelon production are 4/15 to 5/20. We planted cantaloupes and watermelons on different colored plastic mulches and on paper mulch, in late May. We will compare late-season cantaloupe production on mulch with cantaloupe planted on bare ground at the recommended planting date.

We have also set out a selection of tomato cultivars to evaluate their potential for late-season production. We have included some heat-tolerant ("hot-set") tomatoes in the test. Hot-set tomato cultivars retain their blossoms when day and night temperatures are high. Under high temperature conditions, most standard cultivars drop their blossoms before fruit can set.

Discussion

In the past 15 years, a new generation of fabrics has been made available for use in plant protection. These "floating row covers," made of spun-bonded polyester and spun-bonded polypropylene, are so lightweight that they "float" over most crops without support. Medium-weight covers can enhance early maturity, increase

early and total yields, improve produce quality, and extend the season. Spun-bonded fabric is permeable to sunlight, water, and air, while at the same time providing a microclimate similar to the interior of a greenhouse. Plants are protected from wind, and the covers give 2-8° of frost protection. In addition to extending the cropping season, advantages include protection from insect pests.

Use of row covers requires a high levels of management. For example, when growing tomatoes or peppers under covers, temperatures on a warm day can quickly rise above 86° F. If these temperatures are sustained for more than a few hours, blossoms may drop. When growing insect-pollinated crops, such as melons, squash, or cucumbers, covers must be removed at bloom to allow for insect pollination. Placing row covers over crops growing on bare soil creates a favorable environment for the germination and growth of weeds. Since periodic removal of the cover for hand cultivation is not practical, weed control can be a significant problem under row covers. For this reason, they are often used in combination with plastic mulches.

It is important to analyze the costs and benefits of extended-season production before large amounts of capital are committed to materials. One method for determining if season extension techniques can be a profitable addition to a farming operation is called partial budgeting. A partial budget requires assessment of changes in income and expenses that would result from changing to a different practice. It is called a partial budget because it is not necessary to calculate the expenses that would be the same for either practice. We are gathering cost and benefit information to determine whether or not season extension techniques are profitable for growers raising produce for local markets.

Edible and Medicinal Mushroom Farming

Dr. Omon. S. Isikhuemhen



Golden LEAF Field Day

Objective

The project is designed to introduce mushroom growing to farmers interested in commercial cultivation of edible and medicinal mushrooms.

Opportunity

The national market for mushrooms is nearly \$900 million annually. Though North Carolina has many of the climatic factors needed to grow certain types of mushrooms, for the most part, the state's farmers haven't actively participated in the mushroom market.

Rather than competing in the large commercial market for button mushrooms, the project focuses on exotic mushrooms which are both edible and have medicinal properties. North Carolina is well suited to growing exotic mushrooms, like those grown in Asia.

Exotic mushrooms, such as shiitake and portabella, are considered gourmet fare, and as such, command higher prices in restaurants and grocery stores. Mushrooms, such as reishi, maitake, and shiitake, are also appearing in health food stores, where customers purchase them believing that they stimulate immune responses to bacterial and viral illnesses, including HIV.

Among mushroom distributors and suppliers surveyed in the state, 73% indicate that they are interested in buying and selling exotic, medicinal and cultivated mushrooms.

Method

Project coordinators plant mushroom spawn on substrates, such as wood chips, and establish a growth cycle, before shipping the product to farmers for them to finish. Eventually, these farmers will learn the earlier parts of the growing process, so that they are self-sustaining.

Discussion

There are abundant agro-industrial wastes suitable for mushroom cultivation in NC. We found, however, that mushroom biology and biotechnology was not institutionalized in NC, in part because there is limited academic and industrial expertise in the state to initiate and service the mushroom industry.

In collaboration with other researchers in NC A&T State University, we have begun to study the health benefits and growth factors of the edible and medicinal mushrooms.

In the near future, there will be tremendous growth in the demand for mushrooms for use in pharmaceutical production. Establishing the infrastructure for mushroom production now will facilitate the state's response to this opportunity.

Medicinal Herb Demonstration

Dr. Marihelen Glass
Dr. Vestel Shirley
Marsha McGraw



Golden LEAF Field Day

Objective

The focus of this demonstration is to provide growers with information regarding production requirements and general marketing ideas for medicinal herbs.

Opportunity

Since most tobacco farmers are typically small-plot farmers, crop choice must be limited to those crops with high monetary return per acre, such as raw products used in dietary supplements and alternative medicines. The monetary yield of raising raw products such as Aztec Sweet Herb, Black Cohosh, Catnip, Echinacea, Gotu Kola, Peppermint, St. Johns Wort and Vicks Plant makes the growing of this class of plants a viable enterprise.

Method

Herb choices were determined by the current market for the product, the value of the product based on experimental results, farmer preferences and herbs targeted by the FDA for possible regulation.

The medicinal herbs we have chosen can be produced throughout the Piedmont area. The herbs were grown

from seed in the greenhouse and remained there until they could be transplanted into the field. While in the greenhouse, the herbs were grown under conditions that met their requirements. Fertilizer was used as needed. Once the crops are transplanted in the field, they are grown on black plastic mulch, straw mulch and bare rows. Plot layouts allow growers to view each herb under different mulch conditions. By observing each crop, growers can make decisions as to which production condition is most suitable for his/her farm.

Because herb quality is an important factor when taking herbs to market, another aspect of the demonstration includes chemical analysis of a select number of herbs. Extractions from these herbs will allow a comparison with assays from commercial herbs.

Discussion

This demonstration will provide growers with the general production knowledge, marketing information and comparisons of our herb quality with commercial herbs. We believe that many farmers will find medicinal herb production an excellent choice for an alternative cash crop.

Aquaculture Production Demonstration

Dr. M.J. Ibrahim



Golden LEAF Field Day

Objective

The focus of this demonstration is to provide small-scale producers with information regarding tilapia production in a recirculating, indoor tank system.

Opportunity

Aquaculture is the one fastest growing segments of U.S. agriculture. Tilapia production accounts for approximately 4% of the \$1 billion U.S. aquaculture industry, and that portion is increasing as consumer demand increases.

Tilapia, a freshwater, plant-eating fish native to Africa, is considered an ideal fish for aquaculture. Tilapia grow in a variety of environmental conditions, breed easily in captivity, are efficient converters of feed, and appeal to consumers. North Carolina's prominence as a source of tilapia has grown rapidly in the past few years.

To make tilapia production economically feasible, producers use enclosed (indoor tank) systems, which allow production at greater populations than they would be able to achieve in a natural setting. These systems require use specialized equipment, which filters waste from the water and adds oxygen as needed. This allows nearly all of the water to be reused rather than discarded. Ninety percent of U. S. grown tilapia are raised in this type of setting.

Method

The NC A&T State University aquaculture facility is located in 30' x 40' insulated building with four rubber tanks of 950 gallons each, plus associated monitoring and water treatment equipment. Fingerlings are stocked and monitored for growth. Oxygen is supplied to the tanks with a blower pump. Automatic feeders distribute feed every 30 minutes for fish weighing less than one pound, and each hour for fish weighing more than one pound. The uniform timed application of feed throughout the day results in a more stable daily water quality pattern, requiring little or no direct control of the oxygen supply. The operator monitors the sludge collector for excess feed content and adjusts the feeding rate and amount in the automatic feeder. Floating feed is preferred as it allows the fish time to eat, before sinking to the bottom where it can be vacuumed automatically from the system.

Discussion

Aquaculturists maintain that the key to successful management is stress management. Fish can be stressed by changes in temperature and quality of water, by handling, and by nutritional deficiencies. Stress increases the susceptibility of fish to disease, which can lead to catastrophic fish losses if not detected and treated quickly.