

Sustainable Agriculture

Integrated sustainable agriculture needs experimentation stations. Infrastructure must be developed and implemented to execute this much-needed research. The integrated pasture poultry infrastructure project created the infrastructure needed to execute a pasture poultry system within an orchard. The infrastructure and management system that were created will allow for the long-term study of soil quality and fertility, as well as the ability to determine whether or not this integrated system can cut down on the carbon inputs needed in traditional orchard management.



Freedom Ranger chick 3 day old



movable brooder house on pasture

Materials

There are three types of chicken houses needed to conduct this study a brooder house, for starting all baby chickens or chicks. Once the birds are old enough to go out to pasture their housing is determined by the purpose of the bird. Laying hens and broilers have different housing requirements. The laying hens will then go into a movable henhouse equipped with roost and laying boxes. The broilers will go into a finishing house this house has no floor so that the broilers manure is deposited directly onto the ground.

Recycled materials were used on 75 to 80% of all of the construction on the houses. The building materials were reclaimed from conventional poultry houses that no longer met industry standards. These recycled materials made the infrastructure more affordable.

Electric fencing is easily moved around the pasture as well as being the best defense against predators. The electric fence charger is powered using solar panels. Solar panels will also eventually be installed to maintain the 15 hour light requirements for laying hens to achieve maximum production. Unfortunately solar lighting is not an option for broilers at this time the wattage requirements for heat lamps is cost prohibitive to use solar panels to generate enough power required for the heat lamps which are needed for the first several weeks of growth.

Design and Building

Design is exceedingly important to the development of sustainable infrastructure. The first rule of sustainable farming is you must sustain the farmer this primarily means all infrastructure must be designed in a manner to allow the farmer to perform maintenance and managerial tasks as easily as possible.

The brooder house was designed to have easy access side doors for changing fears and waters. The brooder house can house 100 chicks for approximately 2 weeks. This house also doubles a breeding house that can hold 15 adult chickens. This house was constructed on an old 6' x 8' trailer.

The finishing house was designed without a floor so that all the manure will be directly deposited on the ground. This reduces the amount of litter needed as well as reducing the amount of time it takes to clean out the house. Once the chickens have fouled the inside of the house the house can simply be moved to a new clean location. The light weight design enables one person to do this, the finishing households approximately, 50 chickens for six weeks and measures 4 x 10' at the base.

The laying hen house must be portable to avoid erosion issues and have easy access clean out doors to encourage good management and sanitary living conditions for the chickens. Another requirement for the henhouse is that it is on wheels so, it can be easily moved by three people. Laying boxes are located on the outside of the house for easy egg collection. This laying henhouse was designed to house 75 laying hens and measures 6' x 24' it comes apart into two 6 x 12' sections to make moving it through the orchard trees easier.



solar powered fence charger



Installation of caster wheels to frame of henhouse



completed henhouse

Management Plan

The management plan for the broilers consisted of two weeks in the brooder house. At two weeks of age the broilers moved into the finishing house. Finishing house should be moved every morning and every evening. The fence should be moved every 2 to 3 days depending on the amount of manure the broilers are producing. The broilers had 23 hours of light a day as well as 24-hour access to water and an antibiotic hormone free conventional feed with a 28% protein content and compost. The broilers butchered and eight weeks at the D.A.R.P. processing facility in Tahlequah Oklahoma. The broilers produced a 3 1/2 to 4 pound carcass.

Laying hens were allotted a 40' x 40' square around their chicken house. Laying hens should be let out at dawn encouraging them to forage for insects while they are still in the top of the soil profile. Feed should be provided around 10 o'clock in the morning. Laying hens have specific nutritional requirements so a layer feed should be used with at least an 18% protein content. The house should be cleaned out weekly and moved biweekly along with the fence. Moving the chicken house and the yard will prevent the chickens from scratching the ground bear leading to potential erosion.

Managing both broilers and laying hens have two separate benefits to the orchard. Broiler manure is higher and nitrogen, however laying hens are more active potentially making them better at weed and bug control. Using both types of poultry could potentially lead to the diminishment of chemical fertilizers and pesticides needed in traditional orchard management as well as increasing soil quality and fertility.

Sustainable Agriculture

Sustainable agriculture will be the way of the future. Worldwide populations continue to increase currently we are able to feed everyone on the planet however, in the future the green revolution will not be enough. Best management practices must be developed to improve degraded soils, so that they can once again be productive agricultural land to feed the world's growing population. As the US civilization moves into the future we must find ways to do more with less agriculturally. The other major problem facing conventional agriculture today is peak oil, as oil prices increase so does the cost of most conventional agricultural production methods. Systems as well as agricultural methods must evolve so that current agricultural production levels can be maintained using fewer fossil fuel inputs. This project is an attempt to create the infrastructure needed to study an alternative agricultural management practice that could prove to be highly sustainable increasing soil quality and fertility as well as decreasing carbon inputs needed in fruit orchard production. Without this meaningful research we will not be able to develop agriculture in a manner to sustain future population increases.



full-grown broilers



broiler finishing house

Future Plans

- Future system upgrades will consist of:
- rainwater collection system on henhouse and on brooder house
 - solar panels for laying hens

The future soils research will be conducted over a two-year period. The first soil samples were taken from the orchard before the chickens were put into the orchard. This initial sampling will allow for a baseline to compare with future soil tests.

Comparisons will also be drawn from the inputs to the orchard before and after chickens. These inputs consist of fertilizers, insecticides and overall fuel cost for application. Production numbers will also be collected to determine whether or not the orchard became more productive before or after the chickens were added to the orchard.

Soil changes slowly over time this is why it is so important to begin the studies now so that new methods can be developed that will increase soil quality and fertility for future generations.

