Sustainable Food and Agriculture Program
Main Street Project

Free Range Meat Chicken Production Manual: Slow Growth Breeds

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INTRODUCTION

This manual is designed for aspiring and established farmers with an interest in building a more sustainable farming and food system. Its contents reflect years of effort by dozens of people and many institutional partners.

The data was gathered from several prototype units (seasonal and year-round) designed, built and operated in real-world conditions. The system's design and protocols are intended to maximize efficiency while producing the highest quality products. Once fully deployed, this system has the potential to generate significant economic, ecological and social benefits – increasing farm income, building wealth, protecting and restoring the ecology and improving community health.

Background

The current food and agriculture system is ripe for transformation, relying primarily on a combination of labor of low-wage labor, externalized costs, subsidies and unchecked market power to produce food that is increasingly taking a toll on our ecology and public health.

Main Street Project is working towards wide-scale adoption of a system of sustainable, entrepreneurial agriculture that provides economic opportunity for new and established farmers; that creates thousands of good family supporting entrepreneurial jobs (and well-paying indirect jobs); and that in the process reduces ecological damage from agriculture, produces affordable nutritious food, reduces risks to public health, and helps to mitigate the worst effects of climate change.

The basis of the new system is an entrepreneurial, free-range poultry enterprise system that is accessible to established and aspiring farmers focused on sustainable, scalable agriculture.

The New System

The basis of any agricultural system is the ***unit of production*** of the enterprise, which serves as the basis of measurement for the performance of the system.

In our new meat poultry production system, the unit of production is a half-acre (the smallest component in the free range poultry enterprise system). A farmer, or "agripreneur", can raise flocks of 1,500 free-range, natural chickens per half-acre unit of production, with each unit capable of raising 3.5 flocks per year (the half flock is the result of production numbers being reduced in the Minnesota winter). Year-round coops or poultry buildings are specially designed with surrounding paddock areas for sprouting grains and vegetation for efficient and healthy free-ranging. A solarium area inside the building mimics a free-range area for birds in winter months; external heat is rarely needed during the day and only required to keep birds healthy and comfortable during the coldest nights. Half-acre production units are also the basis for our prototype farms, which operate as testing, training and research facilities in the initial phases of system development.

Production units can be combined to form a family farm. A farm combining up to eight production units comprises an ***economic unit***, which would typically be run by a single family and have the capacity to generate enough revenue to support an on-farm livelihood.

At the next larger scale, eight economic units will form an ***economic cluster***, which can support additional related enterprises like poultry and feed processing, vegetable production, transportation and manure management, and most importantly, the support systems and infrastructure needed to sustain all of the components of the system over the long haul.

Economic and Ecological Diversification

While free-range poultry is central to the system because of the benefits it provides to the soil and the land, it is by no means the only source of revenue produced by these farms. For example, poultry need shade, and hazelnut bushes provide an ecologically appropriate source of that shade. But the hazelnut bushes also produce nuts, a crop that can supplement farm revenue. With trees planted 16-20 feet apart, other revenue producing specialty crops can be grown on the land in-between the trees. (This spacing not only maximizes hazelnut yields per tree, but also provides sufficient space to make the production of additional crops highly efficient.) Simply by incorporating the needs of the poultry into the model, the model generates additional revenue for the farm. Critical to this proposition is building diversification into the system based on productivity of the same space. This is a risk management strategy as a matter of system design; rather than risk management (both economic and ecological) as remediation to failure that could occur in the system due to uncontrollable factors.

Adaptability

Eliminating vulnerabilities is critical to the sustainability of any food and agriculture system, not only from climate change, but also from economic shocks. In these times and looking into the future, the economy will be as impossible to plan as the world's climate and the challenges have started, our food and agriculture economic challenges are a direct result of climate change, which by its own nature is destabilizing and unpredictable, the only real solution then is adaptability at the system level, and this means massive change that can only be achieved if the whole current system changes.

Our sustainable system is extremely adaptable. When the prices of commodities rise to the point that they threaten the viability of the enterprise, our system is designed to repurpose units of production, eliminating the conventional practice of taking entire farms out of production. When markets come back, farmers can scale up again. In this way, farmers in the system can survive significant decreases in production and stay viable. Further, when prices for livestock go down to the level that make raising poultry unprofitable, the poultry coops can be turned into greenhouses that, because of the high quality of the soil, can grow high-value specialty crops. This adaptability is aimed at reducing risks and vulnerability of the farm enterprise to market and ecological forces and effects of climate change.

Competitiveness

This new sustainable system is being developed in parallel with the current conventional system. Rather than being an impediment to the new system, the conventional system is actually essential to the new system's development and growth, both because it gives the new system a baseline for performance and because it provides a useful basis for consumer comparison. For the new system to be successful, it will need to be affordable, not merely in price to consumers, but also in terms of indicators of quality like food safety, quality of calories, availability of environmental services, level of farmers' income, and other attributes.

Competitive market advantages like these are capable of capturing consumers' imagination and building a market tipping point without one-to-one price competition with conventional systems. This phenomenon is already happening. The new system will not replace the conventional system – it will simply provide consumers with a choice, and the choice that consumers make will be a critical metric against which we can judge success. Further, in many instances, the conventional system will provide the physical and intellectual infrastructure needed for the new system to develop. For many elements of the new system, there will be no need to reinvent the wheel.

Opportunity

The timing for launching the new sustainable system could not be better. Consumer demand – including among college students and restaurant patrons – for local, naturally healthy food is growing, as is awareness of unfair and unsafe labor practices related to food. But system adoption won't be possible without new farmers to participate. ***This is where you come in.***

System Development and Deployment Strategy

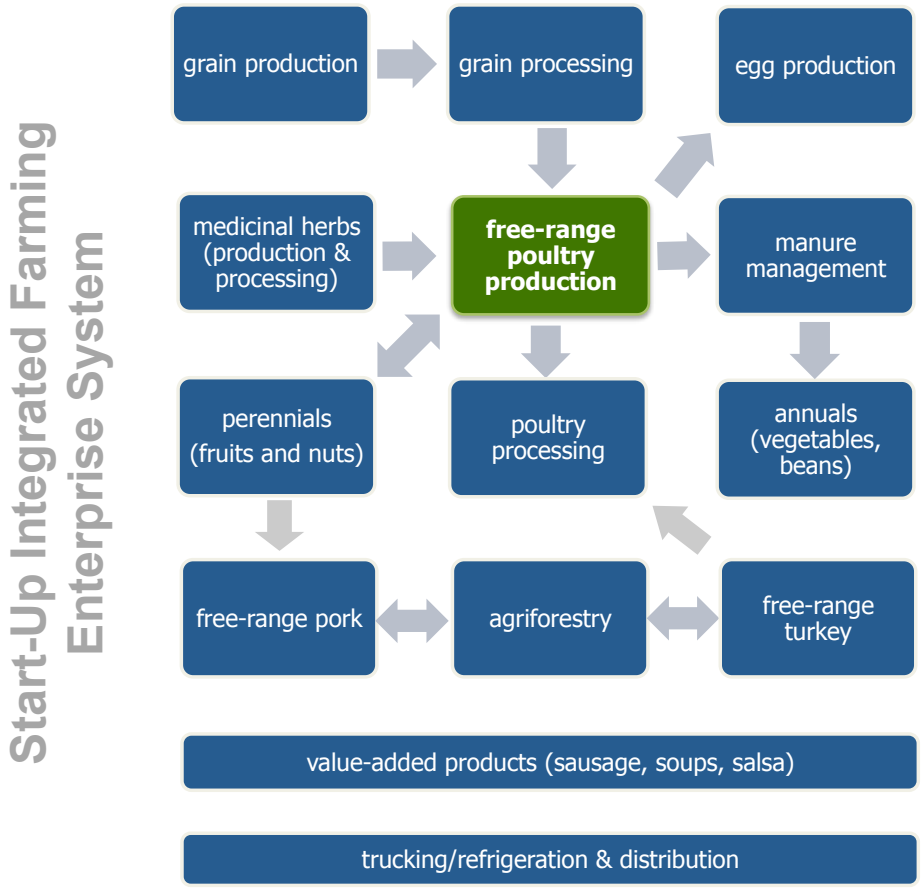
Our start-up strategy is focused on building the support infrastructure, developing the systems, and launching the programs necessary to train and support successful agripreneurs as they enter the new system of farm enterprises. Although the system is not yet complete the starting points have been established and the prototype units of production for free range poultry are under continuous test production.

Next Steps

Scaling up production in the region is the next step. For established farmers, this manual is a starting point. We welcome your questions, comments and suggestions. Send an email to: info@mainsteetproject.org, or call our office in Northfield, (507) 786-9900.

Our Farming System Proposition

The following diagram shows a map of an economic cluster supported by a clustering of free-range poultry production.



This symbiotically (economically, socially and ecologically) connected farming enterprise system has been designed to meet all of the broadly agreed principles of sustainability put forward by the American Dietetic Association, American Nurses Association, American Planning Association, and American Public Health Association in the document "Principles of a Healthy, Sustainable Food System" (found on page 3 of this manual).

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Re-thinking Current Food System Principles

Free range, meat chicken poultry production is one way to demonstrate how rethinking our current food system to develop a more resilient and sustainable regional food supply is possible.

This approach creates the system first--building into it the needed resources, environmental and biological protocols, relationships and a built-in flexibility to respond to changing market factors that affect demand for the product.

Components of the system include:
Utilization of a free-range compatible breed
Ecologically and biologically compatible production system
Alternative and intercropping systems
Utilization of local farmers/landowner partners
Communication, marketing, and education components
Prospective agripreneur recruitment and training program
System for ongoing mentorship and training
Equipment sharing strategies and labor exchange
Strategies for sourcing supplies locally
Start-up financing needs and strategies
System for handling and processing the poultry
Production schedule and distribution system based on customer demand

This regionally, sustainable food system model is aligned with a national set of shared food system principles. These national food system principles are collectively endorsed by: American Dietetic Association, American Nurses Association, American Planning Association and the American Public Health Association. See *Principles of a Healthy Sustainable, Food System* (June, 2010) included below.

PRINCIPLES OF A HEALTHY, SUSTAINABLE FOOD SYSTEM

In June 2010, the American Dietetic Association, American Nurses Association, American Planning Association, and American Public Health Association initiated a collaborative process to develop a set of shared food system principles. The following principles are a result of this process and have been collectively endorsed by these organizations.

We support socially, economically, and ecologically sustainable food systems that promote health – the current and future health of individuals, communities, and the natural environment.

A healthy, sustainable food system is:

HEALTH-PROMOTING

- Supports the physical and mental health of all farmers, workers and eaters
- Accounts for the public health impacts across the entire lifecycle of how food is produced, processed, packaged, labeled, distributed, marketed, consumed and disposed

SUSTAINABLE

- Conserves, protects, and regenerates natural resources, landscapes and biodiversity
- Meets our current food and nutrition needs without compromising the ability of the system to meet the needs of future generations

RESILIENT

- Thrives in the face of challenges, such as unpredictable climate, increased pest resistance, and declining, increasingly expensive water and energy supplies

DIVERSE IN

- Size and scale—includes a diverse range of food production, transformation, distribution, marketing, consumption, and disposal practices, occurring at diverse scales, from local and regional, to national and global
- Geography—considers geographic differences in natural resources, climate, customs, and heritage
- Culture—appreciates and supports a diversity of cultures, socio-demographics, and lifestyles
- Choice—provides a variety of health-promoting food choices for all

FAIR

- Supports fair and just communities and conditions for all farmers, workers and eaters
- Provides equitable physical access to affordable food that is health promoting and culturally appropriate

ECONOMICALLY BALANCED

- Provides economic opportunities that are balanced across geographic regions of the country and at different scales of activity, from local to global, for a diverse range of food system stakeholders
- Affords farmers and workers in all sectors of the system a living wage

TRANSPARENT

- Provides opportunities for farmers, workers and eaters to gain the knowledge necessary to understand how food is produced, transformed, distributed, marketed, consumed and disposed
- Empowers farmers, workers and eaters to actively participate in decision-making in all sectors of the system

A healthy, sustainable food system emphasizes, strengthens, and makes visible the interdependent and inseparable relationships between individual sectors (from production to waste disposal) and characteristics (health-promoting, sustainable, resilient, diverse, fair, economically balanced, and transparent) of the system.

These principles should not be construed as endorsement by any organization of any specific policy or policies.

How this Food System Proposition aligns with the *Principles of a Healthy, Sustainable Food System* in the Poultry Production Phase

The Regional, Sustainable Food System, utilizing free range meat poultry as a central component; is guided by the national *Principles of a Healthy, Sustainable Food System (June 2010).* These principles guide the production protocols and are the basis for all aspects of the system.

Below are the seven national principles and examples of related protocols design by Main Street Project to implement and make these principles operational and applicable to actual farming systems.

Health-Promoting:

Supports the physical and mental health of farmers, workers and eaters.
Accounts for the public health impacts across the entire lifecycle of how food is produced, processed, packaged, labeled, distributed, marketed, consumed and disposed.

Examples of related protocols:
--Farmers and workers are trained in farm health and safety issues.
--Farmers and workers are provided mentors for support.
--Eaters are provided food storage and cooking temperature guidelines on label of processed poultry.
--Free Range Production Method supports the physical health of the poultry and the environment where they are raised. Like all animals, chickens did not evolve to live in cages or confinement. Their health depends on being able to walk freely and forage outdoors but also to come indoors for protection from predators and harsh elements. The management of indoor and outdoor environments is critical for healthy bird development. The management of the outdoor system includes hundreds of considerations regarding: viable perennial crops for shade and protection, mulching the ground to ensuring that sprouts/greens become a significant source of the bird's food. Chickens peck and eat from the ground naturally. Use of ground-up feed and feeding indoors are minimized in a healthy and natural, free-range production system.
--There is no need for pharmaceuticals when birds are raised using these production protocols.
--Poultry that die during the production phase are immediately removed, composted and disposed of properly.
--Poultry are handled humanely, and transported in roomy cages to the closest processing facility.
--Distribution of processed poultry is done according to regulations.
Use of these practices and others outlined in the manual produces a high quality, healthy, pharmaceutical free meat chicken.

Sustainable:

Conserves, protects, and regenerates the natural resources, landscapes and bio-diversity.

Poultry is the center of this food system model. The system utilized deliberately works to balance the energy flows insuring a minimal footprint from each flock of chickens conserving, protecting and regenerating natural resources.

Examples of related protocols:
-- Free range paddocks are managed for maximum natural food production as well as for bio-diversity. They are planted with perennial crops for shade and protection for the birds and also utilize grain sprouts resulting in a cropping system that thrives in an ecologically symbiotic relationship with the poultry. The poultry are rotated between paddocks to ensure ground cover regeneration. Chickens are, by nature, ground feeders allowing for the addition of minerals, water, while the sprouting process activates critical digestive enzymes. Feeding in this manner produces a healthy bird in a natural way.
--Rejuvenation and production of soil. The paddock management system continuously enriches existing soil and produces new soil increasing its productive capacity.
--The incorporation of aquaponic systems (an aquaculture and hydroponic combination with recirculating water systems) utilizes poultry by-products to supplement fish feed and the fish by-products supplement poultry feeds. This practice further reduces the overall system-wide carbon and energy footprint.

Resilient

Thrives in the face of challenges, such as unpredictable climate, increased pest resistance, and declining and increasingly expensive water and energy supplies.

Examples of related protocols:
--An appropriate poultry breed for range feeding is utilized. Industrial breeds do not free range and forage naturally, they were developed for confinement. Through research and breed experimentation; a hardy, slow growth, meat bird was selected. This bird thrives when specific production protocols are followed. The mature bird shows natural characteristics and body ratios that are healthier for the bird to fully develop while capable of ranging, scratching and foraging, all critical to production of a natural healthy bird.
--The roomy, shelter/brooding structure is designed to utilize natural solar heat and allows for adapting the production protocols to raise poultry year round supporting the animal's quality of life in a more natural setting.

--The primary purpose of the buildings is poultry production; however, it is designed for easy adaptation to greenhouse and aquaponic systems.
-- Perennial crops, planted as shade, are selected based on the ecology of the region and are used as a marketable crop (hybrid hazelnuts is a top choice for Minnesota). Perennial crops improve the poultry's environment and also generate multiple ecological advantages such as: soil infrastructure, soil retention, nutrient cycling, water purification and retention plus soil temperature stability critical to the health of the birds. A free ranging paddock can also be intercropped with annual cash crops that grow above the reach of the poultry like sweet corn; further increasing the economic base of the enterprise and the resiliency of the system as a whole.

Diverse In: ***size and scale, geography, culture, food choices.***

Examples of related protocols:
--For a system to become diverse, it has to be designed and structured to be so. A core component of this sustainable food system is the engagement of Latino/Hispanic families and other minorities living in poverty. This resilient food system model and the production protocols are in sync with the culture, tradition, aspirations and assets of these families. Currently these groups provide the bulk of the labor for conventional food systems while their skills could deliver much more value as agripreneurs.
--The production unit, economic units and economic clusters are designed to be scalable and market driven.
--This model utilizes a geographic (regional), food hub (economic cluster) approach. The model defines how the poultry product can be produced, aggregated, processed, marketed, and distributed to strengthen diversity of food choices for all. And the production level is designed to satisfy wholesale, retail, and institutional demand.

Fair:

Supports fair and just communities and conditions for all farmers, workers, and eaters.
Provides equitable physical access to affordable food that is health promoting and culturally appropriate.

Examples of related protocols:
--This food system model is organized into production units, economic units and economic clusters. The way the system is organized allows for consistency in use of protocols and the ability to independently verify the production protocols (such as labor conditions, social, ecological and economic indicators).
--To further address fairness, Latino/Hispanic and other disadvantaged populations; who are currently low wage earners in our food system are provided an opportunity to become successful agripreneurs.
-- Poultry is a food widely utilized as a protein source in many cultures.

-- Agripreneurs are trained in marketing and distribution systems. Their active involvement in marketing and distribution increases their control over where their product is sold and the value placed on it.

Economically Balanced:

Provides economic opportunities that are balanced across geographic regions of the country and at different scales of activity, from local to global, for a diverse range of food system stakeholders.
Affords farmers and workers in all sectors of the of the system a living wage.

Examples of protocols:

--Currently, this food system model; is being launched in Southeastern Minnesota.

--The production system is with its production units, economic units and economic clusters, allows for the aggregation or re-purposing of production units as a way to build the ability of farmers to respond to changing markets. This design helps to ensure the system's resiliency changing conditions. These strategic design advantages allow farmers in the system to increase production or slow down production without compromising the fundamental principles of a sustainable and healthy food system.

--Exploitation of Hispanic/Latino immigrants, migrant workers and other disadvantaged populations is a well-documented component of conventional food systems. Our system proposition is designed to systematically transform traditional workers into farmers and successful agriprenuers. By structuring systems, partners and support infrastructure for disadvantaged populations' economic and social justice can be addressed.

Transparent:

Provides opportunities for farmers, workers and eaters to gain the knowledge necessary to understand how food is produced, transformed, distributed, marketed, consumed and disposed.
Empowers farmers, workers and eaters to actively participate in decision-making in all sectors of the system.

Building a new food system requires full participation from consumers to farmers, including workers. In this food system proposition, the farm worker represents a potential new agripreneur or farm entrepreneur who similar to the end consumer is currently structurally isolated from the path food follows from farm to table. Bringing these two sides closer together is critical to a new transparent system. Everything in a food system can be done without

causing harm, to people (consumers, workers), the ecology and the economy, when done in this manner. All activities add value and a healthy middle support infrastructure for processing, storage, handling and delivery emerges to form a more transparent system.

Examples of related protocols**:**
--A core component of the food system model is continual education and marketing of the product throughout the production process leading to heightened consumer awareness.

--Beginning farmers engage in three phases of experiential learning preparing and setting them up to be successful agriprenuers.

1. Discovery – hands-on opportunities to experience the full cycle of poultry production,
2. Development – intensive education in business planning, farm operation, marketing, scheduling, hands-on field training at incubator sites.
3. Launch – The agriprenuer moves into designing and launching their own business plans, accessing financing options, and procuring equipment and supplies.

Humane Treatment of Animal:
Although not included in the national *Principles of a Healthy, Sustainable Food System*, we have established protocols for humane treatment of the animals. Following these protocols further enhances the health and well-being of the poultry which also translates into benefits for farmers and consumers.

Examples of related protocols:
--Providing adequate indoor protection, roaming space, heat and ventilation for first 10-15 days
--Preparing outdoor environment with a perimeter fence to protect from predators
-- Poultry is secured and protected inside a coop at night.
--Easy access to fresh water at all times
--Prepare paddock for adequate shade, timely production of greens and sprouts--so they can go outdoors as soon as possible and with abundant food throughout the paddock.
--Farmers, workers, and those catching chickens for loading into cages are trained to handle chickens properly.

--Utilization of large cages to ensure the poultry can stand and move during transport to the processor.

The food system model will be evaluated and updated yearly as new outcomes provide better and more efficient ways to achieve a competitive and sustainable production level.

Free-Range Poultry Production System Support Infrastructure

This manual addresses in detail the physical infrastructure (property, paddocks, buildings, equipment, and production practices) needed to establish a free-range poultry production system. However, from the stand point of a new agripreneur, especially a new agripreneur with a minority background; there are several resources that can be tapped to provide support specifically for the agripreneur. These resources will directly affect the ability of the agripreneur to produce, process, market and distribute meat poultry product.

Existing farmer/agripreneur support infrastructure may be adapted to address the needs of the agripreneur embracing this poultry production system. The needs will influence the type of support infrastructure to be deployed. Find below examples of various types of support that may need to be sought or the agripreneur will find useful.

Institutional Support

Everyone needs technical assistance and in many cases training or continued education. We may take the institutions that support us for granted, such as municipalities, the local government, the non-profits. For an agripreneur, all of these broader institutions are important resources.

The foundational institutional support for this food system and the agripreneurs is the Main Street Project. Main Street Project supports economic strategies for local, regional and national competitiveness. This is done with a focus on food systems as a key strength of rural economic opportunities. As such; Main Street Project is the key player in developing the production system and launching a new generation of agripreneurs. Main Street Project continues to provide the mentorship and support needed to grow and further develop the food production system and the agripreneurs.

The Main Street Project supports and guides beginning farmers in three phases of experiential learning preparing and setting them up to be successful agriprenuers.

1. Discovery – hands-on opportunities to experience the full cycle of poultry production,
2. Development – intensive education in business planning, farm operation, marketing, scheduling, hands-on field training at incubator sites.
3. Launch – The agriprenuer moves into designing and launching their own business plans, accessing financing options, and procuring equipment and supplies.

Additional Institutional Support:

Institutions such as the United States Dept. of Agriculture (USDA) , Farm Service Agency (FSA), Natural Resources Conservation Services (NRCS), University of MN
Extension (U of M Extension), Minnesota Pollution Control Agency (MPCA) and others can also help the agripreneur manage various aspects of the enterprise.

For example: The University of Minnesota's Alternative Livestock Systems Department is a unique resource with knowledge and fact sheets available to assist with a diversity of issues facing new agripreneurs. As an educational unit they provide support, applicable research and updates through short courses, seminars, and webinars. The University of Minnesota can also provide soils lab and veterinary lab resources both critical to paddock production and identifying diseases that may breakout.

Legal Support
It is important to establish a connection with local lawyers and government regulators that can help explain or clarify issues that may arise as the poultry operation develops and legal issues materialize. What exact legal issues will surface no one can predict. However, a new agripreneur will face a variety of situations and questions. Here are some examples:

What legal structure will best suit the long-term goals and aspirations of the family or individual agripreneur?
What partner agreement terms need to be discussed and formalized?
What are the advantages of incorporating?
What licenses/permits will I need and how do I obtain them?
What should be included in a farm liability insurance policy?
Is there product liability insurance?
Who can help me interpret the local rules and regulations?
How to interpret the local rules and regulations?

For Minnesotan's specifically; the Farmer's Legal Action Group located in downtown St. Paul is a source of assistance with legal issues. If their case loads allow, they may be able to work on a specific situation and serve as a farmer's legal counsel. Additionally, the Farmer's Legal Action Group; or similar agency, can refer the agripreneur to other legal or regulatory agencies to assist in resolving legal questions and issues.

As agripreneurs become established and gain experience dealing with specific legal and regulatory issues they will be able to mentor and make referrals to legal agencies that have been helpful resources.

Marketing Support

Most individuals who become connected with a farm operation do so because they find value in it. The most important value proposition an agripreneur can offer is their product, the manner in which it is produced and its contribution to the health of the customer. This appreciation for both the product and the agripreneur moves the customer to be supportive of the agripreneur and the poultry product.

What this means is that the agripreneur has the opportunity to market utilizing the dedicated and loyal customers who value not only the product itself (free range meat poultry); but also the unique food system's approach --- from the way the birds are handled, fed and managed to the environmental and ecological contributions from the operation.

As relationships build, customers may become bring in other customers and be interested in other farm products such as vegetables grown on-site or composted manure. Processing the poultry manure by utilizing worms in the composting process provides a nutrient-rich fertilizer product.

Before starting each production cycle, a farmer must make sure there is a basic market that sustains a meaningful part of their operation. During the start-up phase of this food system there will be assembled a team of professionals to provide this type of support including support for marketing and distribution.

Community Support

There is nothing better than a poultry operation that is supported by the broader community. This is critical in the production, marketing, building awareness and sustainability phases of the free range poultry operation. Poultry is a significant source of protein around the world. It is one of the healthiest meat choices for human consumption and can be grown in an environmentally friendly manner.

Although the system we have developed is not yet the mainstream production methodology; there is an increasing demand for healthy and naturally grown (utilizing a, free range system), pharmaceutical free and humanely raised meat poultry. Currently there are not enough agripreneurs raising poultry utilizing the protocols outlined to meet the growing demand.

The increased demand for this product presents a unique opportunity for farmers. The opportunity can further be strengthened by the agriprenuer's continued focus on building community connections and community support. The agriprenuer can engage more fully in the community by offering farm visits on a regular basis and providing volunteer opportunities. The agriprenuer can listen to the community and local customers to develop marketing options that fit various groups in the community.

Community engagement can be a win-win situation for the community and the agripreneur. Cost sharing in the form of pre-payment of product assists in operations financing. Community supported agriculture systems can lower the risks of starting and growing a free-range poultry operation. The reduction of risks will help keep the products affordable and competitive in the marketplace.

Input Supplier Support

An established network of reputable suppliers of needed products and services is critical for every agripreneur. For graduates of the training program at Main Street Project, a resources guide is provided that includes names and contact information of suppliers of: the selected breed of poultry, feed, grain, equipment/repairs, operational supplies and other resources critical to the production of free range poultry.

A description of supplies and equipment needed are provided in **Free Range Meat Chicken Production System Description and Requirements** pages 26-67.

Human Resources Planning and Management

A core input to any enterprise is the energy and work needed to first get the enterprise operational and then managed and maintained to be productive. Data was collected to measure how many hours and people are needed to manage a flock from start to finish once the production facility is operational. Launching the enterprise will have a different set of variables and efforts depending on each individual situation.

The information below is based on tracked hours of work and types of work performed with the flock featured in this manual: one production cycle for 963 finished chickens with a beginning flock of 1,000 chickens.

Approximately 200 hours of labor/work was performed to raise this flock including normal, standard daily tasks and special tasks as outlined in this manual.

The conclusion drawn from the labor data collected is two people are needed to grow a flock of up to 1500 birds however; not all of the chores require two individuals. For the most part one person can take care of everything except for the loading of birds onto a trailer for transport to a processor, and from time to time, help is needed to move feeders from one paddock to the other paddock. This help can be requested from other farmers who may be interested in harvesting the manure or part of it at the end of the cycle or can be arranged as a system of cooperation among poultry farmers so that operations only need one person permanently.

Heavy labor points

- Spreading straw bales after day 50 when feeders have also been adjusted to accommodate growth and deter crowding.
- Loading birds into cages and onto the transport trailer as well as unloading at the processor.
- Manure clean-up after the birds are gone. Note: The cost of labor for manure clean-up is not included in the price of chickens because the manure has value and pays for removal related costs either by selling per bag for gardens or incorporating into vegetable production thus reducing the input costs of raising vegetables

Suggestions for efficiency and productivity:

- Pay especial attention to repairing systems completely when they malfunction.
- Eliminate busy work and look for efficiencies like: picking up trash and disposing of it immediately, fixing a leaking water fountain immediately to avoid increased labor and other micro issues that lead to unnecessary laboring.

It is recommended for the first two or three flocks to raise no more than 500 chickens. This practice provides the grower the opportunity to gain experience and become accustomed to the systems and routines from start to finish. The agripreneur/grower should plan for two or three times more hours of work as they are learning a new system.

Marketing and Communication

Why begin by talking about marketing and communications when the focus of this manual is free range poultry production?

Becoming a successful poultry agripreneur is more than raising a healthy flock of free range chickens in an economical way. Critical marketing and communications information needs to be collected from the beginning of the production cycle and throughout the production cycle. It is important to understand that not collecting and utilizing marketing tools throughout the production cycle can cripple a poultry operation designed to be scalable, sustainable and market driven. Without effective communications and marketing strategies sufficient demand for the end product may not exist and decisions on how to improve operations may not be apparent if daily observations have not been tracked and documented.

Specific marketing and communications strategies will be outlined in the business plan with help from the trainers.

This production manual will address three common sense strategies:

1. Every agripreneur must think about marketing and communications strategies daily; as they raise their poultry. Keeping in mind that knowing how to make the public aware (communications) and how to heighten the interest of the client (marketing) will help the poultry farmer make important decisions. Documenting with both photos and narrative will assure the customer that the poultry was raised in a healthy environment, pharmaceutical free, utilizing natural feeds and the free range method. A **written journal with photographs** will prove useful in developing communications and marketing strategies. Refer to **Raising a Flock from Start to Finish: A Chronological and Pictorial Account**

2. The way an agripreneur manages his or her poultry operation and including such things as how and where trash is stored, maintaining a regular mowing and cleaning regime and maintenance on buildings and driveways can potentially help or harm the enterprise. Be prepared to make the best impression at all times as customers may arrive unannounced.

3. The daily written journal entries plus the records of growth rate, mortality, flock health, feed ordered and consumed etc., will provide the basis for marketing and communication and will be the basis for sound business decisions. The agripreneur will be able to identify needed changes and make adjustments.

In marketing and communications it is helpful to understand the customer's needs. Below find four such scenarios:

1. A retail meat and poultry department manager seeking information to share with their marketing department or newsletter food editor.

2. A college food service manager in need of sourcing local foods and involving students in telling the story on campus.

3. A hospital food service manager needing documentation showing that flock is pharmaceutical free.

4. A single buyer comes to the poultry production site to purchase live poultry. Selling the harvest or part of the harvest to single buyers at the farm can secure a better price and eliminate the costs of processing, transportation and cold storage.

The possible scenarios are many, however; if information about the flock is not systematically collected over time it will not be possible to tell the story.

A single snap shot on a given day during the production process is easy but does little to tell the whole story. Tell the story by following the progress of the poultry over time and highlighting the healthy environment and healthy development of the poultry.

As an agripreneur always keep in mind these marketing questions: Why should the consumer buy your poultry? What do they need to convince management or their customer that your poultry is primo? Do take the time to document in writing with supporting photos the story needed for ongoing communication and marketing strategies as well as using the documentation to make business operations decisions.

Most of why this system works has to do with the design of the regional and sustainable poultry production system, core production protocols with communication and marketing always in the forefront. The well-told story brings the added value to the marketplace.

Understanding the poultry production system and actual experience in raising flocks utilizing the free range method described in this manual are equally as important.

Follow the grower's manual. This manual will provide needed in–depth, specific and practical guidelines and procedures for raising slow growth chickens (Male Breeder ID: **S 77).** The growing protocols outlined are the measuring tool that a consumer, reporter, wholesale buyer or competitor researching the system will use in order to assess the veracity and credibility of the final product.

Following these protocols is critical to a successful free range poultry operation; together with the documentation process they have significant marketing value. Said another way, marketing this product is not just getting it to market, it is about backing it up *permanently* as the fundamental principle of its staying power and endurance.

The next segment Free Range Meat Chicken Production System Description and Requirements explains the resources needed and design of the free range meat chicken production system and site.

Free Range Meat Chicken Production System Description and Requirements

This section of the manual will describe in detail the Free Range Meat Chicken Production System requirements. Requirements related to production site and facility design, ranging paddocks, watering system, feeding system, grain storage, manure management, sanitation, mortality disposal, plus tools and supplies are all outlined in this section. One production unit is used as the example. One production unit can raise 4,500 free range chickens in three flocks in cold climate areas with an additional smaller winter flock if desired.

It is recommended to begin with one production unit in the start-up phase. Investing at this level will provide the agripreneur needed experience in free range poultry production and a minimum investment level of resources including time and labor. This experience will provide the agripreneur a basis for making decisions regarding the agriprenuerial venture.

Four production units would be considered a full-time occupation for one agripreneur with hired labor at processing time to assist in catching and caging birds.

Production Site and Facility Design:

Ownership/Land Control:
The agripreneur may own land or may need to partner with an existing landowner to develop an agreement to build and operate the poultry production site.

Location Requirements:

Site area must be zoned for livestock production
Within 40 miles (preferred location) of poultry processing plant
Access to water and electricity sources
Proper site drainage
Optimal building orientation for wind protection, ventilation and utilization of solar energy

The ecology of a place is defined by many factors, if in a valley for example, humidity and wind will behave differently than if the farm is located on a hill facing North or facing South, or on a piece of land surrounded by forest or a flatland with row crops around. All of these are factors affect the specific conditions of a place and they also define the kind of environment

the birds will be exposed when ranging outdoors. One way to help equalize the environment is to establish replicable management practices and methodology shared in this manual.

But even with this manual, a farmer will start with an undeveloped production unit, as time passes manure will accumulate in the field, perennial crops will grow, annual crops will be planted to provide shade, protection and other benefits to the farmer and to the flock and consequently, the environment for the birds will continually improve and with this system, the quality of birds that can be raised in the same space.

Space Requirements:

One Start-up Production Unit = .5 acres. A minimum of 100 X 200 ft. is needed including an 18' x 72'. poultry building and free range paddock system. See Diagram 1 below for site specific design components. The physical site should include room for expansion to four production units = 2 acres minimum.

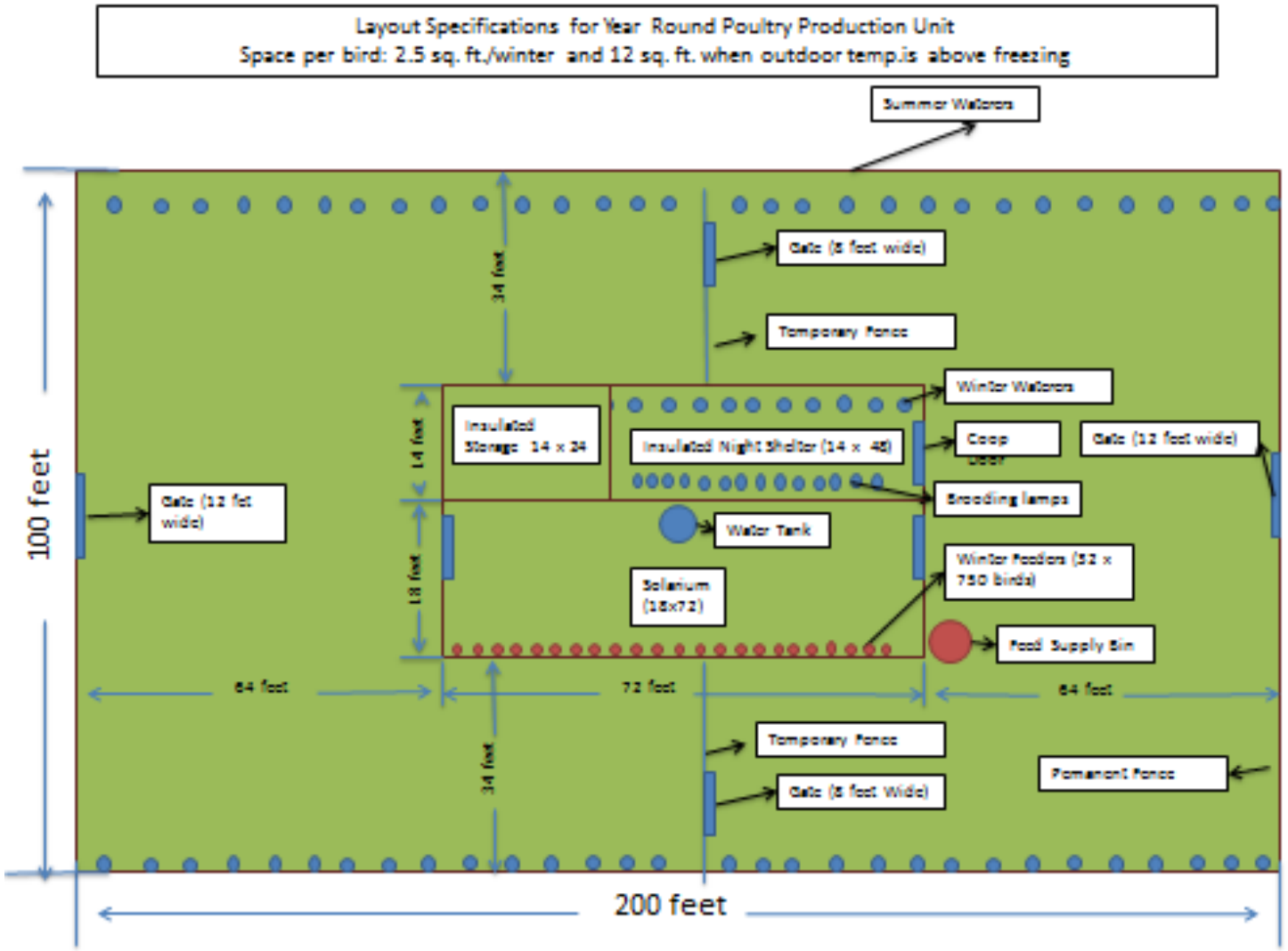


Diagram 1 A: Free Range Poultry System Site Design--One Production Unit

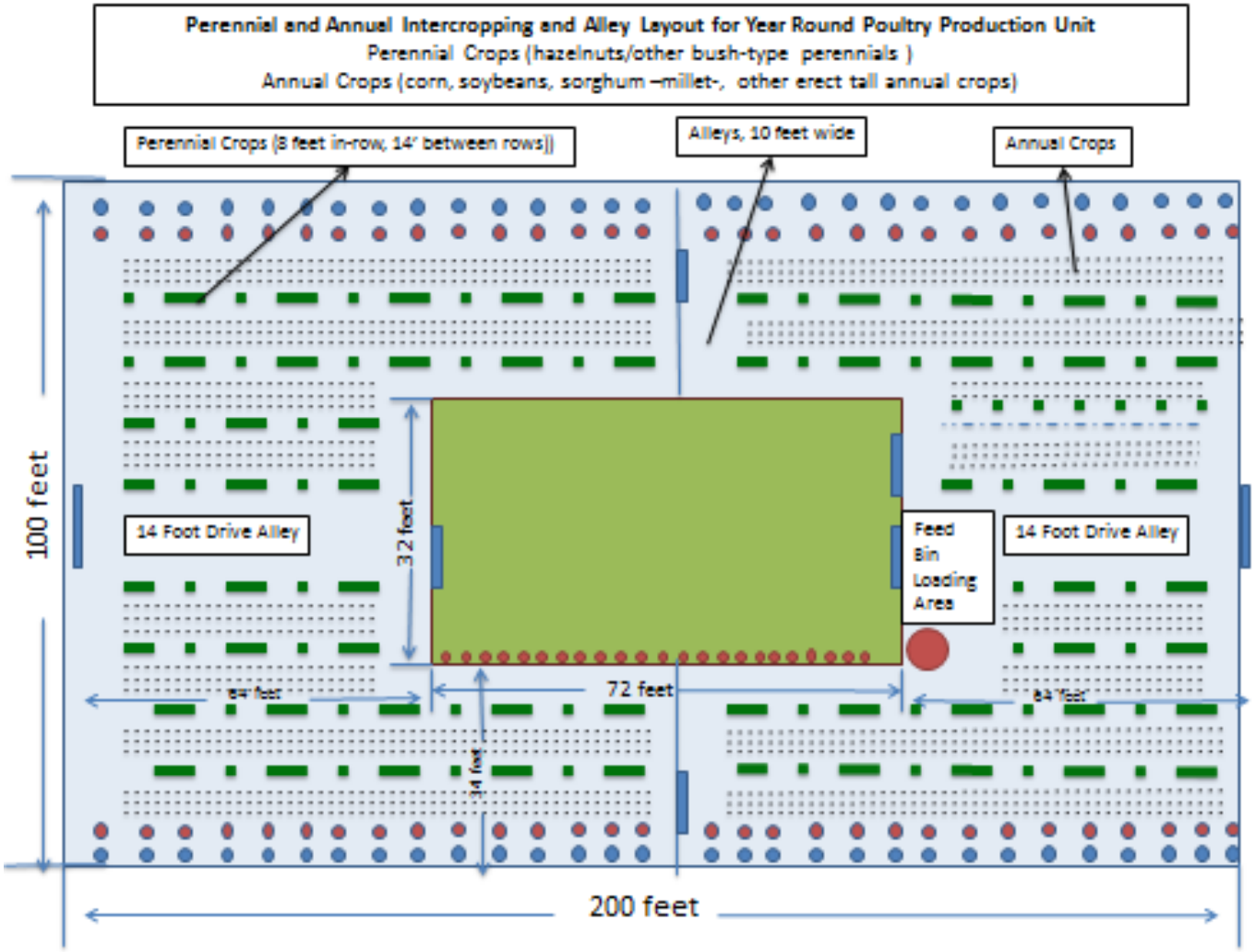


Diagram 1 B: Perennial/Annual Intercropping--One Production Unit

Poultry Building Design Requirements:

The building is 32 feet wide and both 72 feet long and is divided into two sections. It is oriented east west on the site to allow the building's south face to maximize sun exposure for passive or active solar heat collection during the winter.

During summer, a shade cloth cover over the south side combined with proper ventilation reduces temperature sufficiently for a comfortable night environment. This is important for free-range poultry systems where animals spend the days outdoors.

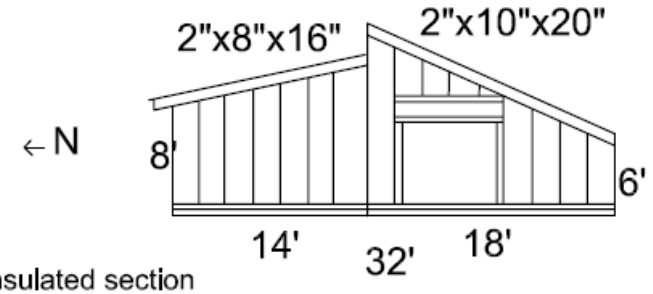
Doors on either the east or west end are large enough to provide equipment access for cleaning and other chores. The height of the building is sufficient for good ventilation, and total cubic feet of space allows for full management of dust and ammonia (for flock and worker health).

This design is built with off-the-shelf materials. It can be put together with farm-sawn lumber or materials delivered from the nearest lumberyard.

It is easily modified to take advantage of local materials. It can also be reduced in size for warmer, year-round regions.

Alternative Coop Design #3

West Side



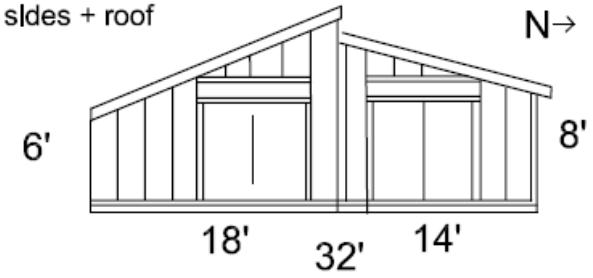
Insulated section

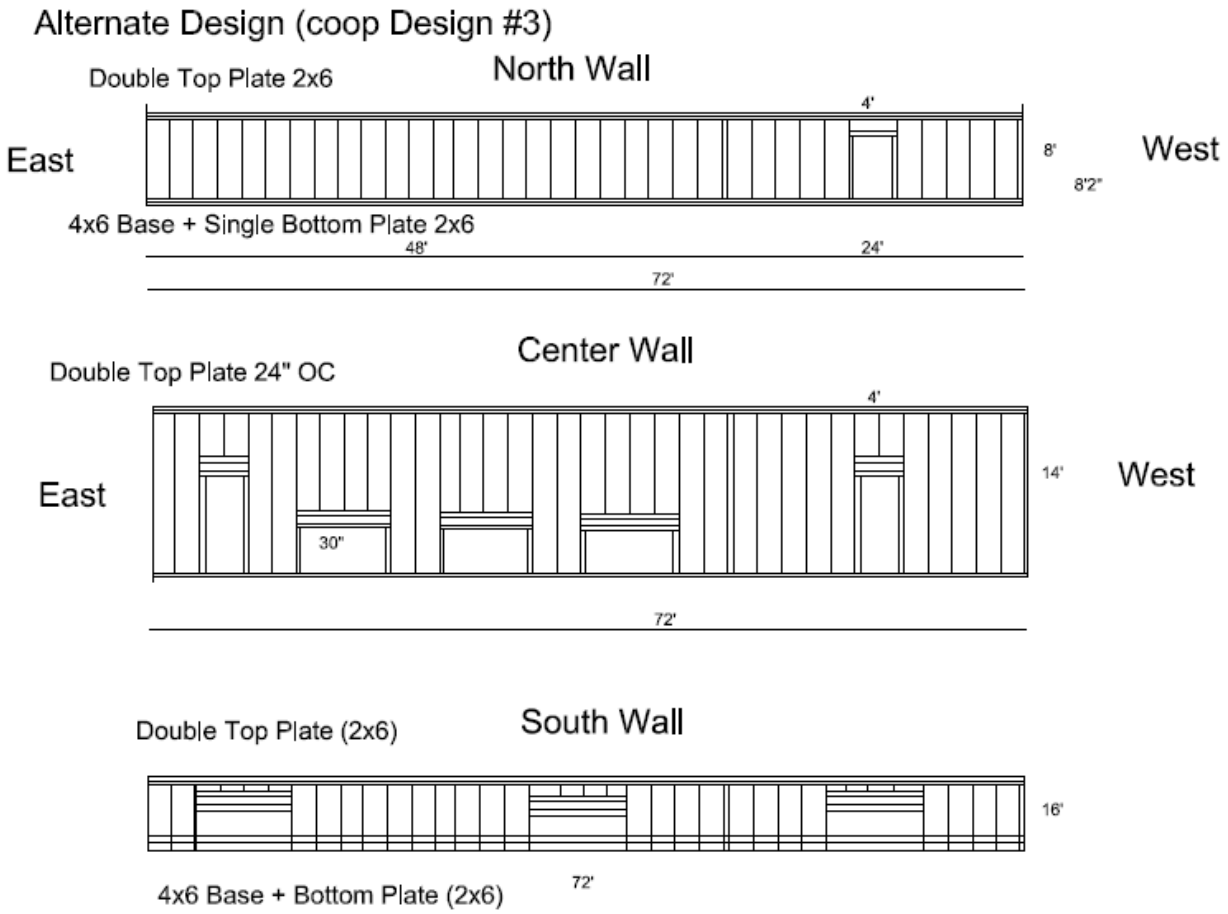
2"x6" studs
OSB 9/16 or 1/2 4'x8'
onsulatlon (R19)
metal siding + roofing

Solarlum

2"x6" studs
poly sides + roof

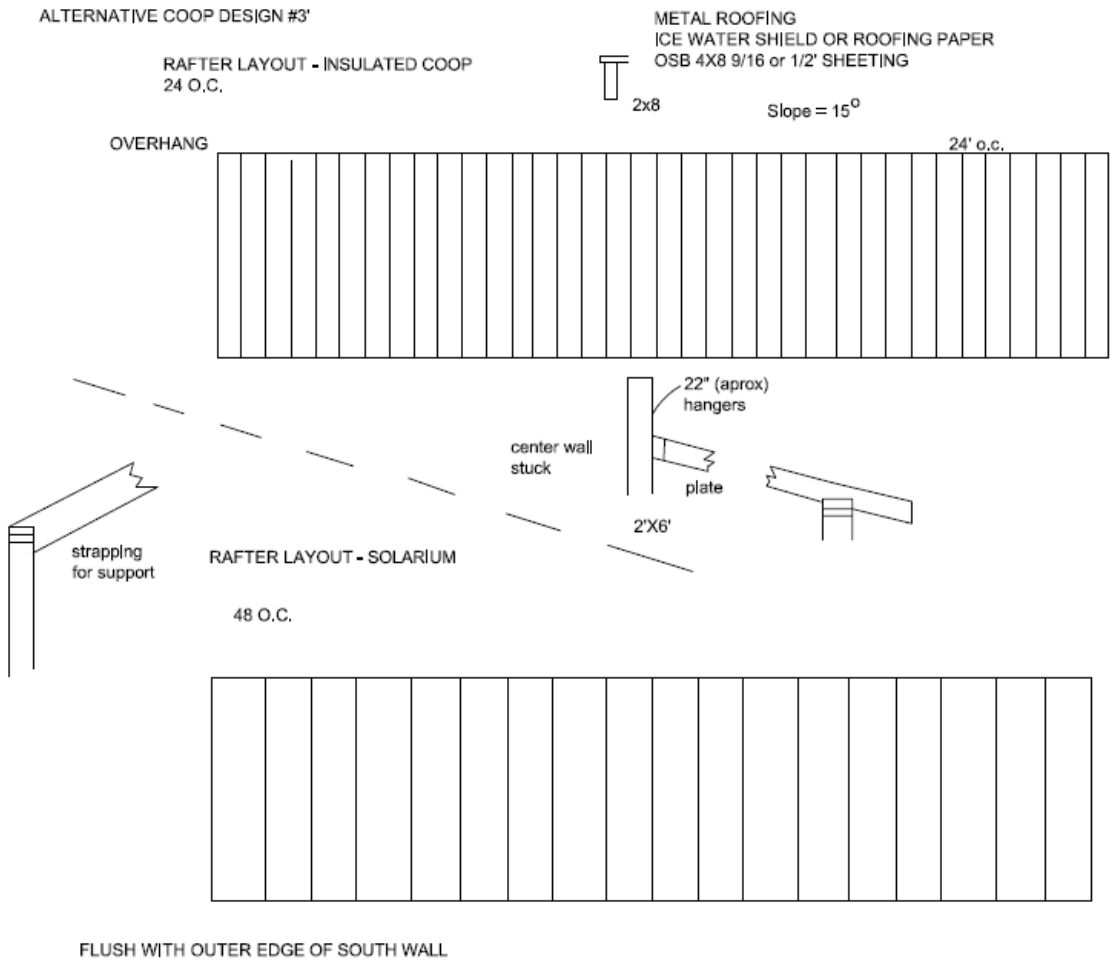
East Side





A 14 foot high middle wall divides the south-facing solarium from the insulated north side. This wall is partially built with transparent material to let in natural light, providing full sun exposure during the winter for heat, while shading the during the summer to help cool.

The building can be adapted for egg-laying operations by expanding from 14 ft. to 18 ft. on the North side's insulated section, to accomodate laying nests on the North wall. Perches can be installed against the middle wall.The natural light, ample vertical space and steady comfortable temperature during the winter keeps hens laying uninterrupted with minor reductions in productivity during the shortest days and coldest weeks of the winter in Northern climates.



The south-facing exterior wall is built with doors to release birds during the day while securing them during the night to protect from predators. During stormy or extended rainy periods, the solarium serves as the roaming space for summer flock. In the winter the same solarium space serves as ample roaming space for a smaller flock (50% fewer birds). This space is managed during the winter for the production of sprouts, with straw to keep the birds busy while scratching for whole grains spread throughout the space.

For cold climates, the building is constructed on top of biomass heat structure and designed to trap heat during the day from the uppermost part of the building. Warm, filtered air is collected from upper parts of the building using an 8" pipe with two in-line fans. The heated air is sent 4 feet below the surface and through a biomass heat system consisting of 400 feet long drainage perforated 6" piping covered with 2 feet of 3" diameter rock. The rock is charged with the hot air which then is released slowly through the remaining 2 feet of soil. This system can keep the building from freezing even in the worst winters in Minnesota, making it one of the most energy efficient options for animal production. Insulation that extends 4 feet horizontally away from the perimeter of the building and vertically 4 feet below grade can significantly increase the building efficiency eliminating the need for extra heating of any kind inside the building.

If the building is equipped with the geothermal solar heat option described above, it can be turned into a greenhouse production system with little or no modifications. For aquaponic systems, the North side area becomes the fish production section while the south-facing solarium can be equipped with a backup in-floor heating system and growing beds. This building can be turned into an efficient aquaponic system as well as serving as year-round poultry production or simply as a greenhouse for vegetable farmers who might choose to alternate between or combine poultry and vegetable farming.

This unit's simple and flexible design makes it possible for farmers who lose one market to shift incrementally to another without having to liquidate or re-build their entire farm infrastructure.

Ventilation System

Openings on both ends of the building's vertical walls allow for air to flow up and out of the building in the summer, without creating a water entry point. The entry and exit doors on the south side—plus other doors and window openings that can be added depending on the sun exposure levels—generate a natural flow of fresh air that goes up and out the top. During the warmer nights of the summer, an extra hardware screen door can be used to keep air circulating while sealing the building to predators.

In the middle wall, openings in the upper part of which can be sealed in the winter to hold more heat on the North side, can be opened for summer ventilation feeding the upward flow of air. If needed, wall mounted vents on the North side can supply the building with cooler air. This are decisions to be made by farmers depending on the location of the building, exposure to air currents and shade as well as density of birds to be raised regularly.

Perimeter and Paddock Fencing System Requirements:

A fencing system is needed around the production unit to deter predators, confine free range poultry to the paddocks and to divide paddock areas for ease in rotating poultry from paddock to paddock while providing optimal usage of the paddock feeding/ranging areas.

Materials needed are: steel fence posts, chicken wire—double thickness and covering the first 21" from the ground up. Above that attach galvanized, square mesh with 3" x 2" hole spacing. Gates – 5' tall and a minimum of 10' wide. Gate width will depend upon the width of equipment that must pass through the gates. Number of gates will be determined by the number of openings needed.

Watering System Requirements:

Indoor Watering System

In the poultry building running water flows to bell-shaped poultry fountains situated along the length of the poultry building with overhead water lines feeding the fountains—see Diagram 2 below: Watering System Layout for Free Range Poultry Production Unit

Each water fountain has individual flow control, height adjustment and shut-off. They are weighted by filling base ¾ full with water or sand which provides stability and less water spillage occurs when they are bumped. Water fountains are placed inside the building at approx. 2' intervals. The height from the floor can be adjusted as birds grow and when not in use; can be hung close to the ceiling.

During the first week; additional 5 gallon floor sitting waterers are utilized at a ratio of one/1000 birds.

Poultry water fountains placed close to building floor to accommodate 2-3 day old chicks.

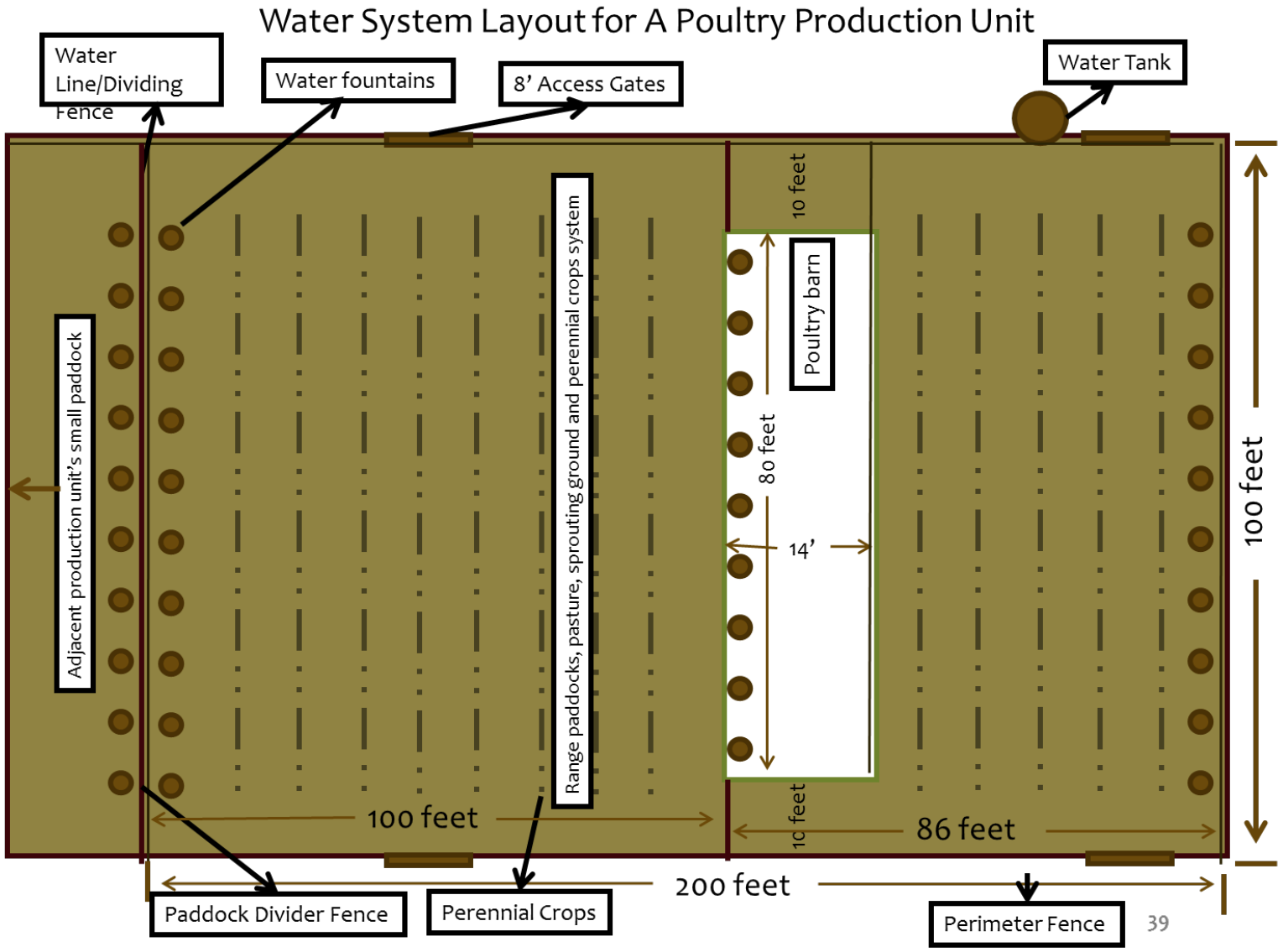

Water System Layout for A Poultry Production Unit
Water Line/Dividing Fence
Water fountains
8' Access Gates
Water Tank
Adjacent production unit's small paddock
Range paddocks, pasture, sprouting ground and perennial crops system
10 feet
Poultry barn
80 feet
14'
100 feet
100 feet
86 feet
10 feet
200 feet
Paddock Divider Fence
Perennial Crops
Perimeter Fence
39

Diagram 2: Watering System Layout for Free Range Poultry Production Unit

Outdoor Watering System

The outdoor watering and feeding system are combined to keep high traffic areas close to each other during most of the growing period—see photo below. The fountains are place at ___intervals.

The outdoor water line is strategically placed so that it can feed the water fountains in adjacent, when there are adjacent paddocks. The water line is run over the top of the paddock divider fence – refer to Diagram 2 above: Watering System Layout for Free Range Poultry Production Unit and the photo of the outdoor water system below.
If the poultry production site will be shut down for the winter months all tanks and water lines both inside and out should have water blown out of them to prevent damage caused by freezing of the water lines.

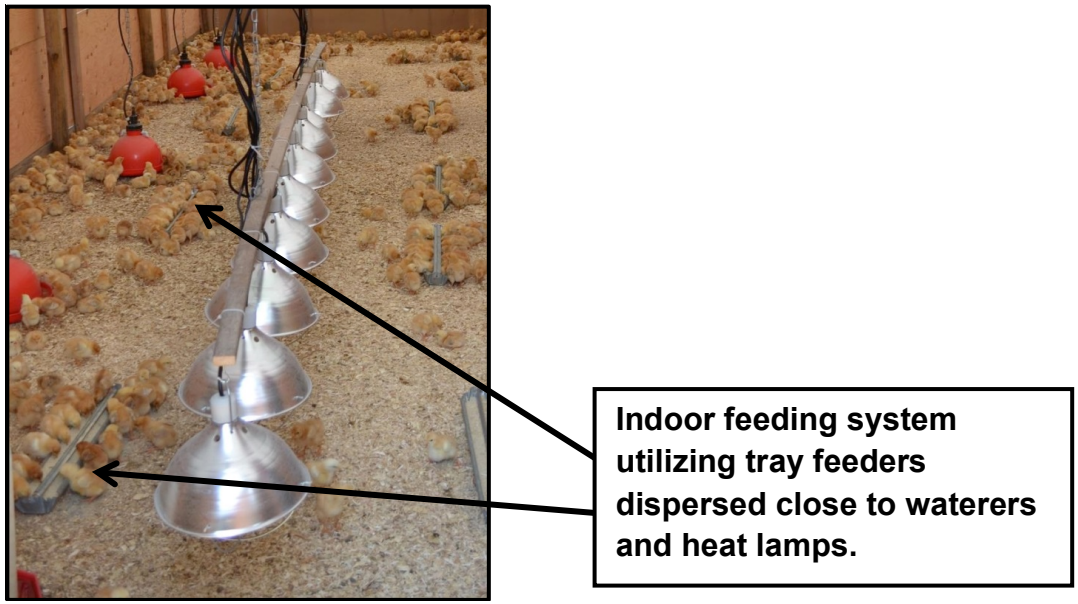
Feeding System Requirements:

Indoor Feeding System

For the first 5 to 10 days feeding trays are place on the floor of the poultry building on both sides of the heat lamps. See photo below.

Additionally, on the poultry building wall opposite the water fountains a row of manual or auger driven feeders are needed. See Diagram 3: Feeding System Layout for Free Range Poultry Production below for placement of indoor feeders.

Once chicks are developed enough (at the latest by the 4th week or as early as 10 days if weather conditions, size of the birds and condition of the cover crop are suitable) feeding happens outside utilizing the outside feeding infrastructure. Additionally, they will consume broadcasted grains and grasses in the paddock. During periods of inclement weather birds must have an option to take shelter and eat inside the poultry building.



Indoor feeding system utilizing tray feeders dispersed close to waterers and heat lamps.

Outdoor Feeding System

The outdoor feeding infrastructure is designed to accommodate feeding requirements as the birds grow. See Diagram 3: Feeding System Layout for Free Range Poultry Production.

Gates, perennial crops and feed system infrastructure are designed to continue to allow for mechanical spreading of grains and for ease of access to feeding equipment and grain bins.

The feeding system layout is designed to:

- Allow for manual loading of feeders.
- Be moved as needed by two individuals.
- Allows for modification of feed tray placement at day 50 to accommodate the second half of the growing period. The same number of feeders are needed but adjusted so that there is approx. 24 " or the width of two full-birds between each feed pan for ease of access without the birds crowding.

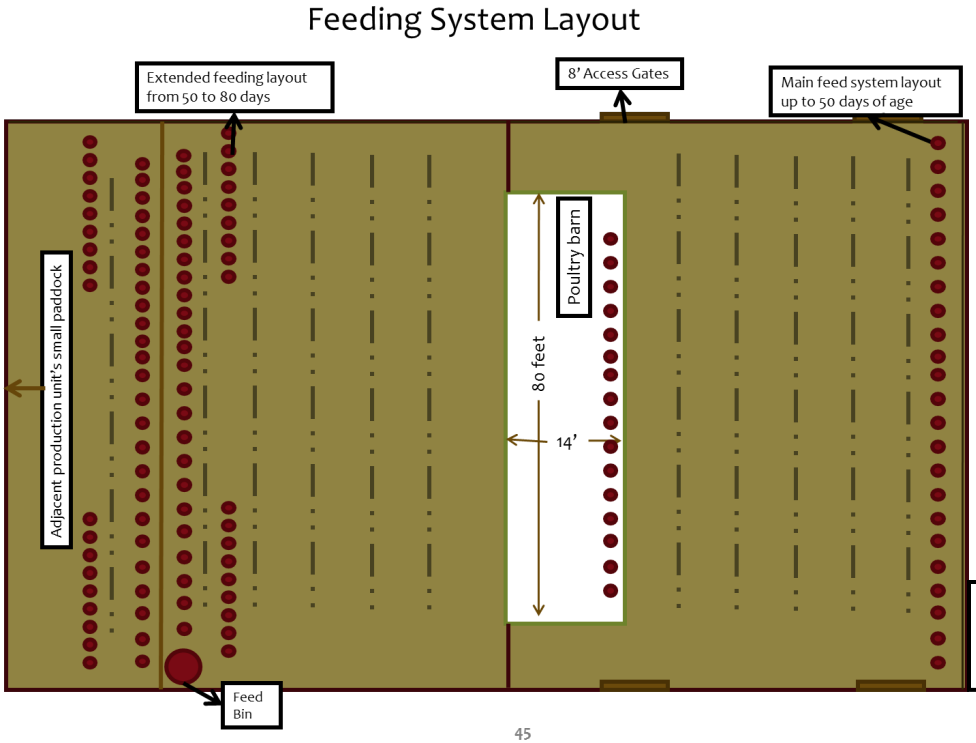


Diagram 3: Feeding System Layout for Free Range Poultry Production

Feeders are spaced at 24 inches apart and are hung from a wooden A-frame structure 14’ long. Each feeder holds 35 lbs. The feeder is hung from an open hook with heavy galvanized chain for ease of removal and easy to clean, move or store. See Diagram 4: Diagram 4: Outdoor Feeder Layout/ Feeding Unit --Utilized Day 1 through Day 50 of Outdoor Feeding

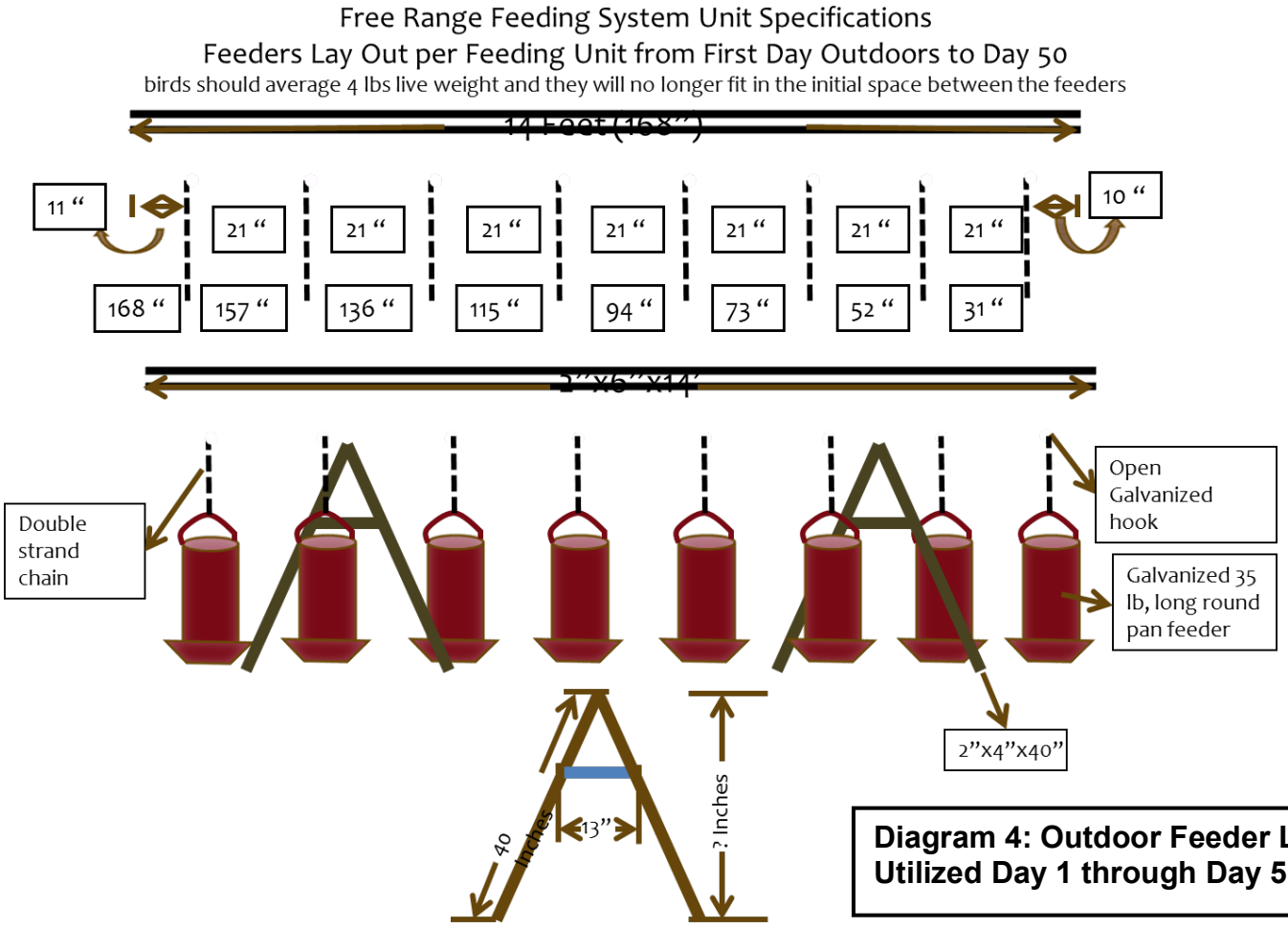


Diagram 4: Outdoor Feeder Layout/ Feeding Unit Utilized Day 1 through Day 50 of Outdoor Feeding

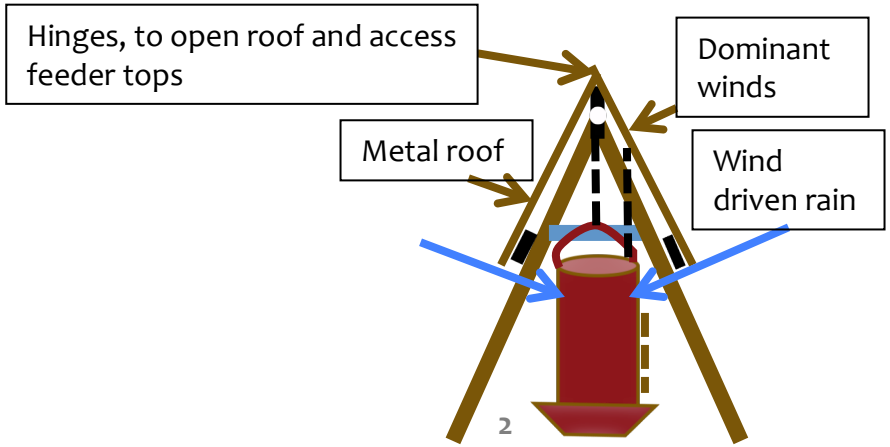


Diagram 5: View of feeder system showing hinge and roof placement to protect from wind driven rain.

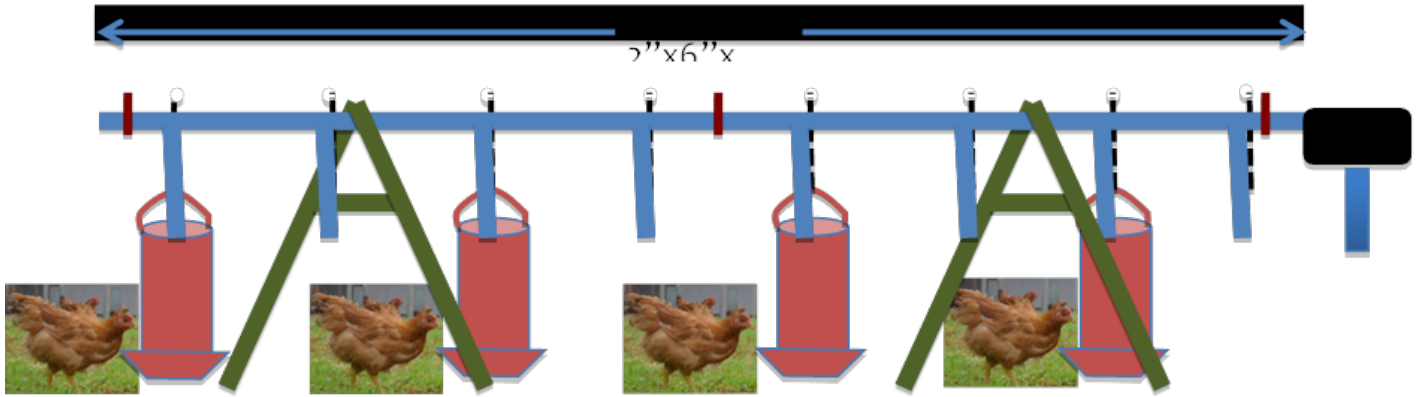


Diagram 6: Feed Trays Adjusted
Feed trays adjusted on day 50 to accommodate the second half of growing period. The same number of feeders are needed but adjusted so they are approx. 24 " or the width of two full-birds between each feed pan; eliminates crowding around feeders. The amount of feed fed is doubled at this time.

Movable Feeding Unit with A-Frame Support

Feed Pan Trays Dropped for Winter to Reduce Deterioration

Grain storage needs are calculated by the number of production units, number of flocks and size of the flocks. No production can start without having adequate grain storage facilities and grain on hand. It is recommended to have the entire amount of grain stored for the full growth cycle.

Gravity bins, from 2 T. to 8 T. capacity; where the grain is easily removed using the force of gravity and a base fed auger system, are recommended instead of traditional cemented flat floor grain bins. See Diagram 7: Gravity Bin Grain Storage below. The bigger size is for the grains needed in larger volume such as corn, barley, wheat, peas, etc. A smaller grain bin is utilized for smaller specialized grains such as flax, Camelina sativa -if available- and other alternative seeds. Note: Other grains may become part of the growing procedures as they are tested and incorporated into the system.

For our one unit production example the two main grains that were broadcasted in the paddocks and fed in feeders are barley and corn. Two 8 T gravity bins were utilized; one for barley and one for corn. A 2 T. gravity bin was utilized for flax seed. Another option is to construct simple grain bins from 4' x 8' sheets of plywood with a hinged lid.

If working with an existing farm facility; gravity or wooden bins may be available for use. Measure to determine capacity and suitability.

Gravity Bin Grain Storage

Broadcasting Grain System for Free Range Consumption:

Another key component to the free range poultry production feeding program is the broadcasting of grains throughout the paddock. The poultry will peck and scratch for food as is their instinctive and natural feeding behavior. Whatever is not eaten initially; as grain, will be eaten as sprouts or plants.

To broadcast the grain throughout the grazing paddocks a small utility tractor, equipped with a three point hitch and PTO (power take off drive) is hooked up to the grain spreader. See description and photo below of the utility tractor.)

The grain spreader has a cylindrical tub which can hold upwards of 600 lbs. This handy implement may also be called a dry fertilizer spreader and sold as a fertilizer spreader or a grain spreader. The bigger the spreader the fewer the trips to the gravity bin to fill up with grain. See photo below of a grain spreader.

Grain Spreader/Fertilizer Spreader

Additional Production Equipment:

Although a start-up operation with one poultry building can do all the work without much equipment; even with two buildings an agripreneur who is hoping to make a living raising free range poultry will need to mechanize any activity that can be efficiently mechanized. The minimum amount of equipment needed will include a utility tractor, bucket attachment for the utility tractor, grain spreader, tiller/or disk and a manure spreader. The grain spreader has been described above as we discussed the handling and utilization of grain in the operation.

Utility Tractor and Front-End Bucket Loader

The utility tractor is the main implement and utilized for several major chores in the free-range poultry enterprise. For example; as just described, it is utilized in the grain spreading operation, as well as utilized to scoop up and dump manure, spread manure using a manure spreader and used to till or disk the surface soil to incorporate seed and break up organic matter. The utility tractor should be between 45 to 60 horse power, have a three point hitch system to hook up and stabilize implements described above and a power take off (PTO) system utilizing at least 500 RPM's (revolutions per minute).

Front end bucket mounts onto the front of the tractor and utilizes the hydraulic system attachment and controls to easily scoop up manure and dump it into the manure spreader. Consider the width of your building and other possible uses you may have for a front end loader when you are selecting the size of bucket needed.

Utility Tractor and Front End Bucket/Loader

Manure Spreader

The manure spreader which will be utilized after each flock is taken for processing must have a properly functioning shut-off gate so avoid spills on the road if manure is to be transported on local roadways. The total manure produced per flock is 3 to 4 tons, or 2 manure spreader loads utilizing the small, single axle, manure spreader utilized in our example. More information about manure management and the use of the manure spreader is found in the section on **Manure Management** pp.53-62**.**

Single-Axle, PTO driven Manure Spreader

Tiller and Disk

Although, not required for the one production unit operation; a tiller or disk will save on hand labor for incorporating seed for sprouting and breaking up mulch without incorporating it into the soil.

A tiller and or disk could be also used in the fall to incorporate dried up corn stalks into the soil. The corn had been planted in-between the rows of perennial crops in the free range paddocks. If owned, leased or shared with another producer a tiller or disk can save on the hand labor of hoeing and raking. See pictures below of PTO driven tiller and the disk.

The tiller shown is a commercial unit. A garden tiller is not designed to take all the wear and tear plus the amount of operating hours needed over time. More torque is required then the traditional garden tillers specifications. The width of the tiller should be from 42” to 60” wide.

When selecting a tiller or disk consider the width of the poultry building, spacing of perennial crops and fruit trees, the radius you need to turn around in and the capacity of the tractor to pull these implements.

Tiller width 42” to 60” wide Tiller width will vary dependent on cropping system, turning space & capacity of tractor.

Disk width will vary dependent on cropping system, turning space & capacity of tractor.

Poultry Mortality Disposal System:

Free range poultry operations will have some mortality (deaths of chickens) during the time span from arrival of chicks to full grow out and transportation to the poultry processing plant.

In our one unit free range poultry production example; galvanized metal trash cans were placed off-site but close by in a secured enclosed area. The cans must have tight fitting lids to produce a proper seal to keep flies, predators, and odors away while eliminating the risk of spreading diseases or contaminating the ground via leakage. They can be purchased at hardware stores or farm supply stores.

The mortality disposal containers should be placed inside an enclosed, locked, fenced area complete with a gate for access. It is best to expose containers to the sun as heat from the sun will speed up the decomposition process.

Utilizing this type of mortality disposal system reduces dead chickens to a small volume of usable fertilizer when fully composted. However; if local ordinances require, the mortality can be transported for disposal at a licensed facility.

For small operations the need for disposal of mortality should be small. For example: for a 1,000 bird flock, it is documented that one 20 gallon galvanized metal trash can was sufficient; even when larger birds died towards the end of the growing period. By that time, the first birds had fully decomposed into a small amount of solid compost.

If more than 50 birds die in a 1,000 bird flock, help should be requested to identify the problem instead of thinking a disposal mechanism is the solution. Contact a poultry veterinarian—contact info for poultry veterinarians is available in the resources guide-- when cause of mortality and treatment protocol is not known. The sooner the cause is determined the sooner action can be taken to remedy the cause and/or control the amount of mortality.

Galvanized 20 Gallon Metal Trash Can for Mortality Composting

Poultry Weighing System:

The rate of weight gain is a fundamental indicator of a meat poultry operations success. The weights compared to target weights coupled with the knowledge of the amount of feed inputs indicates the performance of the flock. These performance measures are used to manage the flock and are important decision-making tools.

This information can be used to adjust feed amounts, determine when to schedule load out of poultry to the processing plant and ordering the next flock that will needed to be incubated.

The birds are weighed weekly. For the first five weeks the tools needed are a five gallon plastic bucket with handle (which the birds are placed in) and a hand held digital scale which can weigh up to 110 lbs.

Hand-held Digital Scale

Weighing Process and Recording First Five Weeks

1. Weigh the empty 5 gallon pail. Need to do only once. This weight is called the tare weight and will be subtracted from the weights collected to provide live bird weight. The tare weight calculation needs to be done only once if you use the same five gallon plastic pail every week.
2. A. Once a week, on the same day of the week, randomly select five male birds from the flock and place in the five gallon pail by hanging pail on the hook of the hand-held digital scale. Record weight on ***Flock Weight Chart*** supplied in section on Record Keeping Tools. Subtract the tare weight and divide by 5 to get individual average weight of the males. Record average weight of males on chart.
   B. Repeat the weighing and recording procedure in 2 A. above to weigh five females.
   C. Add the average male weight and the average female weight and divide by 2 to determine average weight of the flock. Record average weekly flock weight on chart.
   D. Use steps 2 A., B. and C. to determine average male and female weights and average flock weight on a weekly basis for the first five weeks of growth.

By week six the birds will not fit into the five gallon plastic pail. A 20 gallon aluminum trash can with handles is utilized to hold the five poultry while weighing and a wire mesh cover is placed over the aluminum trash can -- fastened with light wire to the trash can handles.

Weighing Process and Recording Week Six and Beyond

Weigh the 25 gallon aluminum trash can together with the wire mesh lid. This weight is called the tare weight and will be subtracted from the weights collected to provide live bird weight. The tare weight calculation needs to be done only once if you use the same 25 gallon trash can and cover every week.

1. A. Once a week, on the same day of the week, randomly select five male birds from the flock and place in the 25 gallon aluminum trash can with mesh cover. Weigh by hanging pail on the hook of the digital scale. Record weight on the weekly chart. Subtract the tare weight and divide by 5 to get individual average weight of the males. Record average weight of males on chart.
   B. Repeat the weighing and recording procedure in 2 A. to the weigh five females.
   C. Add the average male weight and the average female weight and divide by 2 to determine average weight of the flock. Record average weekly flock weight on the ***Flock Weight Chart***.
   D. Use steps 2 A., B. and C. to determine average male and female weights and average flock weight on a weekly basis for weeks 6 through final grow-out week.

Manure Management System Free Range Poultry Production:

Prior to engaging in poultry production the agripreneur must become familiar with manure management regulations, develop a manure management plan, obtain plan approval--if required, and follow manure management regulations set by state and local regulatory agencies.

In Minnesota, farmers must follow Minnesota Pollution Control Agency regulations and the specific County Feedlot Ordinances. In other states and countries you will need to seek out similar agencies on the state and local levels responsible for defining and regulating manure management practices. Regulations vary and laws change.

Main Regulatory Considerations:

What are the Feedlot Rules?
Federal laws (Federal Regulations 40 CFR 122, 40 CFR 123) regulating Animal Feeding Operations (AFOs) and Concentrated Animal Feeding Operations (CAFO) stem from the 1972 Clean Water Act. In Minnesota, these laws are administered by the Minnesota Pollution Control Agency's (MPCA) Feedlot Program through the Minnesota Feedlot Rules (Minn. Rules Chapter 7020), through the MPCA's administration of the National Pollutant Discharge Elimination System (NPDES) permit program.
The Feedlot Rules regulate storage, transportation, and utilization of manure; and contain sections on registration and permitting of feedlots. In the state of Minnesota the counties have regulatory authority. See below maps that outline feedlot authority in Minnesota and contact information.
Each county may have additional location restrictions and expansion limitations around sensitive features such as lakes, rivers, streams, floodplains, sinkholes, and certain wells.

What are basic concepts and definitions?
In order to determine if your operation is subject to the Feedlot Rules, you need to know a few basic concepts and definitions, such as: What is the difference between a pasture and a feedlot? What is an animal unit? What is considered a Concentrated Animal Feeding Operation (CAFO)? Who is in charge of the Feedlot Rules?

Do I have a pasture or a feedlot?
Vegetative cover and manure accumulation are the two main criteria owners must consider when deciding if a portion of their pasture operation is a feedlot.

What is the difference between a pasture and a feedlot?

An animal feedlot is a lot or building or combination of lots and buildings intended for the confined feeding, breeding, raising, or holding of animals and specifically designed as a confinement area in which manure may accumulate, or where the concentration of animals is such that a vegetative cover cannot be maintained within the enclosure. Open lots used for the feeding and rearing of poultry (poultry ranges) are considered animal feedlots.

A pasture is defined as areas, including winter feeding areas as part of a grazing area, where grass or other growing plants are used for grazing and where the concentration of animals allows a vegetative cover to be maintained during the growing season. If a pasture has, or develops feedlot conditions (i.e., manure accumulates and there is a lack of vegetative cover), it is considered a feedlot, EXCEPT in the following cases where vegetative cover is not required:

(1) In the immediate vicinity of supplemental feeding or water devices;

(2) In associated corrals and chutes where livestock are gathered for the purpose of sorting, veterinary services, loading and unloading trucks and trailers, and other necessary activities related to good animal husbandry practices; and

(3) In associated livestock access lanes used to convey livestock to and from areas of the pasture (including winter feeding areas).

The above are examples of the definitions that will be help to the agripreneur as they develop their manure management plan.

Meeting the Rules and Regulations of Township and County Governments

Local governments can impose stricter rules and regulations to any kind of land use, commercial activity, development zoning, ordinances, agriculture, etc. In general, professionals consulted on this matter, point to the following as a way to inform agripreneurs to conduct due diligence and to ensure that they clearly understand the rules, regulations and agencies that govern them:

- The local governing authority is the Township Board, not the Minnesota Pollution Control Agency. The MPCA statutes and regulations are informative as to how stringent township ordinances for feedlots can be, but they do not govern the situation. *Under Minn. Stat. 116.07, Subd. 7(k) a county may adopt ordinance standards that are more stringent than standards in Pollution Control Agency rules. Moreover, Townships have Home Rule authority to regulate land uses, including feedlots, and to establish procedures to carry out regulation within its political boundaries under Minn. Stat. 462.357, Subd. 1 and Subd. 1g.*

- The most important strategic element of working with government units is to understand the overall goals and objectives for the region and the type of agriculture or rural residential zoning in place. What an agripreneur researches on township or county rules and regulations, can be interpreted differently by a representative of the

local government and variances to the rules may be possible. Discussing the specifics of the proposed operation in as much detail possible with local authorities is the best approach.

- Keep in mind that local governing bodies may have farmer members. These farmer members may be eager to see new agriprenuerial pursuits that diversify the local agricultural landscape and discourage encroachment of cities onto land designated for agricultural purposes. Or they may be skeptical of enterprises that do not fit the more conventional systems. In that case education and examples of similar operations may be of value in the process.

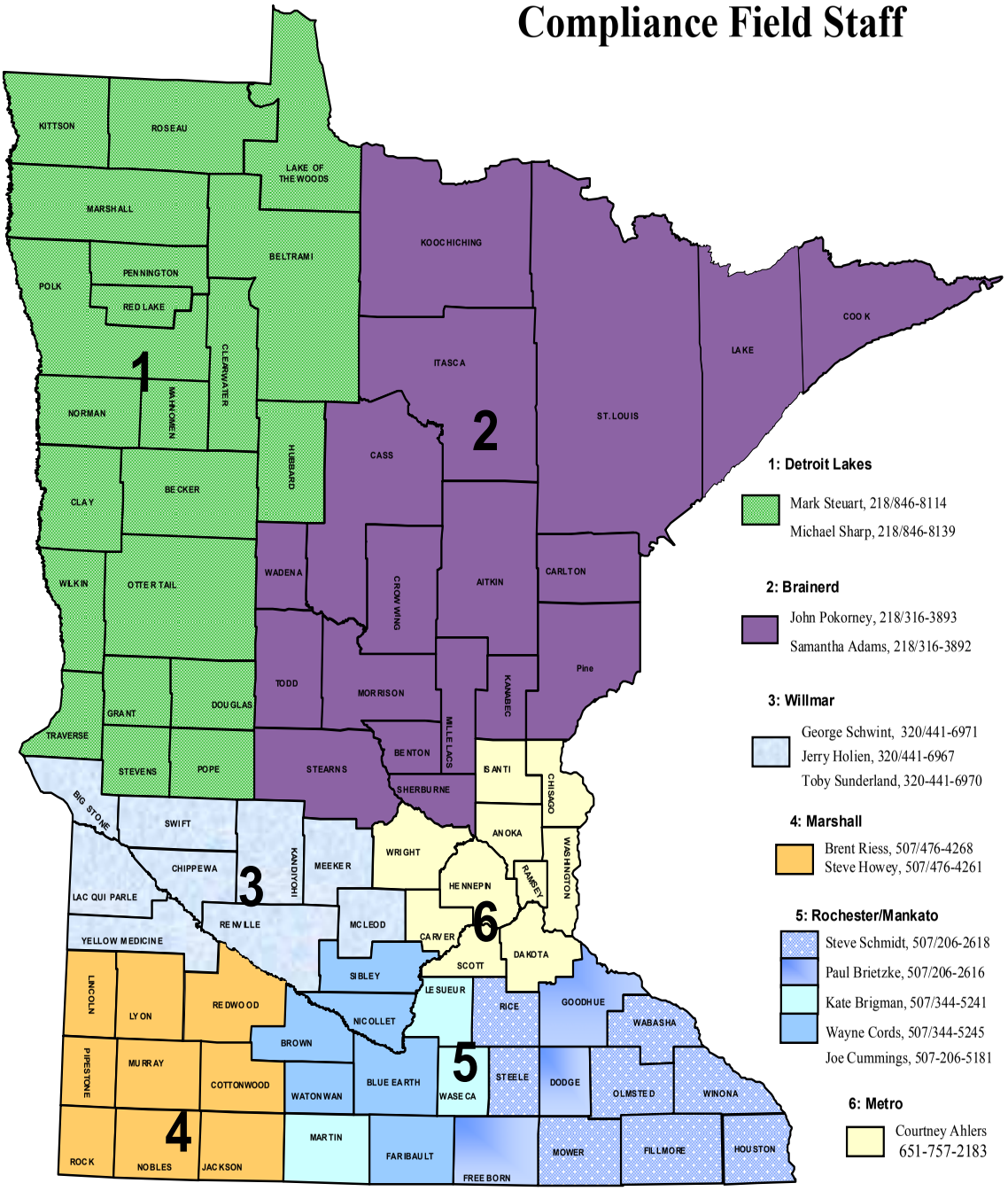
This production manual outlines the process for managing the free-range pastured poultry operations to avoid creating "feedlot conditions" as defined by the MN Pollution Control Agency. Remember, local governments may have more stringent animal density requirements and limits in the number of animals or specific procedures that must be followed. In summary, know the guidelines and work with the designated regulatory agencies. Each proposed agriprenuerial enterprise must fully disclose their manure management plan and work out any required adaptations with the local regulating authority.

The map below shows the offices, names and contact info of various Minnesota Pollution Control feedlot permitting and compliance staff. This map is updated regularly, check the MPCA website *www.pca.state.**mn**.us* to obtain the latest version or call the toll-free general information number at (800) 657-3864. The Minnesota Pollution Control main headquarters is located at 520 Lafayette Rd, St Paul, MN 55155.

Each county that has a cooperation agreement with a Minnesota Pollution Control Agency has a delegated feedlot management authority, known as the county feedlot officer. For the name and contact information of the county feedlot officer call your local county planning and zoning office. If you have questions about the MPCA County Feedlot Program you may also contact Don Hauge at MPCA (Email: don.hauge@state.mn.us, phone: 651-757-2855) or Wayne Zellmer at BWSR (Email: wayne.zellmer@bwsr.state.mn.us, phone: 651-297-7361).

Minnesota Pollution Control Agency

Feedlot Permitting and Compliance Field Staff



1: Detroit Lakes

Mark Steuart, 218/846-8114
Michael Sharp, 218/846-8139

2: Brainerd

John Pokorney, 218/316-3893
Samantha Adams, 218/316-3892

3: Willmar

George Schwint, 320/441-6971
Jerry Holien, 320/441-6967
Toby Sunderland, 320-441-6970

4: Marshall

Brent Riess, 507/476-4268
Steve Howey, 507/476-4261

5: Rochester/Mankato

Steve Schmidt, 507/206-2618
Paul Brietzke, 507/206-2616
Kate Brigman, 507/344-5241
Wayne Cords, 507/344-5245
Joe Cummings, 507-206-5181

6: Metro

Courtney Ahlers
651-757-2183

wq-f1-11

Call toll free: 1-800-657-3864
Updated March 2009

As stated above, prior to engaging in poultry production the agripreneur must become familiar with manure management regulations, develop a manure management plan, obtain plan approval and follow manure management regulations set by state and local regulatory agencies. **See pages 145-148 Manure Management Plan Requirements and Checklist located in the appendix.**

The farm specific manure management plan needs to be developed and approved for each poultry operation; keeping in mind the agriprenuer's specific objectives for use of the manure. These specific manure management objectives could include; but are not limited to using manure as fertilizer for vegetable or grain production, composting or pelletizing the manure, and/or selling the manure. Each use requires a specific manure management plan as per regulatory agency guidelines. **See Main Street Project Manure Management Plan Free Range Poultry 2011 pp. 139-144** located in the appendix. This plan is currently utilized and tailored to a free-range poultry operation near Northfield, MN.

Once chickens have been transported to the processing plant the manure must be removed from the poultry facility building to prepare for the next flock. Very little if any manure will have accumulated in the grazing paddocks. If there is manure accumulation in the paddocks it will compost within 10 days if the recommended manure management practices are followed.

Steps to follow:

- Prepare poultry building for cleaning
- Clean poultry building
- Calculate volume of manure
- Spread manure using appropriate ratios for designated crops and per soil analysis

Prepare poultry building for cleaning

1. Shut-off water, remove or hang water fountains and hoses off the ground.
2. Remove or hang heat lamps off the ground.
3. Remove anything else off the building floor Note: No feeders should be present in the building at this stage.

Water Fountains and Heat Lamps Hung High in Preparation for Cleaning Building

Clean poultry building

1. Pull the manure away from the walls using a hoe or shovel for ease of removal by a tractor or skidloader's bucket.

Notice the 2" X 12" board hanging on supports on the left above. It was used to support the brooding guard for the first week; to prevent chickens from pushing it over.
When no longer needed; it was hung off the ground for ease in cleaning and ease of access and use with the next flock.

2. Remove manure while avoiding contact with walls and equipment. Avoid digging into the ground with the bucket. Go slowly and finish filling each bucket with a scoop shovel to make sure the bucket is completely full. This saves trips and helps insure that the manure is not being pushed back to the sides of the building.

3. The manure is placed in a manure spreader by a small utility tractor of 45 to 60 horsepower utilizing a front end bucket scoop/loader.

4. Calculate volume of manure

Determine the volume of manure by multiplying the length X width X height equal volume in cubic ft. (l x w x h = volume) of dry manure. Be sure to measure your spreader and its load as dimensions will vary depending on the size of the spreader and load. Keep records of the number of loads.

5. Spread manure using appropriate ratios for designated crops and per soil analysis

The nutrient management plan will call for a soil analysis to determine the level of nutrients already in the soil. The nutrient management plan is a part of the manure management plan. The goal is not to over-fertilize yet add the amount of manure needed to boost the available nutrients to the recommended amount for the specific crop.

1. Once the volume is determined it can be applied to the soil at the ratio suggested to fertilize the intended crop. In our example the crops are garlic and black beans.

   At 3 flocks per year (1000 birds/flock) the estimated total of poultry manure per year will be 360 cubic feet. This example excludes a winter flock which will spend more hours indoors and flock size will be smaller to encourage free range behavior.

Additionally weight will vary due to moisture content. Using three flocks as the example, each 120 cubic feet (the capacity of a full load in the manure spreader being utilized) will weigh approximately 1.5 T.
(3 Flocks X 1.5 Tons = approximately 4.5 Tons per year)

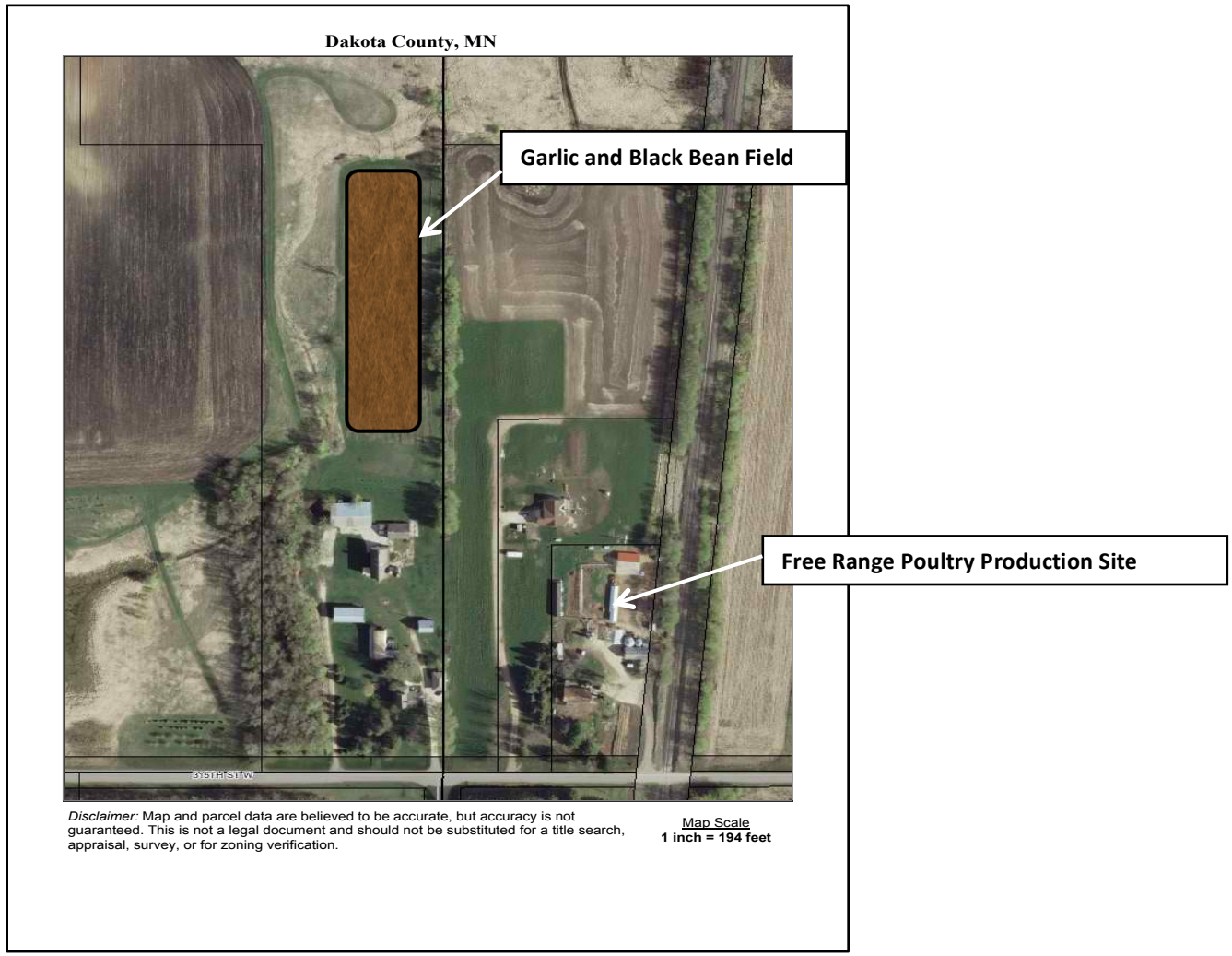
Total dry manure & litter removed bldg.: Approx. 4.5 T or 360 cu. ft.
Estimated nutrient composition of total load:

N (63 lbs. /T) = 283.5 lbs.
P2O5 (55 lbs. /T) = 247.5 lbs.
K2O (47 lbs. /T) = 211.5 lbs.[1]

2. If nutrients are still lacking after applying the poultry manure they can be added according to guidelines outlined in the manure management plan.

See below the aerial photograph of the poultry operation and the garlic field. Photographs and diagrams are useful in clearly outlining a manure and nutrient management plan.

[1] Cunningham, Dan L., Ritz, Casey W., Merka, William, C. "Best Management Practices for Storing and Applying Poultry Litter" reviewed 02/09/2012 The University of Georgia College of Agricultural and Environmental Sciences



See: **Manure Management Plan Free Range Poultry Production** in Supporting Documents section for more in-depth information tailored to this specific operation.

Poultry Building and Equipment Sanitation System and Tools

It is important to sanitize the poultry barn and water fountains prior to the first flock and between flocks entering the free range poultry production unit to control possible harmful bacteria and viruses. The use of a four gallon back pack sprayer (see photo below), bleach and water makes this an easy task.

1. Remove all manure and litter (shavings) from the building.
2. Fill four gallon sprayer with wáter to four gallon mark and add 1 cup bleach.
3. Put on goggles, mask, protective wide brim hat and full body rain coat to protect from the sanitizing solution's spray.
4. Start by spraying the floor, then walls and lastly ceiling in an area and then repeat by moving to next section of the building. By spraying the ceiling last in each pass there is less contact with the spray from the sanitizing solution spray.
5. It is important to completely sanitize building edges where the walls meet the ground. The newly arrived chicks will go there first to scratch and look for ways to get out.
6. Take breaks as needed and change mask if it becomes soaked with spray.
7. Sanitize wáter fountains by spraying the bell-shaped fountains using the sprayer. Brush fountain with a long handled brush. Dump the small amount of wáter and sanitizing solution on floor. Allow fountain to fill with wáter which rinses and removes the sanitizing solution.

Unless there is a problem with disease, a flock is lost, or needs to be disposed of there will be no need to sanitize again until time to prepare for a new flock.

In the case of a poultry disease problem or unknown cause of mortality the operation will be under quarantine.
Quarantine—no birds will go out or come in and special measures will be taken by the agripreneur to prevent spread of the problem and find a solution.
Experts on poultry mortality and disease control issues from reputable institutions will be accessed to determine and eliminate the cause of mortality.

Four Gallon Backpack Sprayer

Additional Tools and Supplies:

Hoe, Rake, Scoop Shovel, and Wheel Barrow
These tools are used regularly to remove wet wood shavings from under the water fountains, to turn bedding and to move wet manure and bedding from the area to a compost pile outside the production unit.

Wood Shavings
To bed the poultry building wood shavings are utilized. The goal is to keep the bedding dry so that ammonia gases do not build up and the area underneath the poultry water fountains is kept dry.

1. The bedding is frequently turned and naturally dries out.
2. However, if there are wet spots; shavings needs to be removed and new shavings added. Wet bedding is most often noticed under the poultry water fountains and if water drains into the building from rainfall. Also spreading a thin layer over the turned wood shavings will also help keep the poultry's breasts and feet dry.
3. The amount of wood shavings will vary depending on the daily conditions of the building and any malfunctioning of water fountains.

If the wood shavings become wet and are left that way significant damage to breast meat may occur. The damage can result in rejection and condemnation of birds by meat inspectors at the poultry processing plant.

You will want to keep a supply of shavings on hand to be sure you have enough to address various conditions that can occur in the poultry building. Most grain elevators and farm supply stores have wood shavings available in easily transportable bags.

Why straw is NOT to be used as bedding in the poultry building.

1. Straw holds moisture and becomes packed
2. Matted straw does not allow for air circulation needed in the bedding to encourage drying
3. Builds up ammonia gases which are toxic to both the poultry and humans
4. Cannot be turned effectively once wet and settled
5. Straw bedding requires a large amount of hand labor in the poultry building clean-up process

Straw Bales

There is an important use for straw bales in the outdoor, free-range paddocks. Barley, oat or wheat straw is utilized to:

1. Keep the free-range grazing paddocks mulched to encourage sprouting of grains spread on the paddock and the grains present in the straw. Barley straw was utilized in the production unit described in this manual.
2. Protect the birds from sitting directly on the soil.
3. Spread over the paddock area as needed after rainfall to prevent muddy areas.

The number of small (30-45 lb.) straw bales needed depend upon:

1. The weather
2. If there is vegetative ground cover
3. The condition of the soil
4. The age of the paddock (how much mulch has been applied before)
5. And how many flocks are utilizing the paddock per year

Sugar

A minimal amount of sugar is needed per flock. It is utilized by the chicks during their first half hour of arrival in the brooding area of the poultry building.

1. Immediately, preceding the arrival of the chicks one cup of sugar is dissolved in one gallon of water for every one thousand birds. In our example, a flock of 1500 birds, 1.5 cups of sugar was dissolved in 1.5 gallons of water.

2. The water is then poured into the reservoir of the bell-shaped, water fountains that the water valves are closed on. The birds arrive and sip on the sugar water giving them an energy boost as they find their way around their new environment.
3. After one half hour the remaining sugar water is dumped out and water fountains valves are turned on for the chicks to access drink water when thirsty.

Free Range Paddock System: The Cornerstone of this Poultry Production System

This poultry production system relies heavily on its free range paddock system to raise naturally grown meat chickens in a healthy environment producing an end product that is a healthy choice for the consumer. This free-range system enriches the soil plus the growing of perennial crops is an added value for the agripreneur while providing shade and predator protection for the poultry.

Paddock System Considerations: This section will provide recommendations for the establishment of perennial and annual crops in the paddocks and outlines in detail paddock establishment, management and rotation practices.

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Perennial cropping system:

Developing a whole farm food production and management plan prior to launching a free-range, meat poultry production system within the plan is the ideal. Done this way, paddocks are already designated in the area where water, electricity and cropping systems are easier to establish and manage. If perennial cropping is not already established; find below considerations for selecting and planting perennial crops. If perennials are not planted prior to starting poultry production the young trees/bushes will need to be protected by wire or PVC pipe until they are well established and leaves cannot be reached by the chickens.

Perennial crops may include trees or brush species. We recommend productive edible perennial crops such as hazelnuts. In our specific case, in Minnesota, the American Hazelnut (Corylus americana) is the perennial crop of choice. The American Hazelnut provides the benefits of shade and protection from predators. The root system's infrastructure helps to process poultry manure and supports micro and macro biological systems at a larger scale. Hazelnuts allow the sun and air to flow all the way to the ground as compared to larger tree species. Fruit trees such as apple and plum can be planted farther away from the buildings. Close to the buildings it is better to stick to nut trees that possess root systems more adaptable to poultry ranging and can better tolerate the heat poultry produce as they lay in the shade of the hazelnut trees.

Hazelnut and fruit trees should be planted no less than 8 feet apart within rows and 14 feet between rows. Leave space for turning with a small utility tractor between fences and the last tree or row of trees. Chickens will try to fly and roost on the bottom branches of fruit trees. Be sure to properly prune the fruit trees

Establishing small grains in the paddocks:

During production, paddocks begin to be utilized at approximately 15-16 days and throughout the remaining production process. The free-range paddock system is a dynamic system and requires keen observation skills and daily management. It will be beneficial to review the basic principles of paddock management and the outside feeding and water systems found on pages 39-45. Additional paddock management considerations are presented below.

If the flock comes in late spring, both paddocks may be overgrown. The small paddock will be the first area the birds will graze and needs more care in preparation.

*If the paddock is **not weedy** follow the guidelines below:*

Use barley or wheat as they have been tested and are well received. Note: Main Street Project is studying the use of grain mixes, for use in the second rotation through the smaller paddock that the chickens first ranged. Grains proven to be palatable to chickens and of high nutritional and energy value are barley, oats, sunflower seeds, Camelina sativa, flax, and amaranth. Future supplements to this manual will include specific instructions for including other small grains or a mix of small grains for use in the paddocks and how to manage the paddock when utilizing various selected small grains.

The first paddock needs to be seeded with barley or wheat at a rate of at least 50 pounds per application for a total of three applications. Spread grain either by hand broadcasting or use a grain spreader.

A. Spread the first 50 lbs. along the building expanding no more than 15 feet from it. This is where the birds will forage first.

B. Spread the second 50 lbs. one day later starting where the first application ended and covering the remaining paddock area.

C. The following day spread another 50 lbs. distributing throughout the entire paddock. This process should take approximately 10 to 15 minutes to spread the grain seed.

If the paddock ***is weedy or overgrown***; it is best to mow very low (as low as the equipment and landscape allow). Then proceed to establish the paddock using guidelines A through C above.

If the plan is to start a flock early in the spring, the best practice is to plant winter wheat the fall before and proceed with spreading seed as indicated in guidelines A through C above and leaving the winter wheat for foraging. This practice ensures early ground cover for early spring flocks.

We do not recommend establishing full pastures because they are expensive to develop. Intensive management of the paddocks for food production in terms of biomass is best and most efficiently done through sprouted and soaked grains. Leafy biomass takes more energy for the birds to digest and acts counter to the objective of growing meat birds within a reasonable period of time.
Complete the paddock establishment guidelines A through C at least four days before the chickens come out. If dry weather persists, irrigate with a sprinkler attached to a hose and move throughout the paddock to soak the grains. The goal of broadcasting the grain using the guidelines outlined is to have grain at different growth levels and barely sprouted grain on the ground when the birds first come out.

Birds will eat the entire small paddock within a maximum of a week after coming out. Observe ground cover and grain use by looking at the area between the building and the fence. There may be a few spots that have not been touched at all but when the majority of the area is eaten it is time to move the chickens to the next paddock. Use the condition of the paddock as your guide not the behavior of the chickens.

Establishment and considerations for annual cropping system year 2 and beyond:

In year two, after the paddocks have been set up and used for one year, annual crops such as corn, sunflowers or other erect crops are planted. The crops selected must grow straight and its produce must be above the chickens reach. You can see why sunflowers and any type of corn would be ideal for this. These types of annual crops provide extra shade on hot days and protection from predators as well as produce food for chickens and/or humans.

Plant annual crops so they do not interfere with the necessary activities of poultry production. Alleys are needed for the farmer to continually broadcast grains by hand or with a tractor and grain spreader throughout the paddock including under the annuals and perennials. Birds need easy access to the paddock when they come out of the building. And the farmer needs to be able to easily walk around and secure birds into the building at night. See photos below that illustrate this.

Alleys are left for the tractor and grain spreader or the farmer to easily broadcast grains under and between the annual crops.

Chickens freely range under the annual crops and can take refuge there on hot days. Annual crops also provide cover for the chickens making it difficult for flying predators to see and access them.

Maintenance of Paddocks:

Daily broadcasting of grains:

Once birds start ranging, begin by spreading 50 lbs. of grain daily throughout the paddock. This practice will help ensure even distribution of grains, grain that is growing, grain that is sprouting and some just soaked. This said; the agripreneur must *always* observe the chickens foraging habits, the ground, and the weather in determining the rate at which the grain is spread and when the ground needs to be watered to encourage sprouting. These factors directly affect how the chickens range and the amount of grain needed in the paddock.

Grain is best broadcasted in the evenings as it settles and starts soaking up moisture right away. Grain will soften significantly overnight. If spread in the morning; birds will eat hard, dry grain which is less conducive to digestion.

Free-ranging chickens can consume as much as they want when provided grains in this manner. The restrictions of percentages established for ground feed content of small grains; especially barley, do not apply to this management system.

If it is not raining; water paddock to get the seeds started. It is healthier for the bird's digestive system when the grains are soaked and softened and the birds do not consume dry feed continuously.

If it is raining, monitor water flow inside the paddock and ensure that water is diverted and managed away from the paddocks or within the paddocks in a controlled manner. Rain is good for sprouting large amounts of grain. Take advantage of the rain and double the amounts of grain broadcasted during a rainy period. At the same time reduce ground feed placed in the hanging feeders by half the weight of the extra grain spread. For example: If 50 lbs. of grain is being broadcast and the amount to broadcast is doubled then 100 lbs. of grain will be broadcasted. The amount of ground feed will then be cut back 25 lbs. or ½ the weight of the additional grain (50 lbs.) spread.

A sprouted seed produces natural digestive enzymes critical for feed conversion, this means that the ground feed is better utilized when birds are also eating sprouted grain. Sprouted grains can increase digestive proteins up to five times more than when consuming only ground feed. Additionally, the sprouted grain absorbs water and minerals and reduces the food to water ratio needed. When fed only ground feed a bird needs to drink upwards of 2 pounds of water per pound of ground feed to digest the feed.

Always apply more grain in the paddock than birds can eat. Observe the flock. If they consume all grains broadcasted; increase the amount broadcasted daily until some broadcasted grain remains at the end of the day. When grains soak longer than one night, a bird will select the softened grains first. Missed grains will sprout and grow for future consumption. There will be green cover in the paddock, dispersed grain—softening and sprouting, grain in feeders and bugs available to consume throughout the paddock. These diverse food choices and the free-range paddock feeding system promote the development of a naturally healthy chicken, support market claims and potentially positively impact net profit.

Ground feed considerations:

To determine if more bagged ground feed is needed in the hanging feeders again observe the behavior of the birds. A good sign that the birds need more ground feed is how clean the feeders are at the end of the day. Birds will peck at the feed tray which is easily heard and also look inside the feeders to see how much grain remains.

The recommended approach is to keep the feeders half full and observe how full the feeders are at the end of the day. Gradually increase the amount of ground feed put in feeders in the morning as birds increase consumption.

Once birds have gone through the first full rotation of each paddock and are eating larger amounts of ground feed daily fill feeder buckets to the top in the mornings. Because feed sometimes gets hung up in the bucket feeders, a walk down the feeders line is recommended midafternoon to shake the feeders. This will help insure feed access for the entire day.

Some birds become accustomed to the easy access of feed in the bucket feeders. More aggressive birds will make a beeline for the hanging feeders when let out each morning while others will roam and eat off the ground in a calm fashion. The more aggressive eaters will grow faster. The remainder will grow slower but on schedule. This presents the opportunity for multiple harvests while keeping birds consuming as they more naturally would utilizing the paddock ranging system.

The rates of grain fed indicated in this manual are not meant to be prescriptive. The rates recommended in this manual are the actual amounts used for the experimental flock. The weather conditions, the condition of the paddocks and the age of the chickens were variables considered in feeding this flock. However, the procedures and the observations used to produce this flock have been applied consistently producing predictable results in over 20 flocks observed.

Each paddock behaves differently and grains may not sprout as easily on some causing birds to eat the green cover faster. In this case the amount of grain spread needs to be increased. The specifics can only be determined through observation. Various paddock practices such as tillage before the first planting and disking to break up the mulch and work in the grains can also affect the condition of the paddock. These practices cannot be prescribed for every field and are not recommended while birds are growing and present in the paddock.

The use of straw mulch:

After each rotation, when the birds are moved to the other paddock (small to large or large to small), put them in the building earlier than usual on their last day in the paddock before rotation. Seed the paddock and then spread straw until all the ground is covered lightly. A good measure of when there is enough straw on the ground is when the farmer can walk around without getting manure on boots.

This step is critical every time birds are rotated. During rainy or dry days if the birds are producing bare spots and also during regular days after the birds have exposed the soil close to outdoor water fountains, feeders and the building make

it a habit to regularly spread light amounts of straw. The straw will decompose rapidly and will improve the germination bed for grain that will be broadcasted. This practice continuously improves the seed bed.

Spreading straw on bare spots, wet spots or near bare spots also works to balance the nitrogen-carbon ratio in the soil allowing for richer soil micro-biological systems to develop. The straw limits nitrogen transformation into ammonia while building up the bacteriological diversity. And it helps turn ammonia into nitrates and nitrates into nitrites at an accelerated pace. This provides growing plants needed inputs and prepares the soil for more robust growth of ground cover. This practice helps the agripreneur meet the objective of producing more food outdoors and directly impacts the appearance and health of the poultry.

During rainy periods when birds make muddy spots it is critical to spread straw to prevent the birds from developing chest blisters or contamination from the soil. By spreading straw the paddocks look clean but more importantly the straw protects the most expensive and sought after part of the bird, the breast meat.

As straw accumulates in paddocks spread grain may settle under the mulch. If this is observed, rake and turn the mulch. Some grains like oats and barley will poke through very thick layers of mulch. A good way to monitor this is to check for plant growth once the birds have been moved to the other paddock. If there is little plant growth turning over the mulch will expose seeds and help to regenerate the ground cover. Birds will get the benefit of all the food available in the paddock. Typically, if only light amounts of straw are applied, raking is normally not needed. However, when there are wet springs and/or summers extra straw may be needed and raking may be necessary.

Keep a tidy paddock to prevent injury to birds, equipment or people. Remove all wood boards, tools, feed bags and other foreign material lying in the paddock. Two seriously dangerous items for the poultry are strings from feed sacks and plastic wrappers. If a bird swallows a string from a feed bag it may get stuck in the process of digestion and the bird will have difficulty eating and drinking. The bird will most likely die; but, some will digest the string. DO NOT pull the string out of the bird; rather cut the string close to the bird's beak. Plastic candy wrappers are also deadly to birds as they will become lodged and impossible to digest. A tidy operation is a tremendous marketing tool; especially as on-the-farm-sales are the most profitable and encouraged.

Paddock Rotation:

Paddocks need to be rotated when birds have eaten all green cover available. The rate at which this happens will depend upon daily temperatures, rain patterns and quality of soil plus how much mulch has accumulated via spreading thin layers of straw during grazing process. The photo below provides an idea, but experience at a free range poultry production site will provide the full picture.

Observe the condition of the paddock the birds are currently feeding upon. When the green cover is getting low it is time to prepare the next paddock they will utilize.

- Three or four days before they are moved to the larger paddock, whether it is the first rotation or later, spread 200 lbs. of barley or a mix of grains on the ground using the grain spreader for even application or apply by hand.

- The ground cover from previously spread grain and sprouting weeds (if not overgrown – the chickens will eat the weeds) will be higher. The grain in the new, larger paddock will sprout more easily as the ground will retain more moisture and the soaked grain will be shaded by the ground cover.

- It is important to continue to observe and increase the grain spread daily based on the way the birds eat. Each paddock behaves differently and grains may not sprout as easily on some causing birds to eat the green cover faster. If this happens; the amount of grain spread needs to be increased. The specifics can only be determined through observation.

- Various paddock practices such as tillage before the first planting and disking to break up the mulch and work in the grains can enhance the condition of the paddock. These practices are not recommended for every paddock and are not recommended while birds are growing and present in the paddock. When dealing with a hard and compacted paddock the application of grain and mulch will generate some ground cover. Once the poultry starts to deposit manure on the soil and the worm population increases the soil will become more porous. It is recommended to start with a 500 bird flock when paddock conditions are poor. After a year of production with smaller flocks paddocks become highly productive.

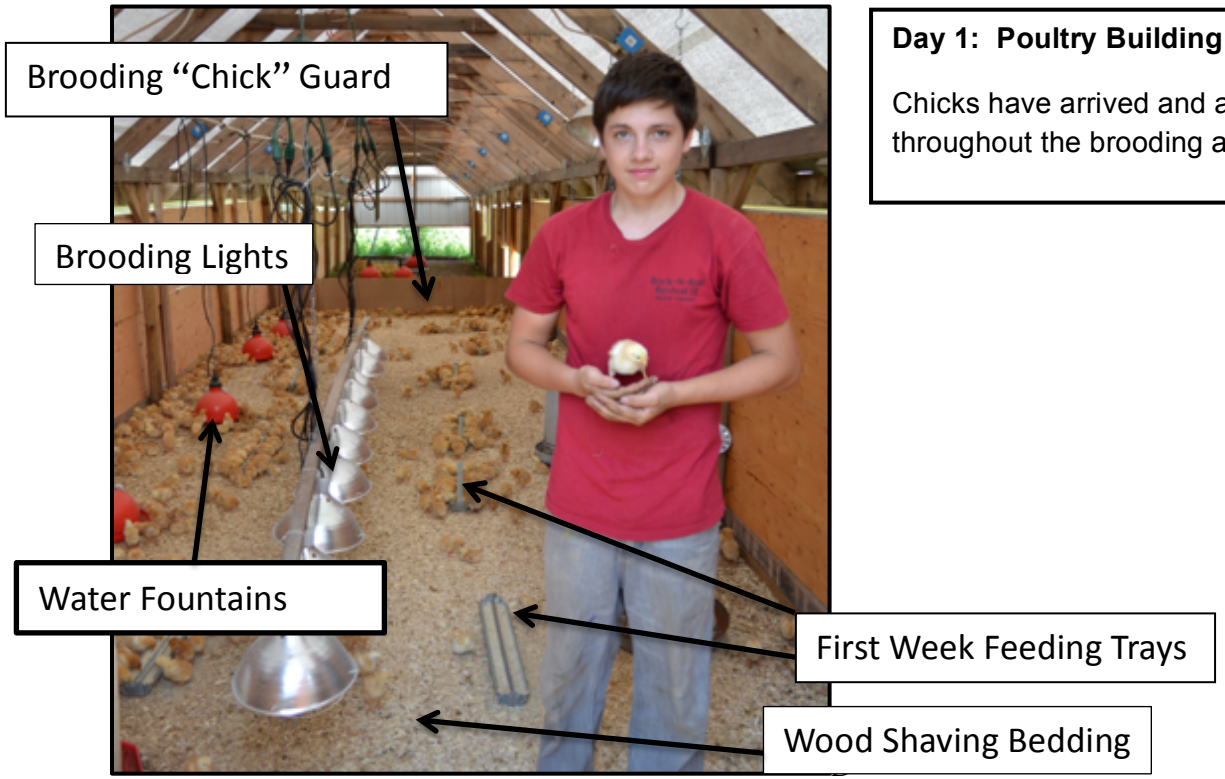
- Right after switching paddocks, spread straw throughout the entire paddock the birds just left. Spread barley or a grain mixture at 75 lbs. for the small paddock and 150 lbs. for the large paddock. This will generate a thick ground cover combined with the left over grain already on the paddock. Water paddock and allow paddock to rest and grow green cover while the other paddock is fully grazed.

Repeat free- range paddock management practices as described above on each paddock systematically, rain or shine, as birds are moved back and forth. Not managing paddocks properly is the primary cause of growth delays, health problems and significant increases in processed feed consumption. All of these factors negatively affect the bird's health and the enterprise's net profit.

Preparation of Coop and Chick Arrival

The agripreneur has completed preparing for and building the free-range, meat poultry facility. Free range paddocks have been seeded and fenced. Indoor and outdoor watering and feeding systems are in place as well as the grain storage system. All implements and tools needed are in place and poultry production materials are on hand. Additionally, the poultry mortality, sanitation and manure management systems are planned for and in place. The agripreneur has established a support system that can assist with technical and legal issues.

An order for chicks has been placed. Now begins the preparation preceding the arrival of the chicks.



Day 1: Poultry Building

Chicks have arrived and are comfortable…dispersed throughout the brooding area.

Preparing for chicks:

1. **Check building for drafts and repair.** Pay special attention to walls and ceilings. Holes or cracks in walls and ceilings will promote drafts. In early spring the weather can get cold at night. Rain and cold temperatures combined make it harder to maintain comfortable (dry and warm) conditions. During this type of weather closer attention to drafts and dryness is critical.

2. **Install a brooding guard**. A brooding or chick guard is a wall about one and a half feet tall placed across the width of the building making the area of the building smaller and helps to regulate temperature. Chicks will gravitate to this draft-free area. The birds will start digging under the brooding guard as soon as they arrive, bend the base about 2 inches so that they do not actually dig under and get out.

3. **Spread wood shavings** in the building to a depth of 2". As manure accumulates add bedding as needed as the building needs to be *kept dry at all times*. Pay special attention to areas under water fountains. Keep water fountains in repair and water level adjusted for less spillage yet ease of access to water.

4. **Warm building and adjust temperature utilizing brooding lights (heat lamps) and the ventilation system one to two days in advance of flock arrival.** If brooding lights are not turned on ahead of time and the ground has not warmed up, chicks will not gather under the lights and can smother each other trying to get closer to the brooding guard.
   Remember at this early age the living conditions—temperature and air currents close to the ground matters to the comfort of the birds. Air currents above the ground and other conditions define what happens at the ground level; including how dust moves in or out of the building. Know what is happening and use common sense to adjust the temperature and protect birds from cold drafts during this critical period. Properly placed thermometers will be helpful in this process

   a. Place a thermometer 1 ft. off the ground and another 4 ft. off the ground. (see photo below) The thermometer placed at 1 ft. will show the air temperature the bird experiences. The thermometer placed at 4 ft. monitors the heat reflected from the roof and the general temperature of the air in the building. Adjusting the air flow (ventilation) to bring the readings close to each other is the goal and will help to prevent a drafty environment. The industry's target building temperature for newly arrived chicks is between 80 and 90 degrees F. At arrival, this flock experienced temperatures as low as 70 degrees F with no more loss of birds than at higher temperatures as recommended by the poultry industry. Attention to weather, wind protection, dry bedding , access to food, water and the preparation of the site well ahead of chick arrival are equally important as the actual temperature.
      With summer flocks, we have repeatedly achieved healthy flocks. During the first week heat lamps are not turned on until temperature inside the brooding area--close to the ground-- reaches 60 degrees F.

From week two until completion of the fourth week unless the temperature falls below 50 degrees F and/or it is rainy or windy heat lamps are not turned on at night.
Note: General recommendations do not account for individual characteristics of a poultry production site. For example: During recent high heat indexes of 105 degrees F.; the chickens did not show signs of heat stress. The outdoor paddocks, which had been planted to corn, provided needed shade and kept the ground a cooler temperature. This same corn had protected young chicks from wind and drafts during the brooding period.
Daily observation by the grower is essential together with the application of knowledge, common sense and logic throughout the growing process.

Ventilation flaps can be opened on hot days, when thermometer located at 1 ft. from floor registers a temperature above 90 F. There are 3 ventilation flaps available to adjust temperature in the building.

b. The number of brooding lights (heat lamps) will vary depending on the size and type of building and season of the year. In the building system utilized in our example; for spring and fall flocks 15 brooding lights (heat lamps) per 1000 chicks were needed. Likewise, 20 brooding lights were needed for winter flocks. The important variable is consistent temperature and humidity. Depending on the age of the birds, they may be comfortable at lower temperatures. The breed of chicken used in this research develops feathers more evenly and therefore, respond differently to humidity and temperature. Observation is critical and multiple observations have shown that at 65 degrees F this breed behaves naturally and grows at a healthy rate. Adjust brooding lights and ventilation as needed.
c. Before birds arrive place brooding lights 20 inches off the ground to pre-warm the area. If not done pre-arrival birds will find the warmest spot (where the sun hits the walls), or the least drafty and gather there. Once birds have established this behavior it is difficult to get them to go under the heat lamps. Then as the building cools down the chicks will pile on top of each other to keep warm and suffocate.

5. **Place water fountains.** Only about 10 water fountains per one thousand birds are needed when chicks arrive and should be placed so that they are sitting on the ground or close to the ground within reach of thirsty chicks. It is important to disperse the water fountains throughout the brooding area. Additional fountains are added as birds grow to prevent crowding around the fountains. Each day during the first week birds change significantly. By the end of the first week, bell-shaped, gravity fed drinking fountains and metal can-shaped feeders can be used instead of the feed trays and portable water jugs.

   a. When you hook up the sanitized and rinsed water fountains (**see Poultry Building and Equipment Sanitation System and Tools on page 63-64 for sanitation procedure**) be sure each unit works properly. Then shut off the valve so that no water is flowing. Dump water in fountains into a pail and discard. Chicks will receive sugar water upon arrival. (See b. below)

   b. Sugar water will be their initial source of liquid during the first 30 minutes in the building. Dissolve one cup of sugar per one gallon of fresh water for every 1000 chicks. Pour sugar water into basins of the five empty water fountains that have their valves shut off. Then turn valves back on and let the birds do their job. As they drink, new water flows in until all the sugar water is consumed. The sugar water supplies extra energy needed for adaptation to their new environment. Turning the water valves back on after loading with sugar water prevents the risk of forgetting to turn the waterers on immediately after they finish their sugar water. That mistake could result in death of chicks; as they cannot go without water for very long.

6. Place 15 rectangular chick feed pans per every 1000 chicks in flock. **(See photo page 77 showing feed trays dispersed at intervals throughout the brooding area).**
   Chicks do not receive grain until 30 minutes after their arrival. Fill feeders daily and add feeders as needed; so chicks are not crowding around feeders. The type of feeder changes when the chicks are 7 to 10 days old. **Find detailed information about indoor and outdoor feeding and equipment on pages 39-44.**

7. Check the perimeter fence to see that there are no holes and the fence goes all the way to the ground. Little birds can scratch and get out, wander away and become food for predators.

Chicks are only hours old when they arrive. They will thrive as long as the building remains at the proper temperature with no drafts; have access to food, water and dry bedding.

Slow growth and heritage breeds are very sensitive to noise and anything that moves. Be quiet and move slowly amongst the flock to reduce stress.

The losses that can occur at this age are primarily due to smothering-- if they pile up trying to stay warm and stress related injuries if they stampede and injure themselves. Many steps need to be performed pre-arrival to guarantee

healthy adjustment and comfort of the chicks including having all systems, tools and supplies in place and carefully attending to all pre-arrival preparation. **See photo page 77 of well-adjusted flock shortly after chick arrival.**

Raising a Flock from Start to Finish:
A Chronological and Pictorial Account

When an agripreneur starts producing slow-growth, meat chickens; he or she must understand the specifics of how to raise and promote the healthy development of the meat chicken from day one through harvest and marketing of the finished product.

The entire process will be impacted by the "living environment" the birds are provided. The indoor brooding space and the outdoor ranging paddocks must be managed to maximize bird comfort and health. Exercise, exposure to sun, access to sprouts, water, shade and protection are key components. Training chickens to retreat to shelter every night to avoid many potential predator and weather risks is also essential.

If you have not grown free-range, meat chickens on the scale described in this manual, utilizing this specific slow growth breed, and a paddock ranging system there is much to learn and understand.
The author believes strongly that documenting every aspect of this venture is core to becoming a successful agripreneur. Recording observations daily in a journal via a written log and using photos will inform every aspect of the enterprise. Compiling this information with the information learned from other agripreneurs will improve and inform the production process.

To develop this keen sense of observation write down anything that appears to be important to informing the progress or problems of the flock. Utilize photos to tell the story of the progress of the poultry from the beginning until processing of the finished product.

Documentation is critical in identifying and solving issues, providing technical assistance, monitoring the health and growth of the flock, and making projections for the days and weeks ahead related to managing and marketing the flock.

Written documentation is the only real factual source of information to inform decisions in the short and long run. Verbal communication is always good for scanning but has very limited use for managing. Performance monitoring tasks cannot be completed if the agripreneur has not been tracking weights and other critical data as stipulated in the schedule.

Scheduling a visit with a quality and production supervisor without having supporting documentation about the operation would be counter-productive as a flock's specific progress and problems are not easily studied to make informed decisions. This not only wastes the time of those involved but also can result in a loss of resources and efficiency. Time and resources are best managed when written documentation and key data collection is available.

A perspective or on-going customer will want to see similar information including photos relating to how the flock is raised and progress being made towards harvest. The agripreneur can better answer the customer's questions, make production projections and show the natural and health conscious manner in which the birds were raised through use of written documentation and photos.

If free-range meat poultry production cannot be brought to a consistent replicable point, this poultry system will not become scalable to meet the demands of a regional food system. Record keeping via clear and concise written documentation is essential to the success of each individual operation. Likewise, it is necessary to compile documentation from several agripreneurs to inform and build a production system scalable to the demands of a regionally-based food system.

Main Street Project's food system's expert and poultry production manager, Reginaldo Haslett-Marroquin utilizes written and pictorial journal entries to illustrate how journaling informs the process of raising and marketing free-range, meat chickens. Note the various note-taking styles, charts and photos used to inform this process and system.

Documentation is necessary for success and is an important management, marketing, and decision-making tool.

See the section on **Supporting Documentation** that reviews the progress of the production process with the flock described in this manual. Also available in the manual are documentation tools for the agripreneur to use in collecting necessary documentation. These tools are found in the **Production Documentation Tools** section.

Below find the journal and photos collected to document the production process of the flock described in this manual.

Raising a Flock from Start to Finish:

A Chronological and Pictorial Account

Note: This journal demonstrates the poultry production system in year one. Paddock management will change each year as soil builds up and organic matter is able to support corn, sunflowers and other annual crops. These crops serve as shade, predator protection, food for chickens and/or humans and will increase organic matter in the paddock.

Days of age	Date	Journal entry/description of activity or event
-2	7/5	Two days before flock arrives the paddocks need attention—vegetation too tall for little chicks to maneuver.

This is the look of the east paddock two days before the birds arrived. It is overgrown and too tall. The east paddock was tilled and planted to barley as soon as chicks arrived. When they came out a week and a half later the new grass and grain shoots were just right for their size. If let out in this kind of weed/grass patch they will get lost and wonder too far. In the beginning chicks do not have a sense of place and when night fall approaches, without a mother hen to guide them back-- it would need to be done by hand.

This is the look of the west paddock two days before the chicks arrived. Like the east paddock pictured above the oats, barley, and weeds are too high. The birds will spend time on the east paddock before going to the west paddock. The west paddock was mowed at 6 inches, without hurting the end buds so they will regenerate in time for the flock to be rotated after the east paddock is grazed.

Days of age	Date	Journal Entry/Description of Activity/Event
1	7/7	Birds came today. There was sugar water as specified, water system checked, brooding lamps and brooding guard to limit air flow at ground level, clean bedding and pan feeders.

Day 1—July 7, Poultry Building

Chicks have arrived and are comfortable…dispersed throughout the brooding area.

They are drinking and feeding out of the feed trays and bucket feeders. Note: An extra waterer, was placed because chicks where crowding the other waterers. This helped.

They will transition to bucket feeders when they go to the paddocks or when they are big enough to reach in. They are placed in the area to get them familiar with them.

Days of age	Date	Journal Entry/Description of Activity/Event
1-4	7/7 - 7/11	• Made sure the systems were working. • Reduced interruptions—absolutely NO VISITORS—birds are active and every time a door opens drafts occur, temperature changes, they get scared –all could lead to losses.

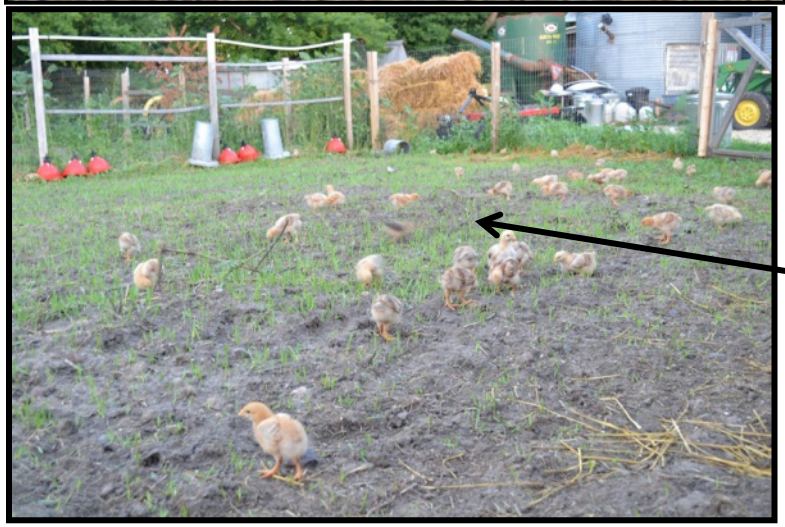
		• Fed day and night, lights on all the time for warmth • Checked water fountains to be sure functioning correctly and adjusted • Only filled gravity flow water tank with one day's supply of water to keep it fresh • Removed feed not eaten by the end of the day, put in bag to store for use outside later

Days of age	Date	Journal Entry/Description of Activity/Event
5	7/12	• Brooding guard removed on day 5 to allow chicks to roam over entire building • Added regular cylindrical bucket feeders inside the building on opposite side from the water fountains. • Kept rectangular floor trays. Some chicks jump into the round tray on bucket feeder but most are not doing this. Chicks are eating a bit more—see feeding schedule chart for day 5.

Days of age	Date	Journal Entry/Description of Activity/Event
5 - 15	7/12 – 7/26	• Continue to set aside in a bag feed they have not eaten during the day to spread later in the paddock. • Watching for holes they dig and potential escapees from the brooding area-- bring them back and fix hole. • Adding feeders as needed • Checked for overflowing water fountains, • Added some bedding where needed, no need to remove soiled bedding • Keeping a close eye on everything & recording temperatures on both thermometers. • When the daytime temperatures rose above 90 degrees-- turned the lights off mid-morning and turned back on mid-afternoon. Note: Once the forecast is known a timer would work for this. **IMPORTANT ON DAY 10—7/17 THIS FLOCK WENT OUT TO THE SMALL PADDOCK TODAY AHEAD OF SCHEDULE-usually occurs on day 15 or 16**

		• Followed the schedule and took weight on day 10 using poultry weighing system and chart to record weights. (see Weight Schedule and Chart page) • One dead chicken, seems physically trampled on, disposed of immediately

Small Paddock--Day 10, July 17.
Birds go out for the first time into paddock.
The base board where the coop sits was too tall for some chicks and they were having trouble jumping over it.
Placed straw on both inside and outside to create a bridge, two minutes later they had figured it out.
This flock is developing very fast; most flocks won't go outside until the end of week three or four, especially in early spring when it is colder or wet.



Small Paddock--Day 10, July 17.
In this paddock, the taller weeds and grass had been tilled under and barley planted the day they arrived on July 7.
It was up and ready for chicks to graze on. Despite their early age and size, they knew what to do.
Weather and their mobility were the two factors that influenced letting them out on day 10. **We would have waited until 15 days otherwise as indicated on the instructions.**
Note: The doors of poultry building are open and they are going out, but still have food and water indoors.

Large Paddock--Day 12, July 19.

The feed has been completely removed from inside the building and placed around the field.

Some feeders were placed close to the building; since this same kind of feeder was used inside the building, birds recognize them quickly. Once outside they see other feeders and move farther away from the poultry building.

They continue to range and get a sense of the terrain and forage available. All critical steps insuring birds don't go hungry, get stressed and lost.

The perennial crops, apples in this case, serve as shade and protection if predators fly overhead.

Small apples are already developing.

At this point, this paddock has grown taller and has more established ground cover than the small (east) paddock

Flock Transition to Paddock and Dealing with Weather Conditions:

Day 16 is the normal start of an important transition period for the flock. Although, as seen above in the day 10 journal entry with the Main Street Project's flock some flocks may be ready to transition to the paddock sooner-- if they have developed sufficiently and all conditions including the weather allow. The key to ranging chickens is to allow them to go out as soon as possible. They will go out on their own if doors are open, but especially if there is something to eat outside.

Below find important transition related tasks and considerations:

- Clean and store the indoor rectangular floor pan feeders for use with next flock.

- Raise all the watering fountains inside where birds congregate for the night and on pathways to the door that goes outside. There are only a few water fountains—5 for every 1000 birds-- in the building and a full water system outside. If not done, birds will spill water during the night and as they rush out in the morning. The resulting wet bedding can lead to development of chest blisters and leg problems. As long as birds are let out at dawn and not put in until dusk they do not need food and water during the night. However, with proper monitoring, indoor drinkers can be left hanging if they do not interfere with the exit doors this is especially true when utilizing the building for flocks of 500 as there is ample room to utilize waterers with little crowding or spillage.

- Raise the indoor round hanging bucket feeders using the attached chain and only lower when birds are inside due to inclement weather.
  These indoor, hanging bucket feeders will be used during rainy weather and can tide over the flock when it is raining or storming outside. Lower the feeders once a day for a couple of hours to give access to feed until they can go outside again. Chickens like to range and eat worms and other insects right after the rain stops,

  Important: If you leave the feeders down for more than a couple of hours in the period of a day the birds will stay inside after the storm and wait for food inside instead of returning to ranging outside resulting in an uneven flock.
  Keep the doors open so that birds can go outside in-between rain showers.

The French who raise meat chickens of a similar genetic strain do not put feed outdoors and do not manage paddocks for food production, but the birds are allowed to roam outside. Because we want to reduce the amount of ground feed

chickens consume we manage the paddocks for food production. Chickens eat more if they are free ranging. Keep them outside as much as possible. This includes not placing food indoors as they have a one track mind “find food”.

- At about day 16 the brooding period is over and brooding lights are turned off at night. The birds are fully feathered and if they are healthy and the weather permits they can go out of the building and into the prepared paddock. The paddock will have green cover, feed in feeders and grains dispersed throughout. Find more details below under Paddock System Considerations.

- The birds should be transitioning to go out at dawn and come in at dusk unless there is inclement weather. After a day or two birds will have learned how to get in and out of the building and find the feed and water. Initially, make paths using feed on the ground to train birds to leave the building and find the feed and water outside.

  Before birds are let out to range the **outside morning chores** are performed.

  --Move feeders. Remember to move feeders around the entire paddock and even into the corners so the birds range the entire paddock. This will prevent overgrazing a specific area. Overgrazing will naturally occur around the feeders, under water fountains and along the building. Add a layer of straw to keep the ground covered. The rest of the paddock should keep growing something all the time either visibly or under the mulch and is an important source of the bird’s food.

  --Add feeders when overcrowding has been observed.

  --Fill feeders. Keeping feeders filled during good weather spells makes chores easier. During forecasted rains, it is better to fill only with food for the day.

  Weather Consideration: Reduce the probability of wet feed by being constantly aware of the weather forecast. When there is probability of rain place only a one day supply of feed in the round bucket feeders. Wet feed is easier for their digestive system, however; wet feed will begin to mold within 12 to 24 hours and will negatively affect their digestive system. **Note:** In a five year period of raising chickens it has rarely rained so continuously that birds were not able to consume their one day food supply. The extra caution and labor insures health of the birds and less waste of feed.
  Wet Feed: Remove wet feed not consumed in eight hours and clean feeders. Refill feeders according to weather forecast and daily rations needed for that stage of growth.

Charts illustrating amount of feedstuffs utilized with this flock are found on pages 122-125 in the **Daily Feeding and Performance Data chart.** Remember feeding is flock-specific and requires careful observation and recordkeeping.

--Spread grain with a grain spreader throughout the paddock. You want to be able to see the grain on the ground at all times.
--Add water fountains when overcrowding has been observed.
--Check water fountains for proper operation and adjust height from the ground to meet growth of chickens.
-- Clean outdoor waters frequently to deter the growth of algae.

- At dawn, the building is opened for birds to begin ranging and foraging for food including bugs, plants, feed in feeders and whole grains spread in the paddock.

  When the birds first enter the paddock they must be observed for the first several days as they will find holes in the fencing or scratch a hole to get out.

- Leave building open during the day for access by the birds if needed.

- Shake feeders every afternoon to insure that there is never old feed left in the feeder before new feed is put in.

- At dusk, **evening chores** include:

  --Check paddock for all lingering birds and secure them inside.

-- Close up building to prevent losses due to predators. Birds will establish a predictable nesting pattern and will huddle in certain parts of the building.

Days of Age	Date	Journal Entry/Description of Activity/Event
17	7/24	• Take weight
18	7/25	Birds went out to large paddock. Spread barley straw on small paddock,  **Large Paddock –Day 18** Birds are now coming out on the large (west) paddock. Mowing of paddock was done the day flock arrived. It lowered the height of the vegetative cover. But it started growing again sending tender shoots that the birds will eat. The paddock was not tilled under as there was not going to be enough time for a new crop to take up deeper roots for later regrowth. Birds are still small, but capable of stepping over obstacles and moving around.

		,  . **Small Paddock - Day 18, July 25** This photo shows the small paddock the birds just finished grazing planted and mulched the same morning-- 7/25, after birds went out on the large paddock. Because there was no rain in the forecast, a light watering was applied to assist the seeds in sprouting.
19	**7/26**	Small chickens are getting inside the feeders, need to check and pull them out before securing them for the night
20	**7/27**	• Spread 30 lbs. of barley in large paddock, rain has been frequent, weather has been good for sprouting grain
21	**7/28**	• Spread barley seed and barley straw in the large paddock to keep them clean, rain has been heavy
22	**7/29**	• Did 15 minute clean-up of the paddocks and buildings—buyers coming out tomorrow.

Small Paddock—Day 22 – July 29 Paddock is coming back in a hurry. Birds are 22 days old and getting bigger by the day.

Large Paddock
Day 22, July 29
This paddock has been partially treated with straw and barley grain spread on it. Birds are eating the ground cover and growing happily.

Broadleaf weeds are left to grow for shade and predator protection. Some days have been very hot. Shade and ground cover reduce the temperatures significantly.

Birds are eating from round bucket feeders placed on the ground when they are not ranging for food in the paddock.

Later sawhorses and cross boards where used to raise the feeders and facilitate feed flow. This will be shown later in the manual.

22

23	**7/30**	• Hand-broadcasted barley throughout the large paddock
24	**7/31**	• Take weight. Hot and humid, barley in paddocks growing well
25	**8/1**	• Watered and spread straw as needed (walking around found bare spots some without straw and some without sprouts, both needed attention)
26	**8/2**	• Cloudy, all birds out, spread grain, • Paddock for rotation is almost ready for them to move into, the way it looks, they still have another week to finish eating the cover of the large paddock.
27	**8/3**	• Added 5 more feeders • Spread 2 bales of straw, • Lots of sprouting barley all over paddock, birds liking it
28	**8/4**	• One bird dead in the morning, looked like it was trampled during the night
29	**8/5**	• There is a handful of small birds that are not growing much, seem to eat o.k.
30	**8/6**	• No observations
31	**8/7**	• Took weight. • Spread barley seeds and straw. • Cleaned up the coop, 5 bucket loads of manure spread on the garden. Took 1 hour to clean up. • Put 11 bags of new wood shaving in barn after clean-up (neighbors do not like manure smell this keeps the place smelling very good and everyone happy, including the birds)
32	**8/8**	• 4 birds were trapped inside the hazelnut chicken wire protected cages; got in through the bottom. Fixed the problem and checked the other hazelnuts for the same problem, all looks good. • There was 1 dead bird in the coop. It had no signs of disease or physical injuries, it was well developed, of good weight showing that it was eating and drinking well up to the point of death. The only explanation was that it chocked on something. Started training helper who will take care of the chickens when we are on vacation. • Two friends who know poultry have also offered to come and help with the chickens every week
33	**8/9**	• Nothing observed

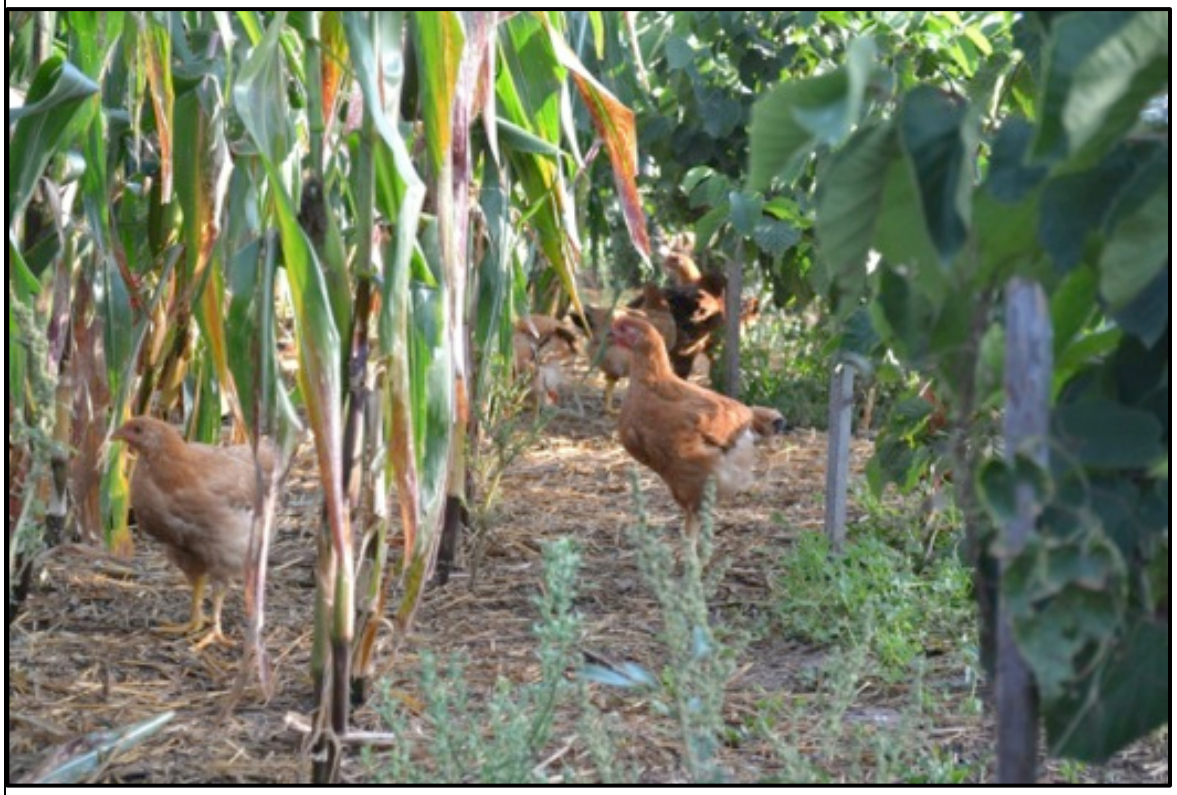
34	**8/10**	• Nothing observed
	8/11	• Helper came again to get trained. • Spread barley in the smaller paddock (45 minutes). They will move back into this paddock on Friday this week.
35		• Re-grown barley on small paddock is now close to 10" tall and ready to receive the birds again
	8/12	• Spread barley grain and barley straw and watered large paddock. • Moved feeders to small paddock, all set for them to go out on the small paddock tomorrow. • Farmer friend came to help and to learn. • A dead chicken was in pieces outside in the large paddock looked dismembered by a predator, no predators seem to be inside the fence and all signs point to a hawk or eagle. Hawks have not come around this year, but a Castle Rock neighbor just 5 or so miles north commented on two bald eagles that have relocated to our area, need to keep an eye on this from now on.
36		 **Large Paddock—Day 36, August 12** Birds now 36 days old, some have reached 3 lbs. live weight, still ranging on the large paddock. A-frame, hanging feeding system has been brought in. Using this raised feeder system, and adjusting chains to accommodate height of growing birds. Grain flows as it is supposed to and it also makes it easier to clean and manage. Feeders can also be more easily moved around to keep the manure from accumulating in same space. More straw and seeds spread for sprouting. Recent rains have kept the vegetation coming back daily.

Large Paddock—Day 36, August 12
Apple trees have also set fruit and are benefitting from the effective weed and bug control, plus the extra fertilizer.
No accumulation of manure has been observed; most of it dries up and gets incorporated at night by the worms.
The ground is covered with worm castings every morning, indicating a lot of activity underground. This explains the quick transformation of manure into soil enhancing continued sprouting of seeds.

		 **Small Paddock—Day 36, August 12** Small paddock has completely come back and is ready to be foraged again. Outdoor feeding units were moved to the paddock after birds went in for the night so feeders were ready in the morning. More barley seeds were also spread to ensure extra grain aside from the greens.
37	**8/13**	• Birds went back to small paddock this morning, • Large paddock planted and mulched last night, • It rained lightly, enough to soak the area; we also placed a sprinkler on for 30 minutes on two spots.

38	**8/14**	• Take weight (see weight tracking and dates on respective summary format in this manual). • Some feed was still left from the day before in the feeders, • As of today, the feeders where completely cleaned up by the end of the day. They especially eat well out of the larger feeders with bigger pans. The small ones don't flow as well but could be fixed by drilling new lower holes and lowering the pan about 1 inch. Will do this and test them later.
39	**8/15**	• Nothing observed
40	**8/16**	• **We are at half way through the production cycle on this flock.** • Spread 250 lbs. of barley seed in the smaller paddock and watered it before birds went in. • We ran out of the first 2 tons of feed today. ***Note:*** in 40 days 1,000 birds have eaten 4,000 lbs. of feed which equals: 4 lbs. per bird, or 0.10 lbs. /day of feed per bird on the average. The total price of this feed was $0.34/lb. for a total of $1,360 of feed consumed. • The average weight of each bird as of today is 2.3 lbs. for a total feed conversion rate of 1.73 lbs. of feed per 1 lb. of live weight gained. The industry's conversion rate noted at this point is 2.04 lbs. of feed per lb. of live weight. But the industry live weight is 2.4 lbs. Note: We fed less, but they weighed less, (this changed later as they took off). Since the first half of their development is critical to the rest of their performance, determining rate of gain and documenting it at exactly half of the expected period to maturity is helpful to determining if the flock is on track. ***NOTE: What we did not know is that even though our birds did not gain as much weight as the industry specifies during this first half of production, they gained and grew faster during the second half; sometimes surpassing the industry expectations. In short, we achieved good results, but the birds developed differently.***
41	**8/17**	• Spread 400 lbs. of barley with the tractor spreader on the larger paddock, took 10 min to do.
42	**8/18**	• Birds went out to the larger paddock. • A new fenced section is open for them to forage on the barley planted on the farthest side of the large paddock. This area was designated as a possible overflow area if needed to determine the actual total area needed for this kind of breed. • The larger paddock regrew to about 3 inches, and germinated all of the seed spread. Paddock has a heavy load of sprouts, thick barley grass 3 and 4 inches tall and 400 lbs. of soaked grains.

43	8/19	• It rained hard last night, morning was misty and moist, perfect sprouting conditions for the seeds and for the birds to range.
44	8/20	• Nothing observed
45	8/21	• Take weights.
46	8/22	• Nothing observed
47	8/23	• Nothing observed
48	8/24	• Nothing observed
49	8/25	• Nothing observed
50	8/26	• Nothing observed
51	8/27	 **Large Paddock—Day 51, August 27** Birds have been to the small paddock for a third time, and moved back to the large paddock for the third time. Birds are now 51 days old, some of them 4.5 lbs. average live weight. The 60 day time period for the first harvest day is now being scheduled. Rotations between paddocks are shorter now and birds are eating everything.



Large paddock—Day 51, August 27 A small area of the large paddock had been planted with corn and seeded for testing. This was opened to the birds on day 51 for foraging.
Hazelnuts were planted as a perennial crop. Sweet corn was also planted in between hazelnut rows before the birds arrived. A supplement to this manual will provide complete specifications on how to plant annual erect (tall) crops like corn when research has been completed. If a flock is going to be started in June, planting corn as soon as possible in May is advised. Both paddocks can be planted with corn early, space 48 inches per row and leave room to move around at the end of the rows. Providing abundant shade also provides more predator protection.

Large Paddock—Day 51, August 27
Birds like the grass, but they are also carnivores, so they eat every bug they can find. The sprouts hiding between the grass blades are dug out as well, they cut and swallow whole grass blades. They make a tremendous site, especially when customer want to visit and kids come along.

52	**8/28**	• Took Weight  **Small Paddock—Day 52, August 28** Back to the small paddock for sprouted grain and lots of greens. Grain spread the night before the birds come out plus grain spread when they leave the paddock that is already sprouting when they move back, combined with the already rooted shoots make the paddock a succulent table. At this age and size birds eat up small paddock in 2 to 3 days. Note: This rotation system works for slow growth, meat chickens but did not work for Cornish broilers as the broilers stayed in smaller areas stomping on the ground cover, concentrating the manure and destroying the ground cover.

		 **Small Paddock—Day 52, August 28** More birds have reached 4.5 lbs. live weight, there are 975 left. Some of them are growing very slow but a good number of males have reached harvest weight.
53	**8/29**	• Spread barley on small paddock, grass is now grown and ready for another pass

54	**8/30**	• Let birds out on small paddock, they should mow it over in 2 days
55	**8/31**	• Spread barley on larger paddock. • Spread straw on smaller paddock. • Spread one 5 gallon bucket (25 lbs.) of barley on bare spots • Seed left on ground was starting to sprout • The birds had eaten all of the green cover on small paddock but not the roots so it should come back again.
56	**9/1**	• Watered the small paddock and cut the grown weeds on the large paddock (with a machete). The weeds were spread around and mowing them was too intrusive and would destroy a lot of the ground cover and sprouting grain.
57	**9/2**	• Spread soaked barley (soaked it overnight in wheel barrels) on the ground, 2 wheelbarrows of barley (100 lbs. each) are now set to soak every morning so it goes into the paddock ready to be eaten.

Small Paddock – Day 57, September 2
No manure has accumulated in either paddock even though the birds have been in each paddock repeatedly.
Sprouts continue to germinate in a predictable manner.
Grass is right back within 4 days.
The routine includes spreading 200 lbs. of grain seeds, a good soaking and letting it sit for two days. In this photo notice the barley shoots, sprouting barley and corn on the ground. Corn was discontinued after this application because it did not sprout well as it had been machine dried.

58	**9/3**	• Light rain in the afternoon still enough to soak barley on the ground • One bird was crushed while opening egress door in the morning, door slipped  **Small Paddock – Day 58, September 3 doors were also open to Large Paddock and they are now ranging on both sides of the coop.** Approx. 700 birds left growing. Most are now 5.2 lbs. on the average, live weight. Hanging feeders are left only on the large paddock keeping the small paddock as a “salad bar” of sorts. They come out to this paddock on two to three day intervals. Since the smaller paddock is significantly smaller than the large paddock, it has to be managed carefully to keep the ground cover mowed but alive. The small paddock was planted with cherry trees but has since dwindled and deteriorated, does not seem to handle free ranging by birds as well as hazelnuts.

59	**9/4**	• Took weight. • Soak barley. Two wheelbarrows of barley mixed with corn are soaked in the morning every day; one is spread in the morning, and one in the afternoon. • Coop ventilation door was open on the smaller paddock, one bird was out on that side (jumped over), and door was closed at 1 pm. • Small paddock looks ready for another pass. Spread 2 bales of straw on large paddock
60	**9/5**	• **First harvest day, birds need to be placed in cages at night and secured for early morning transport. They cannot be caged during the day, they will fly all over, and hurt themselves resulting in heavy loses thru bruises, broken limbs and condemnation by USDA inspectors. They will swell and turn blue by the time they are processed.** • **Humane handling of these birds is not hard and the most important consideration is to do it after they are sleeping, use headlamps not regular illumination.** • **200 birds can be processed at this point.**
61	**9/6**	• Spread 20 bales of straw on large (west) paddock, weeds are almost gone, sprouts continue to germinate well. It has not rained significantly since last week.
62	**9/7**	• A couple of water fountains were found to be running continuously and had created a puddle on back half of the poultry building. This caused birds to sleep on wet surface which may cause breast area burning or deterioration. • 3 birds still weighing under 2 lbs. were transferred to another building to observe and feed them apart from the main flock in hopes of them catching up to the rest.
63	**9/8**	• Fewer birds, but same amount of feeding, some birds are not eating as much out of pressure from more aggressive birds who are eating more now.
64	**9/9**	• Spread barley seed and straw on the small paddock, watered in the morning and again in the evening
65	**9/10**	• Nothing observed
66	**9/11**	• Nothing observed
67	**9/12**	• Dry barley spread on the west paddock aside from soaked barley that is regularly spread for feed
68	**9/13**	• One bird that was isolated because of leg problems is now walking and back to full health in the overflow coop, it was moved back to the main flock. No rejection observed, could not find it once mixed with the

		rest within minutes of having returned it.
69	**9/14**	• Dry barley was spread over the west field aside from the soaked grain
70	**9/15**	• **Second harvest day. Up to 400 birds can be harvested at this time**
71	**9/16**	• Take weight. • Dry barley spread again on large paddock. • Watered small paddock, sprouts are fully coming out on the east side; it looks like they can go out on that side in a day. • A bird was killed and eaten by a hawk next to the coop. • It has been almost a month since the last significant rainfall, paddocks are not coming back as quick as in the spring and early summer
72	**9/17**	• Nothing out of the ordinary
73	**9/18**	• Nothing out of the ordinary
74	**9/19**	• Nothing out of the ordinary
75	**9/20**	• Nothing out of the ordinary
76	**9/21**	• Nothing out of the ordinary
77	**9/22**	• Nothing out of the ordinary
78	**9/23**	• Take weights
79	**9/24**	• Nothing out of the ordinary
80	**9/25**	• **Final harvest day of 200 birds, all birds gone, even the very small ones. Only a couple under 3 lbs. and 1 under 2 lbs.** • **Most of them within average weights (see dressed weights sheet for a full reference of an example of this record)**

81	9/26		**Large Paddock—Day 81, September 26** All birds left yesterday. If a new flock was scheduled; this space would have been heavily seeded and watered today. No fall/winter flock is scheduled. Therefore, the paddock is left to grow some cover on its own. The feeder bottoms are unhooked from two of the latches so that snow won't accumulate on them. The water system is drained valves shut. Manure from the building has been removed and used on a field being planted to garlic.

85	9/30	 **Small (east) Paddock—Day 85, September 30** Five days after last harvest of flock the small paddock is coming back heavily in spots. There is no sign of manure less than one week after final harvest. If a new flock had been scheduled in; the paddock is on track to be in top shape for their arrival. Note: This has consistently been the case since 2007 when this system was started. However, the paddock ranging system now works better utilizing the new breed of slow growth meat	

Large Paddock—Day 85, September 30
Views of the large paddock -- five days after last of flock was sent to processor.

Note the regeneration in progress.

Apples where harvested from large paddock on October 5.

Reminder there is no set specification or guideline that addresses every situation. Good observation skills, knowledge of poultry development and guidelines learned from raising previous flocks of slow growth meat chickens will be the most helpful to the entrepreneur utilizing a free-range paddock system.

Importance of Following Known Best Practices

Changes made to suggested best practices outlined in this production manual can cause a snowball effect resulting in significant changes to projected outcomes. These changes impact the income potential from the flock in question and impact the agriprenuer's ecological and sustainability goals.

> For example: A poorly scheduled and managed delivery to the processor can result in processing delays of a few days to a week. This delay results in increasing feed and labor costs, overgrowth of some birds and under development of others (chickens will not have the space vacated by larger chickens had they been harvested). Additionally, not harvesting in a timely way, can results in increased pressure on the paddock system and coupled with dry weather conditions, results in overgrazing that can revert paddocks to near feedlot conditions (lack of vegetative cover or growth).

Production and Performance Data Main Street Project

This segment of the production manual includes production and performance data from the Main Street Project flock featured in this production manual.

Included are:

Production and Yield Summary

Dressed Weight Data Summary

Dressed Weight Raw Data by Harvest

Daily Feeding and Performance Data

Production Management and Financial Oversight Summary

Production and Yield Summary

Total chickens produced	963 of 1000 chicks delivered
Mortality rate	37/1000 or 3.7%
Total dressed lbs. produced	3,775 lbs.
Average dressed bird weight	3.91 lbs.
Average live bird weight	5.58 lbs.
Total dry manure & litter removed bldg.	Approx. 4.5 T or 360 cu. ft.
Estimated nutrient composition of total load:	
	N (63 lbs. /T) = 283.5 lbs.
	P2O5 (55 lbs. /T) = 247.5 lbs.
	K2O (47 lbs. /T) = 211.5 lbs.[2]

Inputs:

Total labor hours	96.75 hours 12.33 lbs. /bird
Total lbs. of barley spread on fields	8,565 lbs.
Total lbs. of corn spread on fields	*650 lbs.
Barley straw for mulching	87 small square bales (approx. 35-40 lbs. /bale)
Wood shavings bedding	35 bags approx. 3.25 cu. ft. /bag of compressed wood shavings

*Corn was broadcasted in paddocks with this flock. However, corn that has been dried does not sprout well; therefore corn will not be used in the future. Small grains that sprout easily will be substituted.

[2] Cunningham, Dan L., Ritz, Casey W., Merka, William, C. "Best Management Practices for Storing and Applying Poultry Litter" reviewed 02/09/2012 The University of Georgia College of Agricultural and Environmental Sciences

Dressed Weight Summary Data