

PROFILES IN SUSTAINABLE AGRICULTURE

Clover Valley Farms, LLC



Minnesota Institute for Sustainable Agriculture

ACKNOWLEDGEMENTS

Writing and Editing

Sarah Stai, EcoSmith Consulting
Jane Jewett, Minnesota Institute for Sustainable Agriculture

Layout/Design

Sarah Stai, EcoSmith Consulting (PDF)
Jane Jewett, Minnesota Institute for Sustainable Agriculture (Web)

Profiled Farmers

Jeff Hall and Cindy Hale, Clover Valley Farms

Technical Advisers

Beth Nelson, North Central Region – Sustainable Agriculture Research & Education
Jan Joannides, Renewing the Countryside
Betsy Wieland, University of Minnesota Extension Small Farm Team
Wayne Martin, University of Minnesota Extension Small Farm Team
Nick Olson, Land Stewardship Project
Jerry Ford, Sustainable Farming Association of Minnesota

Reviewers

Levi Muhl, Minnesota Department of Agriculture
Jacquie Jacob, University of Kentucky
Emily Hoover, University of Minnesota
Sue Peterson, Azariah Acres
Inga Haugen, Farm Girl at Large
Jackie Hoch, Hoch Orchard and Gardens
Mike and Gretchen Perbix, Sweetland Orchard

Photo and Video Credits

Matthew Olin, University of Minnesota Duluth
Sarah Stai, EcoSmith Consulting
Jeff Hall and Cindy Hale, Clover Valley Farms

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PREFACE

Today's aspiring farmer is confronted with many sustainable agriculture resources, which generally fall into two categories: inspiring narratives and technical bulletins. The "Profiles in Sustainable Agriculture" project seeks to integrate these two types of resources into a technical case study format. The case studies combine a detailed narrative with embedded technical assistance via links to finance, production, and marketing resources. This "one-stop shop" case study format provides beginning and transitioning farmers with both a motivating story and the contextual understanding needed for integrating the nuts and bolts of sustainable farming into a real-life enterprise. Clover Valley Farms is the second case study of the series.

Recent trends related to local food and the changing demographics of American farms are creating a whole new enthusiastic generation of aspiring farmers. While this enthusiasm can carry beginning farmers through many an exhausting day in the field, a healthy dose of realism is essential to long-term success. Although it may seem logical to focus on learning how to grow crops or raise livestock and worry about the rest later, there is a "three-legged stool" of farming: production, marketing, and financial management. When all three components are addressed from the outset, farming dreams can be realized.

You may have already discovered that "cookie cutter" approaches don't work well in farming; what works on one farm or for one farmer may not work for another. There is no formula or tool for getting you from A to Z, but the case study does step you through what beginning farmers need to think about before starting their own enterprise.

It is recommended you read through the case study once from beginning to end, then use it as a reference document and revisit appropriate sections as needed. Reading the case study online (whether in the PDF or Web version) is optimal due to the number of external resources to which it is linked. The case study has also been laid out with as many internal links as possible to help you navigate the information and find resources that are relevant in multiple locations.

Resources are provided as links within the text and in various sidebars called "Educator's Perspective: Resource Tips" or "Farmer's Perspective: On the Bookshelf." Other sidebars called "Spotlight On" and "Farmer's Perspective: Lessons Learned" provide supplemental details and insight.

ABSTRACT

Clover Valley Farms is a small-scale integrated farm near Duluth, Minnesota. Jeff Hall and Cindy Hale raise poultry, hogs, apples, and herbs. They started selling products in 2007 and have grown into a combination of direct sales and wholesale.

This case study describes how Cindy and Jeff started working toward their farming dreams in 1999, how they have gradually added enterprises, and how they integrate farming with their off-farm jobs and their overall lifestyle.

There are details on training and networking, business planning and goal setting, production methods, on-farm research, poultry processing, cider pressing, yields and profitability, marketing models, and business management. Jeff and Cindy's emphasis on integration (such as the passive solar greenhouse that helps heat their home while giving life to their herbs) is highlighted throughout the case study.

Interviews and footage for this case study were obtained primarily in 2010. Some follow-up notes from 2011 are included, but as with [all case studies](#) in the [Profiles in Sustainable Agriculture project](#), this case study necessarily represents a snapshot in time. Like many farmers, Cindy and Jeff's approach is continually evolving.

Farmer's Perspective: Lessons Learned

Jeff & Cindy's Top Ten Pieces of Advice for Start-up, Small-Scale Diversified Farms

1. Work on farms of different scales, crops and animals, management systems, soil types, and marketing outlets.
2. Seek and cultivate relationships with mentors early and ongoing; never stop.
3. Start small and increase business gradually. Learning how to have continuous product throughout the season, and managing multiple kinds of products, is a genuine challenge.
4. Involve your customers, have field days, and ask for feedback! Your customers can help you make important decisions that reflect directly to your bottom line.
5. Know the regulations related to your product(s)!
6. Support yourself off-farm for the first 4-5 years in order to reinvest all farming profits back into the business, save for future capital purchases, and avoid all debt other than a farm mortgage.
7. Join farmer-based agricultural organizations and engage in farmer-to-farmer learning opportunities such as tours, field days, conferences, and workshops.
8. Develop a farm financial and management planning system that works for your operation and the people involved; review and revise annually, and get professional help (i.e., consultants, accountants) when you are out of your element.
9. Explore and take advantage of traditional farm programs, loans, on-farm research grants, and small business resources through the USDA, FSA, state agricultural departments, university extension services, and community colleges.
10. No matter what, take at least one day or half day off each week to do something fun that reminds you why you wanted to farm in the first place. Have bonfires and roast marshmallows whenever you can, especially with friends.

INTRODUCTION

Cindy Hale and Jeff Hall have built [Clover Valley Farms](#), just north of Duluth, Minnesota, into a classic case of “what’s old is new again.” Using a modern homestead model, they produce poultry, eggs, hogs, herbs, and fruit for themselves and for sale within their local community. At the same time, the greywater and composting systems and the passive solar greenhouse integrated with their home would score points in today’s fast-growing green building industry, while their small-scale, diversified approach to farming makes advocates of sustainable agriculture stand up and take notice.



As you shall see, “integrated” is a key word in Jeff and Cindy’s vocabulary. They use integrated pest management to grow apples in new and restored heritage orchards. Apple pulp from cider pressing is used to finish their pastured hogs each fall, and it keeps the diets of their free-range poultry interesting too. Jeff and Cindy use the hogs and poultry, in turn, to prepare and maintain orchard sites. They also grow herbs and other produce in their greenhouse year-round, no small feat along the northern shore of Lake Superior! Herb sales contribute to their farm income, fresh produce keeps their family healthy, and the winter greens help their laying hens produce eggs that keep customers coming back for more. Jeff and Cindy’s story focuses on integration of efforts and shows how they have used goal setting, record keeping, financial management, networking, and gradual expansion to work toward their vision of a profitable, rewarding, community-centered farm.



Educator’s Perspective: Resource Tip

Climate Data

The National Oceanic and Atmospheric Administration (NOAA) has Regional Climate Centers where you can look up climate summaries or prepare monthly climate calendars based on data from the nearest weather station.

The following data for Duluth, Minnesota, give a picture of the weather conditions encountered at Clover Valley Farms (based on the period 1971-2000).

Temperature: Normal temperatures ranged from -1.2°F to 76.3°F for the year. From June through August, normal daily highs and lows ranged from 48.5°F to 76.3°F, with averages of 59.9°F to 65.5°F.

Precipitation/Snowfall: Annual precipitation was 31 inches, with normal monthly amounts ranging from 0.83 inches in February to 4.25 inches in June. Average annual snowfall was 84.3 inches.

Growing Season: Median date of last spring frost was May 18 (ranging from April 28 to June 22); median date of first fall frost was September 23 (ranging from August 27 to October 10). Median growing season was 124 days (ranging from 86 to 154).

The new U.S. Department of Agriculture (USDA) Plant Hardiness Zones map, which was released as an interactive version for the first time in 2012, also has some weather data available based on zip code (see also “[Greenhouse Construction and Operation](#)” Spotlight box).

ASSESSING & PLANNING

Getting Started

The story of Clover Valley Farms begins in 1996, even before Cindy and Jeff met. That was the year Cindy purchased the land. She comes from a rural background and has always loved gardening and imagined farming in some way. When Cindy and Jeff met through the [Duluth Community Gardening Program](#), they started off with a shared interest. Jeff joined Cindy on the farm in 1999, and they immediately set about putting in a big garden, renovating the homestead orchard, and pondering what else they could do with the farm.

Jeff and Cindy started experimenting with raising poultry in 2004. That first year, they raised only 6 chickens, for their own use. In 2005, their daughter May entered the picture and inspired them to explore options for summer work to complement their academic-year positions. They wanted a source of income that didn't require sending May off to day care every summer, and they found that poultry could be a great fit. As described below under [Business Planning](#), they gradually increased the number of birds they raise each year, starting sales in 2007, and have added ducks, turkeys, and hogs to their efforts since then. Trees already existing on the farm also made apples and other fruits a natural component of their enterprise.



Much of Cindy and Jeff's training to be farmers has been of the hands-on variety. They participated in the [Land Stewardship Project's](#) (LSP) Farm Beginnings program in 2008 and a Farmer-to-Farmer Mentoring Program in 2009 through the [Midwest Organic and Sustainable Education Service](#) (MOSES). They were mentored by Tom Galazen of [North Wind Organic Farm](#) in Bayfield, Wisconsin. Tom runs a small operation, including a small inspected kitchen, with the help of interns. From Tom, they learned about fruit tree grafting and northern varieties, managing interns, and about the "homestead model" of farming. Cindy and Jeff have also done extensive networking, and they work to create synergies between their farming activities and their off-farm careers wherever possible (see [Farm Business > Professional Development](#)).

Farmer's Perspective: On The Bookshelf

[You Can Farm: The Entrepreneur's Guide to Start and Succeed in a Farming Enterprise](#)

By Joel Salatin

Cindy and Jeff were inspired early on by this book geared toward farmer "wannabes." Published by Chelsea Green, it discusses myths and realities of turning farming dreams into viable family businesses. Cindy and Jeff now emulate many of Salatin's methods, including his "daily move pens" for pastured poultry (see "[Salatin-Style Pens](#)" Resource Tip box under [Production > Production Methods > Poultry](#)).

Jeff and Cindy's educational backgrounds and professional experiences have clearly contributed to the technical know-how and philosophies that get applied to their farm. Jeff has a degree in Outdoor Education, which he has put to use by working with both children and adults and which reflects his interest in ecological systems. Cindy has degrees in Ecology and Environmental Science and specialized in Forest Ecology for her Ph.D. She also has extensive experience with science education. As described throughout the case study, research and outreach have become inherent parts of Cindy and Jeff's approach to farming.

Jeff now works full-time in the Duluth school system during the academic year and is full-time on the farm during summer. Cindy has a half-time position with the [Natural Resources Research Institute](#) at the University of Minnesota Duluth during the school year, while summer brings a combination of academic and farm work. They expect their ratio of on-farm to off-farm work to continue evolving as the farm does (see [Farm Business > Human Resources](#)).

Educator's Perspective: Resource Tip

Hands-on Learning

The Land Stewardship Project's [Farm Beginnings](#)TM is a farmer-led educational training and support program designed to help people who want to evaluate and plan their farm enterprise.¹

The [Beginning Farmers](#) Web site from Michigan State University (MSU) provides a list of resources under [Jobs and Internships](#) and [Training Programs](#).¹

The Minnesota Institute for Sustainable Agriculture (MISA) maintains an [events calendar](#) and a [list of internship opportunities](#) with farms and related organizations in Minnesota and beyond.

ATTRA (the National Sustainable Agriculture Information Service) has a [directory](#) of on-the-job learning opportunities in sustainable and organic agriculture in the U.S. and Canada. Farmers and interns/apprentices can connect by searching for opportunities by state.

The MOSES [Farmer-to-Farmer Mentoring Program](#) pairs experienced organic farmers with transitioning organic farmers to promote the successful adoption of organic methods through one-on-one interaction.

Some training programs are designed to serve as "incubator programs" and may be targeted to specific audiences. The [Minnesota Food Association](#), for example, provides small learning plots through its [Immigrant Agriculture Training Program at Wilder Forest](#).

¹Farm Beginnings is offered in Minnesota, Wisconsin, Illinois, Nebraska, North Dakota, South Dakota, and New York. Links to programs in other locations are on the MSU Beginning Farmers Training Programs page.

Business Planning (The Chicken or The Egg?)

Cindy and Jeff's model has been one of gradual growth that is closely tied to available resources and lifestyle choices. As mentioned above under [Getting Started](#), for Cindy and Jeff, it was a case of the chicken coming first – but eggs were close behind. Other products, such as herbs and fruit, were always in the works too because of the existing greenhouse and fruit trees. As the business grew, customers asked for other products like pastured turkeys, lamb, and pork. Hogs were a good fit for Clover Valley Farms because they could be raised from feeders in the spring to finish weight by fall. As long as Jeff and Cindy both have off-farm jobs during the academic year, they expect to avoid producing animals that require year-round care, with the exception of the laying flock, which

they find easy to manage. Another benefit they hope to realize by raising hogs is that rotating them on pasture with chickens will increase the quality and quantity of pasture forage without tilling, seeding, or soil amendments (see [Production > Production Methods > On-Farm Research](#)). With improved pasture quality, they hope to see the economic benefits of getting more marketable meat with less supplemental feed.



Jeff and Cindy’s approach to growth is to try new products first on a small scale, where the emphasis is on learning and not making money, and then to increase production and work toward profitability as resources allow. As mentioned above, customer requests also come into play. For the first year of raising a new animal, they include it on the pre-order form that goes out to customers each spring as a “just-in-case” option (Appendix I). With broilers, for example, they didn’t sell birds until the fourth year of production; with ducks, turkeys, and hogs, they sold small numbers in the first year (Table 1).



Table 1. Summary of farm growth through 2010 (round numbers)

Year	Hogs	Poultry (Meat)	Poultry (Eggs)	Fruit	Wholesale Herbs
2004		6 broilers			
2005		15 broilers			
2006		25 broilers			
2007		50 broilers*			Small quantities of 6 bulk herbs*
2008		150 broilers	25-hen laying flock*		Packages (¾ oz. clamshell) of 7 herbs, 1-2 times per year
2009	3*	300 broilers 15 ducks* 15 males and stewing hens ¹	35-50 hen laying flock	50 lbs of apples*	Packages of 7 herbs, 2-3 times per year
2010	5	300 broilers 50 ducks 20 turkeys* 25 males and stewing hens	50-hen laying flock ³	none ²	Packages of 8-9 herbs, 3-4 times per year; garlic and garlic braids

*first year of sales

¹“Males” here refers to males of breeds using for laying and not kept as roosters for breeding; stewing hens are retired laying hens (see [Production > Production Methods > Poultry](#)).

²No apples sold in 2010 while Cindy and Jeff focused on establishing a new orchard (see [Production > Production Methods > Apples & Other Fruits](#)) and also adding 20 currant bushes. Apple sales were expected to resume in 2011.

³Egg sales in 2010 are described under [Production > Yields & Profitability > Poultry](#).

Cindy and Jeff manage this growth by having what they call “corporate meetings,” where they discuss planning for each season, develop monthly calendars, and review finances. They decide on the numbers and types of animals to raise each season by consulting their detailed inventories, which tell them how well they are tracking toward profitability (see also [Production > Yields & Profitability](#)), and by assessing how well the previous season went in terms of scheduling and quality of life. The way they integrate tasks throughout the year is shown in their annual calendar (Appendix II).

Farmer’s Perspective: Lessons Learned

Adaptive Management

Jeff and Cindy use the principles of adaptive management to make decisions about farm planning. In other words, they keep track of how well their past decisions played out, then use that information to make the next set of decisions, so that their choices continually build on the knowledge they’ve acquired. As an example, in 2010, they decided that all poultry processing in the future needed to be done by the end of August. Until then, processing of some birds had always occurred in September, when apple harvest comes into full swing and Jeff has gone back to work at his off-farm job. To accommodate this change in the processing schedule, they expect to adjust their production schedule and possibly the breeds of poultry they raise (because the birds will have less time to grow and reach processing weight).

Jeff and Cindy prepared a business plan in 2010 as part of the process of becoming a Limited Liability Company (LLC) (see also [Farm Business > Business Structure](#)). They expect to do annual updates that will help them track their progress. Their formal planning efforts actually started earlier, however. Jeff and Cindy feel the most important outcome of their participation in LSP’s Farm Beginnings class was that it forced them to talk more about their goals and plans. Now, their detailed planning happens in the context of the overall vision statement they formulated in 2009.

Clover Valley Farms Vision Statement (2009)

Make a profit. This includes working toward a wage of \$12/hour for Cindy and Jeff’s labor and then growing that to \$20/hour.

Keep stress to a minimum. This means keeping a balance between work and the things that provide physical, mental, emotional, and spiritual renewal, such as:

- Time for regular exercise.
- Family time at home and away.
- Time for reflection and giving thanks.
- Mindfulness; being in the present.
- A schedule that is not overbooked at any given time.
- Sharing of record keeping and financial management tasks.
- Regular and open communication about farm tasks and plans.

Nurture community and quality of life. Cindy and Jeff’s farming practices seek to:

- Improve the quality of their surrounding environment, including biodiversity and native habitats.
- Provide a rich array of food for family and friends.

Educator's Perspective: Resource Tip

Business Planning

A MISA publication called [Building a Sustainable Business: A Guide to Developing a Business Plan for Farms and Rural Businesses](#) assists with the creation of a holistic business plan rooted in personal, community, economic, and environmental values.

A free online course called [Strategic Farm/Ranch Planning and Marketing](#), one of a series in SARE's¹ National Continuing Education Program in Sustainable Agriculture, covers goal setting, developing business and marketing plans, managing risk, meeting with lenders and alternative financing, transferring farms, and understanding retirement options.

A free online business planning tool called [AgPlan](#), from the [Center for Farm Financial Management](#), offers tips and resources for writing a plan and provides an option for getting it reviewed.

The U.S. Small Business Administration has Small Business Development Centers throughout the country that offer free consultations for business planning. [Click here](#) for an office locator.

¹Sustainable Agriculture Research and Education, a program of the USDA

Farm Description

Clover Valley Farms sits about 20 miles north of Duluth and about 4 miles from Lake Superior. Cindy and Jeff own 25 acres, of which 8-10 acres are in production. Much of the property is forested, while the remainder is made up of old pastures, orchards, and the homestead (Figure 1). Cindy and Jeff can envision using most, if not all, of the property for farming purposes eventually, though they do not anticipate it would involve clearing the forest. The hogs, for example, could be sent to the forested areas to forage temporarily. Cindy and Jeff currently have about one acre of forest enrolled in the Wildlife Habitat Incentives Program (WHIP) and will be planting a cover crop and native fruit trees such as highbush cranberry, red-osier dogwood, juneberry, grey dogwood, and pin cherry.

Many farmers would balk at the idea of farming in Minnesota's northerly reaches, but Jeff and Cindy feel there are unique advantages. They both like the seasonal nature of farming there and the lulls provided by the region's climate. They also appreciate that the farm is located out of the range of two of the most destructive pests that plague other fruit tree growers in Minnesota (plum curculio and codling moth; see [Production > Production Methods > Apples & Other Fruits](#)). The farm's latitude limits the number of modern fruit varieties that can be planted there, but Jeff and Cindy have found that there are more than enough locally developed heritage varieties to grow a diversity of high-quality fruits. For Jeff and Cindy, heritage varieties are those that are about 100

Educator's Perspective: Resource Tip

Working Lands Conservation

WHIP is just one of several federal cost-share programs that can help farmers implement conservation activities on their land. The Minnesota Department of Agriculture's [Conservation Funding Guide](#) provides information about opportunities in Minnesota, and many are relevant nationwide.

Until recently, U.S. conservation policy has focused on "land retirement" programs such as the well-known [Conservation Reserve Program](#). Recent trends, however, indicate an increasing emphasis on "[working lands](#)" conservation through initiatives such as the [Conservation Stewardship Program](#). By implementing conservation practices on land that is in agricultural production, more efficient and sustainable land use is possible.

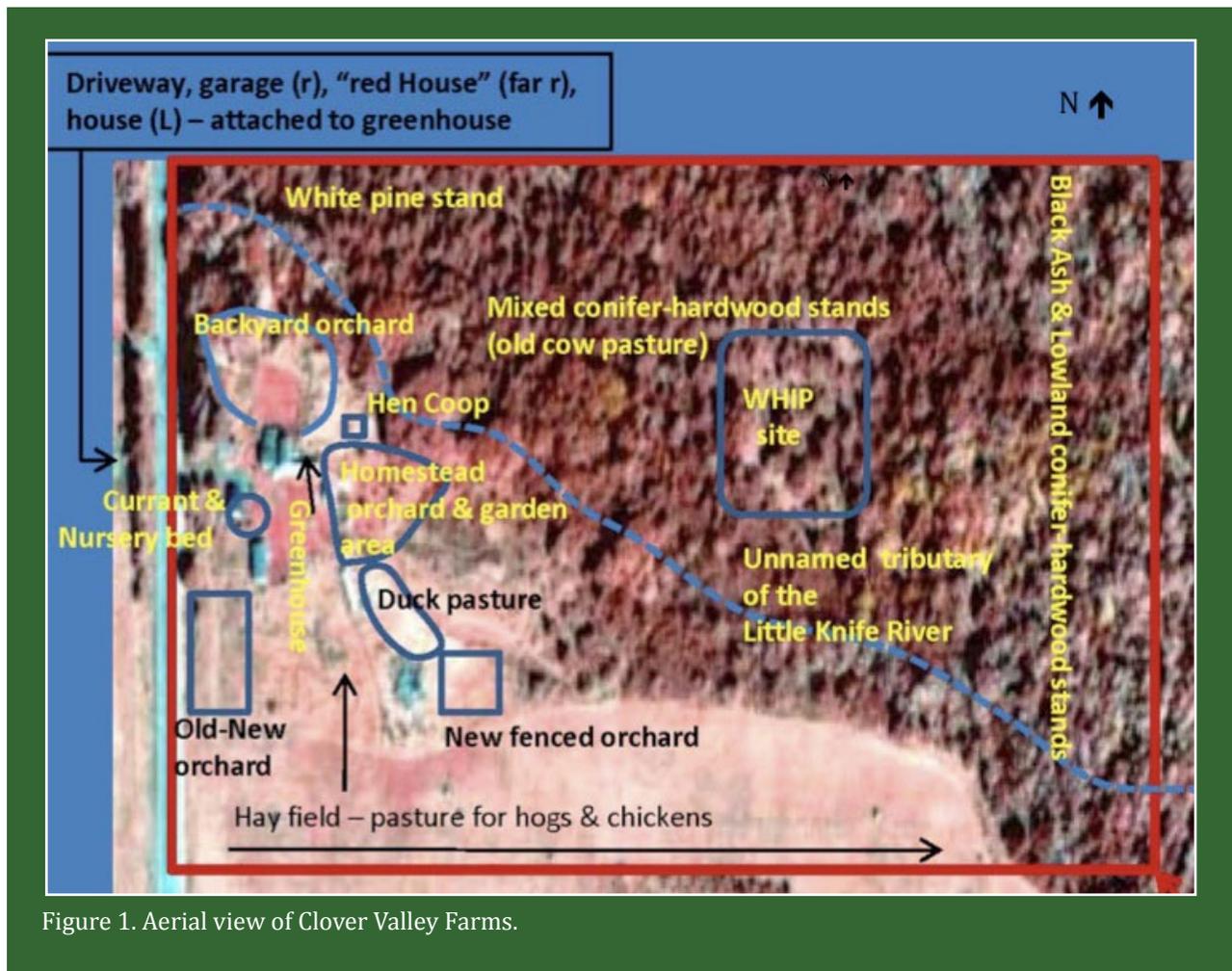


Figure 1. Aerial view of Clover Valley Farms.

Educator's Perspective: Resource Tip

Soils

Farmers seeking land need to know what kind of soil they'll be dealing with. To get a map of soil types for a specific property, contact the local Soil and Water Conservation District or USDA Natural Resources Conservation Service. [Click here](#) for an office locator. Soil data are also available through the [Web Soil Survey](#).

Once farming is underway, SARE's [Building Soil for Better Crops](#) is an essential reference. This one-of-a-kind, practical guide to ecological soil management was updated in 2010.

years old or more, are not patented, and have some historic significance to the region.

The primary disadvantage of the farm's location is the heavy soil. Cindy and Jeff must deal with a 40-foot layer of unstructured red clay, the remnant plain of a glacial lake that existed during the last glaciation (about 11,000 years ago). Before planting apple trees, these poorly drained soils require thoughtful site selection to provide good air flow, water drainage, and sun aspect. The soils also need to be worked for a year or more to increase friability and organic matter. The location of Clover Valley Farms is a bit of bad luck, considering that just a quarter-mile up the road, the clay transitions into glacial till and loamy soils! Cindy and Jeff emphasize that if you are looking at buying land for farming, it pays to do your homework on the soil types of potential properties and to understand the opportunities or obstacles of those soil types.

Cindy and Jeff also value the thriving community of sustainable farmers and local food advocates in the Duluth area (see also Farm Business > Professional Development).

Equipment & Infrastructure

An important part of Jeff and Cindy's philosophy is about keeping their farm "small scale." Nowhere is this philosophy more evident than in their intentional avoidance of large or expensive equipment. Of course, all farming operations depend on some kind of equipment and infrastructure, but in Jeff and Cindy's case it is generally small, portable, and not highly mechanized. Their equipment list includes a small Port-A-Hut for sheltering hogs on pasture, a large Port-A-Hut for sheltering chick brooders, pens for pastured poultry, a lawn tractor with small trailer for daily deliveries of water and feed to pastured animals, their mobile poultry processing unit, freezers for poultry sales, an incubator for eggs, and a cider press for apples.

"If we can't do it with a pick-up or a lawn tractor, we don't want to do it!"

Cindy and Jeff's infrastructure is also fairly simple. The house was already on the land when Cindy purchased it in 1996. The so-called "red house" and an attached Airstream trailer were also part of the land; the red house was eventually separated from the Airstream and moved to a different location. It contains intern housing, a small shop, storage areas, and freezers. The garage and hen house were purchased and moved to the farm from other properties, thanks to an acquaintance who moves buildings and gives them a good price.

The most significant investment that Jeff and Cindy have made to infrastructure involves the passive solar greenhouse that is attached to their home and which integrates household heating and water treatment with their herb-growing operation. Their "grey-water" system, in turn, relates to their use of composting toilets. The components of the overall system are described below.



Composting Toilets

When Cindy purchased the property, there was a well but no septic system. The clay soil of the site would have required a mound septic system, at a cost of approximately \$12,000-\$15,000 in 1998. Cindy wanted a greenhouse anyway and knew that one could potentially be combined with a greywater system at a similar cost to a mound septic system.

The composting toilets now in use at Clover Valley Farms – one in the house and one outside – are one example of the ways in which Cindy and Jeff's lifestyle is intertwined with their farming business. Some of the breakdown process occurs within the holding tanks of the toilets. Every few weeks, the material is then moved to secondary holding bins placed around the farm. These bins

are covered with a loose-fitting cover and are stirred regularly to aerate the material and cause it to heat up, but Jeff and Cindy do not monitor temperatures of the material in these bins. The organic material remains in these bins for a year. Then it is spread on fields, away from the animal production areas. With this approach, Cindy and Jeff reduce household water use while generating a useful fertilizer for their farm.

Educator's Perspective: Resource Tip

Treatment of Human Wastes

Proper treatment of human wastes is one of the great public health triumphs of the world. Public sewage systems in cities and individual septic systems in rural areas have allowed diseases like typhus and cholera and parasites like tapeworms and ascarids (roundworms) nearly to fade from living memory in the developed world.

University of Minnesota Extension's [Septic System Owner's Guide](#) provides a good overview of septic system features, requirements, operation, and maintenance. It includes discussion of alternative systems. (Only a portion of the document is available online, but the online version has ordering information for the complete print publication.) Composting toilets and greywater systems are becoming popular alternatives to conventional septic systems, but they require a thorough understanding of sewage treatment and regulations.

Most counties in Minnesota have a Subsurface Sewage Treatment System (SSTS) Ordinance ([listed here](#)). Each county develops its own ordinance ([see example from Dodge County, MN](#)), but they follow the same general template in order to comply with Minnesota Statutes. SSTS ordinances require that raw sewage from dwellings not served by a municipal sewer system be treated in an underground septic system. Landowners living in counties with an SSTS ordinance need special permitting to use a composting toilet system. Typically, if a home has running water it is also required to have an SSTS. The county's Environmental Services department or Planning and Zoning department issues permits for these systems according to county standards.

"Greywater" is water from sinks, bathtubs and showers, and laundry – basically anything other than toilets. Water from toilets is termed "blackwater." From the perspective of officials charged with protecting public health, however, there is very little difference between "greywater" and "blackwater," because in a household situation human bodily wastes can readily enter the greywater stream. Urinating in the shower, using cloth diapers for an infant and washing them in the washing machine, washing soiled hands after using the toilet or changing a diaper, or washing soiled clothing from someone who has had diarrhea – all of these things put "blackwater" into the "greywater" stream. For this reason, SSTS ordinances generally require nearly as elaborate a treatment regime for greywater as they do for blackwater, and county authorities may be reluctant to permit greywater systems.

Alternative waste treatment systems such as composting toilets require a higher level of daily management and responsibility on the part of the owner. Those who use them should understand the principles of waste treatment and the risks of pathogens from improperly treated human wastes.

Composting of human solid wastes is one acceptable method of pathogen reduction, but the processes required to achieve true composting are exacting. This [Pathogen Reduction Requirements](#) document from North Carolina describes the federal standards used to achieve a "Class A" pathogen-free material from human waste: "Using either the within-vessel, static aerated pile, or windrow composting methods, the temperature of the biological residuals is raised to 40 degrees Celsius or higher and remains at 40 degrees Celsius or higher for five days. For four hours during the five days, the temperature in the compost pile exceeds 55 degrees Celsius. Natural decay of the biological residuals under uncontrolled conditions is not sufficient to meet this process." Treatment of wastes with lime to reach a pH level of 12, and holding that pH level for 12 hours, is another option, and one that may be easier for homeowners to achieve.

The options for treatment of human wastes that will be applied on land and the time delays required between application and other uses of the land are detailed in the U.S. Environmental Protection Agency (EPA), Code of Federal Regulations, [Title 40 CFR part 503.32](#). A [related EPA document](#) includes definitions of terms used in the regulations and classifies types of crops into food-chain or non-food-chain crops.

Passive Solar Greenhouse & Greywater

The greenhouse was built in 1998 at a cost of around \$12,000. Cindy received a \$5,000 grant from the Minnesota Office of Environmental Assistance and worked with Roald Gundersen, a regionally known innovator of “biosystems,” to design the greenhouse and its associated heating and water systems. Originally built as a stand-alone structure, the greenhouse is 36’ x 10’ with six 3’ x 9’ raised beds. Jeff and Cindy grow flowers, vegetables, and herbs in the greenhouse year-round, without supplemental heat or light and by relying on greywater (water from the household’s sinks, shower, and washing machine) and rainwater.

Sending greywater to the greenhouse instead of a septic system means it gets put to good use. Greywater is sent from the house to the greenhouse and stored in an underground 300-gallon tank, where it supplies water and certain nutrients to the raised beds. During the warm months, rainwater is collected and stored in two 3’ x 9’ above-ground, 400-gallon tanks. The rainwater is used to supplement irrigation by the greywater, and the above-ground tanks also provide thermal mass that helps to regulate the greenhouse’s temperature during winter. Irrigation water is delivered to the raised beds through 4” perforated drain tile lines under the surface.

Heat and Moisture Exchange

The greenhouse was originally kept detached from the living quarters out of concerns over excessive moisture being introduced to the house. In 2003, however, when Jeff and Cindy added a second story to their home, they attached the greenhouse. It is now part of a three-tiered system for heating their house. First, a thermostatically controlled fan blows air from the greenhouse into the home if the temperature in the greenhouse exceeds a certain point. When this warm, moist air is inadequate, a wood stove and electric radiant heaters installed on the walls of the house provide back-up.

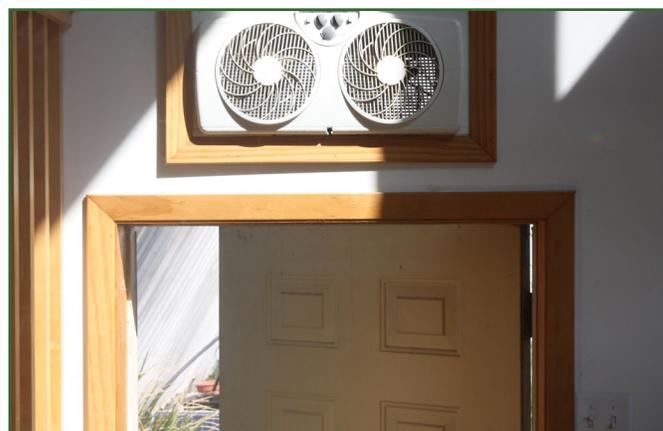
Other mechanisms are in place to keep greenhouse heating and air exchange largely passive. The ridge vents in the greenhouse, for example, open and close automatically because of a resin

Educator’s Perspective: Resource Tip

Greenhouse Case Studies

Clover Valley Farms’ greenhouse is described further in a [case study](#) published by the Minnesota Sustainable Communities Network. It also served as a prototype for a greenhouse built at a nearby elementary school, [North Shore Community School](#). That greenhouse has developed to the point that students now use it to grow greens for their own school meals.

Minnesota’s Clean Energy Resource Teams (CERTs) prepared [six case studies](#) about greenhouses across the state that are incorporating energy efficiency and/or renewable energy into their systems.



that expands when hot and contracts when cold. There is a reversible gable fan used for air exchange with the house and a solar-powered gable fan on the far side of the greenhouse to regulate summer temperatures.

This entire system was permitted under an experimental septic program and benefitted from a county health inspector who was open to the plans. Cindy and Jeff work with the inspector to provide periodic data that show the system still functions. They have been pleased to be able to demonstrate, using flow meters, that they typically discharge only 50 gallons per day – a figure that was initially hardly believed! Typical household water discharge in Minnesota is about 50 to 75 gallons *per person* per day. See [“Conserving Water”](#) from University of Minnesota Extension for more information about household water use.

Cindy and Jeff were told that septic systems for residences are typically designed to accommodate 450 gallons of discharge per day. The well on their property is shallow and slow to recharge, and Cindy and Jeff think that if not for the low level of water use in their home, they would have had to drill an additional well to accommodate their livestock production. In essence, then, they feel the greywater system has indirectly saved their farm business tens of thousands of dollars.

Educator’s Perspective: Resource Tip

Livestock Water Requirements

A clean and adequate supply of drinking water is critically important to good growth and health of livestock. Being thirsty – or worse, dehydrated – can reduce animal performance, sometimes by a lot. Adequate water consumption is just as important in cold winter temperatures as it is during hot summer weather. Planning for your livestock housing areas must include planning for a water supply; if you will keep animals over the winter, that supply must be usable even in freezing weather.

The following resources provide tables of water requirements for most types of livestock and show the variation in water requirements with size and age of the animal, level of feed consumption, and whether it is lactating.

[Livestock and Water](#). 1999. Greg Lardy and Charles Stoltenow. North Dakota State University.

[Water Requirements for Poultry](#). 2001. W. Winchell. Canada Plan Service.

[Water Requirements of Livestock](#). 2007. Daniel Ward and Kevin McKague. Ontario Ministry of Agriculture, Food, and Rural Affairs.

Spotlight on: Greenhouse Construction and Operation

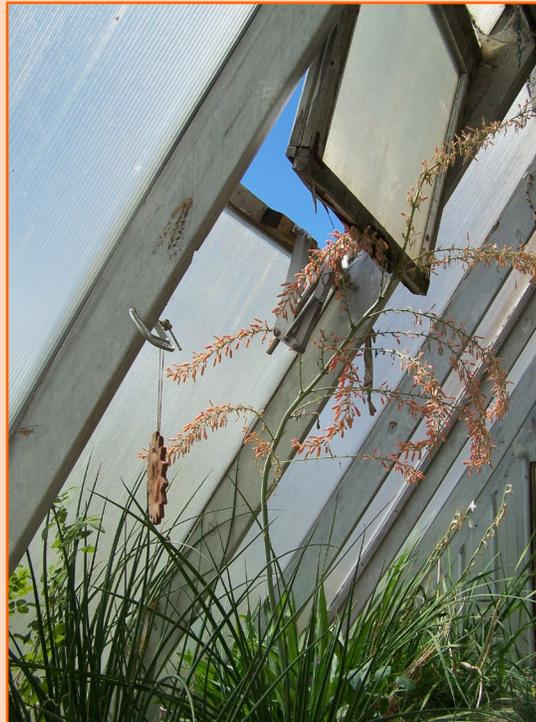
Cindy and Jeff's greenhouse was built with "knee walls" that support the A-frame structure. The walls are bermed on the outside, up to the bottom of the windows and the top of the raised beds, providing insulation. One end of the greenhouse is attached to the house and the other end is insulated, so primary heat loss is through the polycarbonate glazing. The insulation is so effective that the greenhouse can reach 110°F and need to be vented on a sunny day in January, when it's -20°F and windy outside. The angle of the glazing is designed to capture maximum penetration by the sun in the middle of winter. It's actually easier to cool the greenhouse in the summer, when they can open the doors and have the fans going.

Night-time warmth is maintained during winter through the use of rain-water storage tanks and barrels, which provide thermal mass. The sun heats the water during the day, and the heat is stored overnight. Air temperature in the greenhouse may drop to a few degrees below freezing at night during the coldest part of winter, but the soil in the raised beds never freezes. Effectively, the greenhouse becomes a [USDA Plant Hardiness Zone](#) 6 or 7, compared to a Zone 3 outside.*

Jeff and Cindy made a point to keep the greenhouse simple to operate, including "off-the-shelf" plumbing materials such as water lines and a water meter. They use a ball valve to control how much water gets to each raised bed, and drain tile is buried underneath. There are "micro-climates" within the greenhouse, so that some beds are naturally drier or colder than others.

One of the "lessons learned" was about the "water wall" on the north side. It was added as an afterthought rather than being integrated into the original structure, and it worked well for about five years until the tubing started degrading. It functioned by pumping water from the holding tanks and running it down corrugated metal on the inside of the north wall when the air temperature exceeded 80°, then recapturing it in the tanks. The heat of the wall warmed the water, increasing the ability of the tanks to provide thermal mass. Cindy and Jeff eventually hope to restore the water wall's function.

Cindy and Jeff have also learned how to respond when people want to know if a greywater greenhouse "septic system" would be an easier or less expensive way to address their own septic needs. The first question Cindy and Jeff ask people is, "Do you want a greenhouse?" If the answer is not an unequivocal YES, then Cindy and Jeff suggest they reconsider their interest! They feel it important to emphasize that a greenhouse of any kind requires almost daily attention and monitoring, and that if you aren't passionate about learning how to manage and grow plants in a greywater greenhouse, then you don't want a system like theirs. Cindy and Jeff love their greenhouse and can't imagine life without it, but they know it's not for everyone.



*The USDA updated the Plant Hardiness Zones in 2012, for the first time since 1990. A new [interactive map](#) is now available. This [Minnesota Public Radio article](#) describes the changes.

PRODUCTION

Production Methods

The diversity of Cindy and Jeff's enterprise means that many details are involved in their production methods. But what underlies and unifies these methods are four key words or phrases that come up repeatedly when you talk to Cindy and Jeff about their farming philosophy.

- **Small-scale:** As discussed under [Assessing & Planning > Equipment & Infrastructure](#), Jeff and Cindy intentionally limit their acquisition of heavy equipment. They believe their key to profitability is diversity rather than scale.
- **Integrated:** The integrated nature of their farm (and home) is touched on throughout the case study. The ways they combine their production of plants and animals and intertwine their farming practices with their lifestyle are described in more detail below.
- **Subsistence:** As discussed under [Assessing & Planning > Getting Started](#), Cindy and Jeff adhere to a "homestead model" of farming, in which they combine food production for themselves – or family subsistence – with community subsistence. In other words, they model their farm after what was often done historically – producing for themselves plus extra for sale within the local community.
- **No waste:** Jeff and Cindy are proud of the fact that no organic waste has left the farm in 10 years – whether it's the way that hog and poultry manure get worked into the pastures, composted deep bedding from the hen coop is applied to the orchards, or any of a myriad of other synergies that result from their emphasis on integration.

Farmer's Perspective: On The Bookshelf

[Storey Guides](#)

Storey Publishing offers guides to production of various animals, such as chickens, turkeys, ducks, and pigs. Cindy and Jeff have found the series to be a useful source of information.

Poultry

Species and Breeds: Because the composition of Jeff and Cindy's poultry flocks has been evolving as the farm business grows, a description of the numbers and types of birds they produce is necessarily a snapshot in time. For 2010, their production of laying hens (and males) is summarized in Table 2. Jeff and Cindy chose Barred Plymouth Rocks because they forage well and lay well. Barred Plymouth Rocks lay large brown eggs, as do Buff Orpingtons, and both breeds are good for cold climates (Figure 2). As of 2011, however, Jeff and Cindy decided to discontinue production of Buff Orpingtons, because the hens tend to be broody and the roosters loud and aggressive toward younger birds when they are being integrated into the main flock. Ameraucanas are also hardy in winter; they lay medium-sized eggs that are blue, green, or turquoise (Figure 2). Jeff and Cindy mix eggs from the different breeds in their egg cartons and have found that customers love the variety of colors, especially around Easter.



Table 2. Laying hen production in 2010

Chickens (Breed/Sex)	# Birds	How Acquired	Status at End of Season
Ameraucana hens	22	carried over from 2009 ¹	processed 9/27/10
	20	hatched on farm 9/28/10 ¹	carried over to 2011
Buff Orpington hens	35	carried over from 2009	processed 9/27/10
Buff Orpington males (for breeding)	5	purchased as day old chicks on 4/9/10	
Barred Plymouth Rock hens	50		

¹For Ameraucana chicks hatched on the farm in 2010, the breeding male was carried over from 2009 along with the hens.



Figure 2. One Buff Orpington male and three Barred Plymouth Rock hens (one in background) foraging on apple pulp (top left). Ameraucana hen in coop (top right). Smaller bluish eggs of Ameraucanas (bottom right) compared to larger brown eggs of other breeds (bottom left).

Production of broilers and other poultry is summarized in Table 3. Cindy and Jeff raise Cornish Broilers for their fast growth rates and Red Broilers for their pasture foraging abilities and consequent flavor. They recognize there are trade-offs with their choice of broiler breeds; Red Broilers don't grow as fast as Cornish, but Cornish Broilers are not good pasture foragers. Like Cornish Broilers, Pekin ducks are the

industry standard breed. Cindy and Jeff also liked how Pekin ducks grow much more quickly than other breeds and have white plumage, so there are no dark pin feathers on processed birds. Cindy and Jeff experimented with heritage turkey breeds in 2010 (Figure 3) but were unhappy with their growth rates and finished sizes. In 2011, they switched to Broad-Breasted White turkeys and were very pleased with their growth rates and finished sizes as well as their easygoing disposition.

Table 3. Meat poultry production in 2010

Species (Breed)	# Birds	How Acquired	Processing Date
Chickens (Cornish Broilers ¹)	155	day old chicks on 6/11/10	8/6/10
Chickens (Red Broilers)	165		9/17/10
Ducks (Giant White Pekin)	47		7/30/10
Turkeys (mixed heritage breeds) ²	20	day old poults on 7/23/10	10/30/10

¹In 2009, Jeff and Cindy began raising only pullets of this breed, because of the higher mortality rates of males as they get older. In 2011, they planned to try raising males again and processing them at 6 weeks instead of 8 weeks, as they do for pullets.

²Cindy and Jeff don't know which breeds they received; their understanding is that hatcheries sometimes offer "mixes" as a way to sell excess birds from a given breed. Cindy and Jeff believe their 2010 turkeys were mostly Bourbon Reds. See the "Heritage Turkeys and Game Birds" Resource Tip box for information about regulations associated with wild turkeys..



Figure 3. Clockwise from top left: Cornish Broilers, Red Broilers, Pekin ducks, heritage turkeys.

Educator's Perspective: Resource Tip

Heritage Turkeys and Game Birds

In Minnesota, the Department of Natural Resources (DNR) administers licensing of game farms. Some types of fowl used for meat production are classed as “game birds,” and farmers who raise them for sale are required to have a game farm license.

Wild Turkeys are classed as game birds. The Eastern Wild Turkey is one of five subspecies that occur in North America (see photo below). No heritage turkey breeds are considered game birds in Minnesota. The Broad-Breasted Bronze turkey has a similar appearance to the Eastern Wild Turkey and in fact originated in the 1800s as a cross between the Eastern Wild Turkey and European domestic turkeys, but the Broad-Breasted Bronze is not considered a “game bird” under Minnesota law.

Game birds, according to Minnesota Statute (M.S.) 97A.015 subd. 24, include: migratory waterfowl, Ring-necked Pheasants, Ruffed Grouse, Sharp-tailed Grouse, Canada Spruce Grouse, prairie chickens, Gray Partridge, Bobwhite Quail, Wild Turkeys, coots, gallinules, Sora and Virginia Rails, Mourning Doves, Sandhill Cranes, American Woodcocks, and Common Snipe. Note that turkeys other than Wild Turkeys, quail other than Bobwhite Quail, and pheasants other than Ring-necked Pheasants are *not* considered game birds.

Farmers can avoid game farm licensing and reporting requirements by raising species or varieties that are not classed as game birds. If a farmer does want to raise and sell game birds, however, here are the requirements:

- Game birds must be purchased from a legal source, which is a licensed game farm.
- Farmers need a game farm license if they plan to raise game birds to sell, breed, or keep longer than one year. “Selling” includes sale of live birds, or sale of processed whole birds or any parts of the birds.
- Game farms need to keep the required records for “game birds.” The Minnesota DNR’s record keeping and reporting requirements are as follows:
 - Sales receipt requirement: For every sale or disposal of an animal, animal parts, or products, the game farm licensee must complete a sales receipt (as shown in example below), provided by the commissioner, containing the following information:
 - A. name, address, and game farm license number of licensee;
 - B. name and address of purchaser or person to whom sale or disposal is made;
 - C. species, number, and kinds of animals, parts, or products sold or disposed of; and
 - D. identification numbers, if the animals sold or disposed of are marked with numbered tags, bands, or tattoos.
 - Routing of sales receipts: The original sales receipt of a game farm animal must be mailed to the Division of Enforcement within 48 hours of completion of the transaction. A copy must be given to the purchaser at the time the transaction is made. A second copy must be retained by the licensee and be subject to inspection by the commissioner. A third copy must be submitted to the local conservation officer.

Individuals who do not have a game farm license can legally purchase game birds from a game farm,

so long as they do not then sell those birds or keep them for longer than a year. Some feed and farm supply stores sell poultry and game bird chicks. Those stores are themselves licensed as game farms and will require purchasers of game bird chicks to fill out a sales receipt and declare their intended use for the birds.

Further information about statutory requirements for game farms can be found in the Minnesota Statutes: [M.S. 97A.105 Game and Fur Farms](#) and [M.S. 97A.425 Record and Reporting Requirements for Dealers, Tanners, and Taxidermists](#).

Information in this text box was provided by Julia Tayson and Pat Watts of the Minnesota Department of Natural Resources.

GAME FARM SALES REPORT			STATE OF MINNESOTA DEPARTMENT OF NATURAL RESOURCES DIVISION OF ENFORCEMENT	
Seller: <u>L+m Supply</u>	Game Farm License Number		Tag Number	
Address: <u>1400 S Pokegama Ave</u>	<u>11271</u>	<u>159758</u>		
City <u>GR</u> State <u>MN</u> Zip <u>55744</u>	Game Farm License Number		(Date of Sale)	
Purchaser: _____	_____		Species of animals sold:	
Address: _____	_____		_____	
City _____ State _____ Zip _____	_____		_____	
Animals bought for: (Check One)	White Copy to DNR Enforcement Box 47, 500 LaFayette Rd., St.Paul, MN 55155		1) Live <input type="checkbox"/> No. _____	
Propagation <input type="checkbox"/> Resale <input type="checkbox"/>	Canary Copy: to Customer		2) Dressed <input type="checkbox"/> No. _____	
Consumption <input type="checkbox"/> Dog Training <input type="checkbox"/>	Pink Copy: to Seller		3) Eggs <input type="checkbox"/> No. _____	
* Release <input type="checkbox"/> Consult State Statutes before releasing any animal into the wild.	Gold Copy: to Local Conservation Officer			



Photo Credit: Wikipedia Commons

Feed: Through 2010, Cindy and Jeff fed all their poultry species an organic ration designed for chickens (Table 4). Their initial research and consultation with others indicated that with a full complement of minerals, flax oil, and other key ingredients, the same feed meant for chickens could work as well for turkeys and ducks. In 2009, they processed their Pekin ducks at 7 weeks and averaged 4 lbs per bird – the size people wanted, and suggesting that the feed worked well.

Starting in 2011, however, Cindy and Jeff switched to species-specific rations. They found that although a single type of feed simplified ordering and could meet their poultry’s nutritional needs, they saved money with species-specific rations because the birds’ needs were met more efficiently. Their ducks spent time in the orchard in 2011 and foraged more overall than in 2010, so they can’t directly compare the two years; but Cindy and Jeff cut duck feed costs by up to one-third in 2011, which they attributed in part to a switch to a “duck grower” ration. They also felt that using a turkey starter in 2011 helped improve turkey growth from what they saw in 2010 (see Table 10), as turkeys need more protein than chickens in the early stages of growth.

Jeff and Cindy use organic feed, though they don’t anticipate pursuing organic certification themselves. They would consider it if they sold more to wholesale outlets where customers didn’t know them. Currently, however, their emphasis is on direct sales through word of mouth (see [Marketing > Models > Direct Sales](#)), which involves frequent visits to the farm by customers who can see Jeff and Cindy’s practices firsthand.

The amount of feed that Jeff and Cindy use varies by species and stage of growth (Table 4). They fill feeders for broilers in the evening, which helps the birds produce body heat on cooler nights and prevents overheating on warm days. They add enough feed to ensure that some is left in the morning, then remove any uneaten feed during the day to encourage foraging on pasture (see also [On-Farm Research](#), below). Jeff and Cindy also feed layers enough so that it is finished each day, and they monitor feed amounts by manually checking keels (based on a [Body Condition Scoring System for Layer Hens](#)) to ensure hens are neither too skinny nor too fat (both of which would drive down egg production).

Educator’s Perspective: Resource Tip

Organic Certification

Cindy and Jeff use organic feed and like being able to communicate to others that they use sustainable practices, but they must follow certain rules about using the word “organic” on labels or in promotional materials due to strict regulations relating to organic certification. The following resources provide good baseline information on organic certification:

[What is Organic Farming?](#)

[Minnesota Guide to Organic Certification](#)

[MOSES Organic Certification Guidebook¹](#)

[Minnesota Department of Agriculture Organic Division](#)

[University of Minnesota Southwest Research and Outreach Center](#)

[eXtension](#)

[ATTRA Organic Farming](#)

¹MOSES also has a Farmer Transition hotline at 1-888-551-GROW (4769) for questions about soil building, weed and pest control, livestock, and certification paperwork.

Table 4. Poultry feed consumption in 2010¹

	Feed Type		
	certified organic chick starter ration, 21% crude protein content	certified organic chick grower ration, 19% crude protein content	certified organic layer ration, ² 17% crude protein content
Laying Hens (and males)	0.25 lb. per bird per week (2 weeks)	0.25 lb per bird per day	1.0 lb. per bird per week
Cornish Broilers	0.3 lb. per bird per week (2 weeks)	0.4 lb. per bird per day (5 weeks)	n/a
Red Broilers	0.3 lb. per bird per week (2 weeks)	0.4 lb. per bird per day (11 weeks)	n/a
Ducks	0.6 lb. per bird per week (2 weeks)	0.6 lb. per bird per day (5 weeks)	n/a
Turkeys	0.5 lb per bird per week (4 weeks)	0.5 lb. per bird per day (10 weeks)	n/a

¹See text under **Feed** for explanation of switch to species-specific rations in 2011.

²The calcium content in the layer ration provides for egg shells but can be damaging to younger birds, so a layer ration is used only after they start laying eggs.

Breeding: Cindy and Jeff acquired chicks from a variety of hatcheries. They anticipate continuing to order chicks of meat birds (which are hybrids) from hatcheries. They started raising their own layers in 2010 but anticipate ordering layer chicks periodically to avoid inbreeding. Cindy and Jeff experimented with breed crosses but generally stick to mating roosters with hens of their own breed.

Farmer's Perspective: On The Bookshelf

[A Guide to Better Hatching](#)

By Janet Stromberg

Cindy and Jeff like this small but useful guide to breeding and hatching your own chicks, published by Stromberg Hatchery of Pine River, Minnesota.



Spotlight on: Hatching Chicks

Cindy and Jeff's goal is to breed 50 hens every 6 months for year-round egg production. They isolate breeding birds from the rest of the flock by placing about 12 hens and a rooster in a separate, portable hen coop. They store fertilized eggs until they have enough to fill the incubator. Fertilized egg storage is done in egg cartons kept in a small, cool pantry that stays at about 48° to 50° F. They monitor the temperature in the pantry using a high-low recording thermometer. The cartons are put on a 45° slant and turned daily while in storage to prevent the air sac from getting "stuck." When enough fertilized eggs are collected, then the eggs go into the incubator and are brought up to incubation temperature to stimulate development.



The incubator cost around \$40. Although it is not meant for many years' use, Cindy and Jeff have used it for three incubations so far. They clean the internal parts, including a tray used for holding water for humidity control and the egg-turner, with bleach solution to control bacterial growth. The egg-turner rocks the eggs back and forth about every 5-10 minutes, and the target temperature is about 100°F.

When the chicks start to pip at about 21 days,¹ Cindy and Jeff take the egg-turner out and allow eggs to hatch and dry on a wire mesh. Over a 48-hour period, batches of chicks are then moved each morning and evening to a brooder in one of their outbuildings. Of the 36 eggs they incubated in fall 2010, 3 were unfertilized and 5 failed to hatch due to temperature, humidity, storage, or natural reasons. Some producers use more than one rooster to minimize the risk of infertility.

¹Cindy and Jeff followed recommendations in their hatching book on turning the eggs for the entire 21 days of incubation. However, Dr. Jacquie Jacob, small flock poultry specialist at the University of Kentucky, recommends turning the eggs for only the first 18 days.



Farmer's Perspective: Lessons Learned

Know Your Breeder

Jeff and Cindy have found that it's important to do your homework about hatcheries to find out where a given breed is actually hatched and, if possible, to learn how the genetics are managed. They prefer to buy chicks from hatcheries that rear their own birds or contract locally. Many hatcheries raise only one or two breeds themselves but offer other breeds through contracted breeders, which can be located far away. For example, hatcheries in Iowa and Minnesota often get stock from Texas or New Mexico. Birds from local hatcheries spend less time in transit and tend to arrive healthier. This approach also supports local or regional growers.

Layer Husbandry (Figure 4): Chicks of laying breeds spend 3-4 weeks in the brooder and are then kept in a 6' x 12' portable coop, which is moved semi-daily until the birds are about 4 months old. They are then integrated with the main flock in the hen coop, to which two hoop houses and two paddocks for rotational grazing are attached. Laying hens are generally processed and sold as stewing hens at 1½ years of age, after 6 months of growth followed by 1 year of laying. Males not kept as breeding roosters are typically processed at around 6 months of age.



Figure 4. Layer breeding and husbandry: chicks in brooder (top left); portable hen coop used for isolation breeding or birds in transition from brooder (top right); paddocks attached to hen coop (two middle photos); inside of hen coop (bottom left); hoop house attached to hen coop and under construction (bottom right).

Spotlight on: Layer Husbandry

Jeff and Cindy use the portable hen coop to hold young birds until they are ready for laying and integration with the main flock. The main flock is housed in a re-purposed, 24' x 26' garage. The hen coop includes steps and other perches, nest boxes, and isolation cages, where broody hens are kept for 4-5 days to break the cycle. There are three feeders, two founts that are heated in winter, and a grit/oyster shell feeder suspended from the ceiling. They have had one predation event, where a mink got into the coop and took seven hens.

The hen coop has a large door that Cindy and Jeff close in inclement weather or open to let the chickens forage around the homestead. They don't generally allow layers to roam fully, or the hens would start laying eggs outside of their nest boxes.



Mostly the chickens forage in two paddocks attached to the hen coop. The vegetation is thick and tall, which encourages them to wander and forage, though sometimes they lay eggs where they shouldn't! Jeff and Cindy try to rotate use of the paddocks so that one can recover while the other is in use. They plant greens in the attached hoop house in the fall so the chickens can get sunlight and forage during the winter. They also provide fresh kitchen scraps in the winter, offer "habitat enhancements" including apples on sticks, twigs of balsam fir, and even the retired Christmas tree! They may start sprouting rye and oats in five-gallon buckets as an additional cold-weather supplement.



Jeff and Cindy provide supplemental lighting to keep hens laying year-round. When natural day length tapers off in the fall, they start using artificial lighting to ensure a minimum of 14 hours of light per day. They increase light by a few minutes every couple of weeks until February, when natural day length is increasing noticeably again, and keep it at 14 hours per day. They use compact fluorescents because they only need light, not heat, from the bulbs.

The only heat provided in the uninsulated hen coop is that generated by the deep bedding system, which consists mostly of hay (round bales in winter) or grass (bagged lawn clippings in summer). They remove old bedding in the fall, leaving a few inches on top of the dirt floor to "prime the pump" of microbial activity, then add new bedding weekly through fall and winter. By spring the bedding is generally 18" to 24" deep. The compost-

ing process generates enough heat that Cindy and Jeff have seen it steaming in January! Manure from the chickens helps keep composting underway. The chickens also dig in the bedding for kitchen scraps, which helps to turn the compost over. Jeff and Cindy use a hand-held compost turner to aerate the pile almost daily, and they turn the bedding more thoroughly with a tined spade approximately twice a month to keep it fluffy and prevent "capping." They installed metal roofing around the interior base of the coop to prevent the garage's wooden walls from deteriorating.

Pastured Poultry Husbandry: Ducklings spend 2 weeks in the brooder, while broiler chicks stay for 3 weeks and turkey poults for 3-4 weeks. Ducklings grow to processing weight (about 7 weeks) in a 165'-perimeter paddock with shade. Broiler chicks and turkey poults grow in 8' x 10' Salatin-style pens that are moved daily. Pens contain 5-gallon galvanized water founts that are filled twice daily (morning and evening), and feed is provided using two 22-lb capacity hoppers per pen (see also [Feed](#), above, and [On-Farm Research](#), below).

Starting in 2011, ducklings and turkey poults also spent time in the new fenced orchard. Jeff and Cindy put the turkeys in the orchard for the last 5 weeks before processing, after the ducks were processed. The turkeys kept down the weeds and pests better than the ducks, which tended to cluster in one area of the orchard.

In 2010, Cornish Broilers were processed at 8 weeks, Red Broilers at 14 weeks, and turkeys at 14 weeks (see [Production > Harvest & Processing > Poultry](#) for “lessons learned” on timing of processing).



Farmer’s Perspective: On The Bookshelf

[Raising Poultry on Pasture: Ten Years of Success](#)

By Jody Padgham

This book is a compilation of articles published by the [American Pastured Poultry Producers Association](#). It has fourteen comprehensive chapters and covers a wide range of viewpoints and techniques. In general, Cindy and Jeff have found the APPPA to be a useful source for technical information. The organization publishes a simple monthly newsletter called “Grit!” Cindy and Jeff always seem to learn something new from it.

[Poultry Your Way: A Guide to Management Alternatives for the Upper Midwest](#)

This publication was a joint effort between MISA and the Minnesota Department of Agriculture (MDA). Free digital and print copies are available. It includes chapters on management, processing, marketing, and planning.

Educator’s Perspective: Resource Tip

Salatin-Style Pens

Farmer Joel Salatin of [Polyface Farms](#) popularized the “daily move pen” in his book, [Pastured Poultry Profits](#). ATTRA discussed these pens in an article called [Range Poultry Housing](#). Cindy and Jeff have made two modifications to the original design – increasing the height from 2’ to 2.5’ to accommodate turkeys, and adding PVC pipe to the bottom to facilitate sliding the pens across the pasture. With the PVC pipe in place, Cindy and Jeff don’t need to use a dolly on the back of the pen to move it, as described in most applications of Salatin’s pens.

Spotlight on: Pastured Poultry Husbandry

Jeff and Cindy spend about \$150 to construct each Salatin-style pen. They are “sold” on this design. They know colleagues that are turned off by the idea of moving the pens every day, but Jeff and Cindy find that it takes only a few extra minutes in addition to feeding and watering the birds. They purposely use construction materials that make the pens light enough for either of them to move by hand. They’ve found that after just a few times the birds get used to the idea of the pen shifting, and they move ahead in anticipation of new forage each day (even the Cornish Broilers, which don’t usually move much at all!).

Cindy and Jeff have found that the Salatin-style pens are effective at preventing predation and distributing the manure well with daily moves. The manure breaks down in about two weeks, and the grass that comes up afterward is bright and luscious. They know others swear by “day-range” systems (which consist of a paddock and a coop in which the birds get closed up for the night), but they feel this wouldn’t work well for Cornish Broilers, which tend to be sedentary and unmotivated to forage on pasture. Some people take a combined approach, where they move the day-range system every few weeks after a certain percentage of the vegetation is covered in manure. Cindy and Jeff use each 10’ x 10’ patch of pasture (i.e., the area covered by a Salatin pen) for only one day per year. They have enough pasture so that they don’t have to run chickens behind chickens, and they prefer that because it allows them to maximize pasture regrowth and minimize any potential parasite problems.

Jeff and Cindy could keep their ducks in Salatin-style pens as they do with chickens and turkeys, but so far have used a paddock system. One of the key differences between chickens or turkeys and ducks is the amount of water the ducks go through. Although the ducks don’t consume all the water, their tendency to splash around in it requires frequent changes. Jeff and Cindy provide about 15 gallons in the morning and 15 in the evening and say the ducks would happily take more! See the “Livestock Water Requirements” Resource Tip box for more information about water needs of poultry as well as other livestock.



Hogs

Jeff and Cindy raised three hogs in 2009 and five in 2010, though two of those were lost to vandalism in August. In 2010, they purchased the five hogs (crosses between two heritage breeds, Tamworth and Hereford) as 40-lb “feeders” in late April. They were interested in the Tamworth breed because it is known for being a better grazer and doing less rooting than other breeds. They accepted a Tamworth-Hereford cross because of the breeder they were working with; they also understood that Hereford crosses have slightly better growth rates than pure Tamworths. The hogs did well in 2009 and 2010, but in 2011 there was more Hereford in the cross than before, and the hogs rooted much more than Jeff and Cindy would’ve liked. They decided to start investigating other sources of feeder pigs and other breeds, such as Red Wattle or Large Black, known for doing more grazing and less rooting.

Cindy and Jeff use an organic swine starter ration (16% protein) until the hogs reach about 100 lbs, then use an organic swine finish ration (14% protein) (see [Production > Yields & Profitability >](#)

Hogs for amounts of feed). Hog diets are supplemented with apple pulp from Jeff and Cindy's cider press (see [Spotlight on: Cider Pressing](#)), buckets of apples during tree thinning, and other intermittent fruit and vegetable scraps and garden weeds.

Hogs are kept in a 165'-perimeter, portable paddock with electric fencing. As of 2010, the paddock contained a two-hopper, 300-lb capacity feeder (but see "Eating Like A Pig" Lessons Learned box under Production > Yields & Profitability > Hogs), an 80-gallon water tank with 2 founts, and a 6' x 14' Port-A-Hut shelter. (See the "Livestock Water Requirements" Resource Tip box for information about water needs of hogs.) The paddock is moved every 1-2 weeks across pasture (see [On-Farm Research](#), below). Jeff and Cindy anticipate keeping a maximum of eight hogs in this size of enclosure.



Educator's Perspective: Resource Tip

Heritage Breeds

To learn more about the pros and cons of different heritage breeds, visit the [American Livestock Breeds Conservancy](#), whose mission is to ensure the future of agriculture through genetic conservation and the promotion of endangered breeds of livestock and poultry. Over 180 breeds of livestock and poultry are addressed, including asses, cattle, goats, horses, sheep, pigs, rabbits, chickens, ducks, geese, and turkeys.

Farmer's Perspective: On The Bookshelf

[Dirt Hog: A Hands-on Guide to Raising Pigs Outdoors ... Naturally](#)

By Kelly Klober

This book, published by Acres USA, addresses raising hogs on pasture with sections including housing, fencing, breeding, herd maintenance, feed, and marketing.

[How to Raise Pigs](#)

By Philip Hasheider

This book, published by Voyageur Press, covers housing, feeding, and other aspects of care, plus breeding, showing, and marketing. It also includes a glossary, resources, and information about pork organizations, regulations, and ordinances.

On-Farm Research: Integration of Poultry and Hog Production

Cindy and Jeff received two 3-year grants from the MDA's [Sustainable Agriculture Demonstration Grant Program](#) and the USDA's [Sustainable Agriculture Research & Education](#) program to conduct on-farm research. This research allows them to tailor their production methods to site conditions while increasing general knowledge about animal-based pasture rejuvenation and the productivity of pastured poultry.

Background: When Jeff and Cindy started up their poultry operation using Salatin-style pens in an old pasture, they noticed that the paths along which the pens moved throughout the season were not only greener and more productive the following year, they also appeared to contain more desirable plants (such as clovers) than did the unaffected pasture only a few feet away. Recommendations for pasture rejuvenation in their region generally include raking or tilling of the field, addition of soil amendments (such as lime, phosphorus, potassium, or manure), and re-seeding, but they had not taken any of these steps. This led them to wonder if broilers could do the work of pasture restoration for them, while increasing the productivity of the broilers themselves through enhanced foraging opportunities in subsequent seasons. They also wondered about the potential for the hogs' rooting behavior and hog manure to help with pasture rejuvenation.

Project Design: Cindy and Jeff set up an experimental block in their pasture, an old hayfield (Figure 5). The experimental area contained strips along which the hog paddock and broiler pens were moved throughout the 2010 season (the first year of the 3-year study). Some strips experienced no hog or broiler grazing, thus acting as controls. Alternate plots were seeded with a 50:50 white and red clover mix or left unseeded. This design allows them to test the pasture rejuvenation potential of hogs and two different breeds of broilers alone and in combination. They can also test whether seeding is required to enhance foraging after the grazing treatments. They will measure pasture rejuvenation (by collecting plant samples to analyze for species composition and productivity; see Figure 10) and broiler productivity (by tracking amounts of feed used and bird weights at processing time).

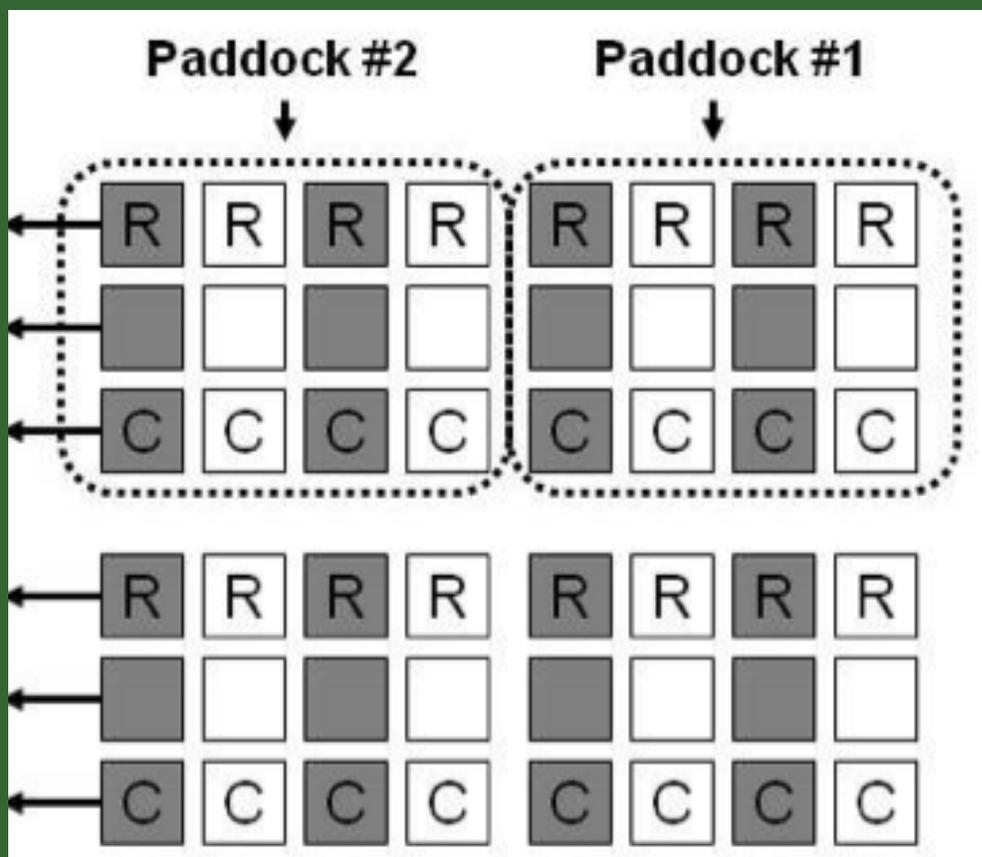


Figure 5. Hogs were placed on pasture in the northeast corner of the experimental field block on April 25, 2010, and moved westward every 7-15 days (based on the level of rooting and sod break-up that had been achieved). The area covered by the 30' x 40' hog paddock (dotted lines) eventually encompassed twelve broiler plots. Chickens were placed on pasture on June 28, using 8' x 10' Salatin-style pens (in one strip for combination with hog treatment and in another strip for the no-hog, control treatment) that were moved westward daily. "R" indicates pens containing 50 Red Broilers, "C" indicates pens containing 50 Cornish Broilers, and the blank boxes indicate the "no bird" controls. White boxes indicate seeded plots; gray boxes indicate non-seeded plots.

Preliminary Results: Because 2010 was the first of the 3-year study, Cindy and Jeff did not expect to find meaningful differences in feed consumption rates or processing weights. The first year's data will provide a baseline for measuring whether feed consumption rates and/or processing weights are affected by changes in the abundance or composition of pasture plants over time. They did observe differences in pasture appearance whether chickens had grazed in a strip or not; these differences were striking both on the ground and from the air (Figure 6). They also found that Cornish Broilers had much lower feed costs per bird than did Red Broilers, largely because it took 14 weeks to grow out the Red Broilers versus 8 weeks for the Cornish. Overall, the feed cost per finished pound of bird was \$0.94-\$0.97 for Cornish and \$1.60-\$2.23 for Red Broilers. Although Red Broilers forage better on pasture, it was not enough to reduce feed costs compared to the Cornish (though in 2011 they'll be trying a different variety of Red Broiler; see *Production > Harvest & Processing > Poultry*). There was no significant difference in feed costs for a given breed whether they grazed behind the hogs or grazed alone, but Cindy and Jeff hope that with increased pasture quality they will see better growth at a lower feed cost for Red Broilers. Cindy and Jeff recognize that Red Broilers may always be more expensive to raise than Cornish crosses because of different growth rates and that typically the key to profitability is to get a higher price for Red Broilers. They would, however, like to figure out the most economical way to raise Red Broilers, because their customers have been pleased with their flavor.

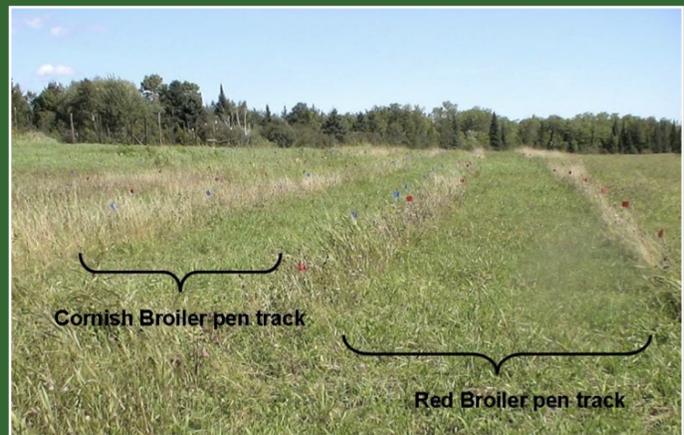


Figure 6. Top: The strip on the right (large bracket) is the path followed by the Red Broiler pen; the strip on the left (small bracket) is the path followed by the Cornish Broiler pen. The narrow margin between the strips and the area to the far left in the picture show areas ungrazed by the chickens. Middle: An aerial photo taken in 2009 (before the start of the study) shows no visible difference between the study area and its surroundings. Bottom: In an aerial photo taken in 2010 (after one year of study), the difference in vegetation in the area devoted to hog and chicken pasture is clear.

Farmer's Perspective: On The Bookshelf

In managing paddock and pasture vegetation for poultry and hog grazing, Jeff and Cindy have found these two publications to be useful:

[Invasive Plants of the Upper Midwest: An Illustrated Guide to Their Identification and Control](#)

By Elizabeth Czarapata, published by University of Wisconsin Press

[Identifying Pasture Grasses](#)

By Dan Undersander, Michael Casler, and Dennis Cosgrove, available free in digital form from University of Wisconsin Extension

Apples & Other Fruits

Species: Cindy and Jeff focus on apples and other tree fruits, but they grow some small fruits as well. Their fruit inventory in 2010, involving about 120 plants, included apples, cherries, pears, and plums, plus currants and juneberries. Eight apples trees were already on the farm in 1996. Cindy and Jeff planted small numbers of fruit trees or bushes during most years from 1999 to 2009, then did a large planting in 2010. The large planting involved 45 new or transplanted apple trees in a newly established, fenced orchard, plus 17 other trees or bushes planted elsewhere around the farm.



The fruit tree operation has its own calendar, different though generally compatible with poultry and hog production. Outside of fall harvest, and once trees are established, the season starts in February with winter pruning, which keeps trees productive and in good condition. During spring and summer, Jeff and Cindy monitor blooms, fruit set and development, and pests.

Farmer's Perspective: On The Bookshelf

[The Apple Grower: A Guide for the Organic Orchardist](#)

By Michael Phillips

Jeff and Cindy rate this book, published by Chelsea Green, very highly. It explores topics such as the use and limitations of kaolin clay, techniques of understory management, and making small orchards viable through heritage and regional varieties, value-added products, and the "community orchard" model.

[Ecological Fruit Production in the North](#)

By Bart and Jean Richard Hall-Beyer

Cindy and Jeff had to write to the authors directly to get this book, but they have found it an excellent resource and well worth the effort (RR#3, Scotstown, Quebec J0B 3J0).

Educator's Perspective: Resource Tip

Tree Fruit Production, Management, and Marketing

The [Midwest Organic Tree Fruit Growers Network](#) offers informational materials for organic tree fruit production and marketing. Topic areas include general information on orchard planning, risk management, crop insurance, organic certification, soil health, grafting, pest management, and pollination. There are also specific resources for apples, pears, and stone fruits. The network, sponsored by [MOSES](#), also produces a newsletter called [Just Picked](#), maintains a Listserv, organizes events, shares research information, and collaborates with the [Organic Tree Fruit Association](#).

The [Fruit Resources](#) page at Cornell University addresses tree fruits, grapes, and berries, with additional links to minor fruits and related topics. The [Tree Fruit](#) page covers a similar range of topics as the Midwest Organic Tree Fruit Growers Network but includes perspectives outside of the Midwest and for conventional production. There is also information on food safety, post-harvest, business management, and labor.

Cornell University also offers well-done [Organic Production Guides](#) for a variety of fruits and vegetables. As of 2011, guides were available for apples, blueberries, strawberries, and grapes. The thorough [A Grower's Guide to Organic Apples](#) has chapters on organic certification, site selection and orchard design, rootstock and cultivar selection, soil fertility and crop nutrient management, groundcover and weed management, pesticides, insecticides, IPM, pests and diseases, wildlife damage management, harvest and postharvest handling, and production and marketing costs.

Penn State updated their useful [Tree Fruit Production Guide](#) in 2010-2011. [Part I](#) contains cultural information, including orchard establishment, orchard floor and weed management, plant nutrition, growth regulators, and frost protection. Other parts of the guide address chemical management, IPM spray programs, harvest and postharvest handling, cider production, and production budgets.

Varieties: Table 5a shows the varieties of each type of tree fruit in their 2010 inventory, and Table 5b shows small fruits. Some apple varieties are unknown because the trees preceded Jeff and Cindy's time on the farm; other varieties are unknown because they are antique or heritage varieties or because of inadequate record keeping early on (an important lesson learned!). Cindy and Jeff have one or two trees or bushes per variety for most of their varieties, up to 5 or 6 plants per variety as of 2010. They have chosen to grow a number of apple varieties because of a personal interest in heritage apples and because mixes of varieties give more flavor to cider and other value-added products they want to offer (see [Production > Harvest & Processing > Apples & Other Fruits](#)).

Initially Jeff and Cindy obtained most of their fruit trees and bushes from a variety of nurseries and the [Duluth Community Garden Program](#). Recently they have been developing their own trees by grafting desirable fruit varieties (from scion exchanges through [MOSES](#) and the [Sustainable Farming Association of Minnesota](#) (SFA)) onto a range of cold-hardy rootstocks (see [Table 6](#)).

Educator's Perspective: Resource Tip

Winter Hardy Fruits

The University of Minnesota Extension fact sheet [Fruits for Minnesota](#) provides recommendations for cultivars suitable for growing in the state's four regions. There are tables for apples (early, mid, and late season), pears, apricots, plums (European and hybrid), cherries (plum, tart, and Nanking), raspberries (summer- and fall-bearing), strawberries (June- and ever-bearing), blueberries, grapes (table, juice, and jelly, plus seeded vs. seedless), mulberries, juneberries, elderberries, gooseberries, and currants (red and black). There is also an explanation of which fruits need multiple cultivars for fruit set.

Table 5a. Varieties of tree fruits in 2010¹

Apples²	Cherries
UMN #1628 (unnamed variety)	Evan's Bali
Ashton Bitter	Nanking
Clover Valley Antique ³	Native Pin
Beacon	Native other
Belle de Boskop	
Blue Moon	Pears
Esopus Spitzenburg	Bosc
Famuse Snow	Magness
Fireside	Nova
Goodland	Shinseiki (Asian)
Heritage Crabs ³	Staceyville
Honeygold	Stinett Heritage ³
Kingstone Black	Summercrisp
Liberty	Ure
Minjon	
Newton Pippin	Plums
Norland Red	Black Ice
NW Greening	Compass
Red Baron	Toka
Red Free	Waneta
Snowsweet	
WestField Seek-No-Further	
Wolf River	
Wolly Polly	
Woody's Russett	
Yellow Transparent	
Zestar!	

¹Some varieties in this table are not known to be hardy in areas north of Duluth.

²Detailed information about some of these varieties can be found via links at the Web site for the [Heritage Orchard](#) at University of Minnesota Duluth.

³Cindy and Jeff have been unable to identify some varieties and have named and described them themselves for record keeping purposes. The Clover Valley Antique, for example, produces mid- to late-season very nice, firm, red fruits that have white flesh and are great for drying, baking, and cidering.

Table 5b. Varieties of small fruits in 2010

Currants	Juneberries (Saskatoon Berries)
Black Russian	Regent
Primus (white)	Native Juneberry (<i>Amelanchier</i> spp.)
Red Lake	

Educator's Perspective: Resource Tip

Juneberries (aka Saskatoons) and Honeyberries

Although juneberries grow wild in Minnesota and have been picked and used in homemade jams and similar products for generations, they are just starting to make a name for themselves as a fruit crop in the state and elsewhere. The species used in commercial production is *Amelanchier alnifolia*. Two Minnesota farmers began evaluating the commercial potential of juneberries in 2005 and summarized their findings in the MDA's Greenbook 2008 with an article entitled [Developing a Saskatoon Berry Market in the Upper Midwest](#). A similar effort is underway in the northeastern U.S.; see [Small-scale Commercial Juneberry Establishment and Marketing](#) from the Cornell Cooperative Extension of Ontario County, New York.

Honeyberries are another up-and-coming small fruit. Also called haskap in Canada, or edible blue honeysuckle (*Lonicera caerulea*), they originate from Siberia, China, and Japan. The fruits are cold-hardy, ripen earlier than strawberries, and look like oblong blueberries. They have a unique taste, sometimes compared to blueberries but also with hints of raspberries, currants, and other fruits. Much of the breeding of honeyberry varieties in North America has occurred at the [University of Saskatchewan Fruit Program](#). Some of these varieties were planted in 2011 for testing at northern Minnesota's [North Central Research and Outreach Center](#).

Propagation: Jeff and Cindy use a variety of cold-hardy rootstocks (Table 6). They are testing the strengths and weaknesses of each rootstock for their site and soils by matching different rootstocks to different fruit varieties. A strongly dwarfing rootstock such as "Bud9," for example, keeps the tree small and allows for higher density plantings and earlier fruiting at 2-3 years. These dwarf trees need to be trellised because of a weak root system that is not self-supporting. Although dwarf trees may have fewer fruits per tree (about 2 bushels' worth), the planting density and earlier yield can result in overall higher yield per acre. Other rootstocks, such as "Antonovka," are self-supporting, result in larger trees, and produce larger crops, but take longer to start producing – generally 5-7 years. Aside from cold-hardiness and disease resistance, Jeff and Cindy are considering which combinations work best for their objectives.

Jeff and Cindy have found that high-density plantings on dwarfing stock are often preferred among growers who focus strictly on fruit production, but they feel large, self-supporting trees may be a better choice for grazing poultry through their orchard as an integrated pest management strategy (see [Integrated Pest Management](#), below).

Educator's Perspective: Resource Tip

Currants & Gooseberries

The University of Minnesota Extension fact sheet [Currants and Gooseberries in the Home Garden](#) describes research, cultivars, site selection, planting, pruning, harvesting, diseases, and insects for these two related fruits. Although the fact sheet is geared toward the home gardener, much of the information is relevant to commercial production. The fact sheet includes an explanation of white pine blister rust, a fungus that affects white pine trees and uses currant and gooseberry bushes as alternate hosts, and how this fungus has impacted currant and gooseberry production in the U.S.

Table 6. Rootstocks in use as of 2010

Apples	Cherries & Plums	Pears
Antonovka B118 Bud9 Fedco Apple M7 M111 unknown or volunteer	Antonovic Cherry Krymsk-5 Cherry Native (<i>Prunus</i> spp.) unknown	Fedco Pear Old Home unknown

Orchard Establishment: Cindy and Jeff have their fruit trees and bushes distributed among various areas on the farm. These areas are described below and shown on the farm’s aerial photo (see Figure 1). Appendix III has more detailed maps of fruit tree and shrub locations.

- The “Homestead Orchard” is located south of the hen coop. It contains heritage apple trees that were already growing on the farm in 1996, plus new apple, pear, and plum trees planted between 1999 and 2009. The site is adjacent to woods on the north but open on the other sides for full sun and good air circulation.
- The “Backyard Orchard,” to the north of the house, contains heritage crab apple trees and a combination of native and cultivated varieties of plum and cherry trees planted between 2001 and 2008. This is a relatively low area, in which some species have done well and others have not.
- From 2005 to 2007, Cindy and Jeff planted pear and apple trees in the “Old-New Orchard” located along Homestead Road. Many of the trees died due to inadequate drainage, and others were moved to the new Fenced Orchard in 2010. Two pears and an apple tree, individually fenced for protection against deer, remain in this area. Cindy and Jeff may use the area again in the future, by improving site preparation and drainage.
- Jeff and Cindy established the “Fenced Orchard,” in the south-central portion of the property, in 2010. The orchard is a mix of pear and apple trees. They transplanted 6 trees from the Old-New Orchard, and the remaining 39 trees were planted as grafted whips. They prepared the site in 2009 by grazing hogs in the area, which “tilled” the soil and added nutrients. In spring 2010, they tilled strips where the trees were to be planted and added more compost. By 2011, mowing between rows had led to a nice thatch, which they expect to help with weed control and addition of nutrients through slow decomposition of organic matter. Jeff and Cindy fenced the orchard with fence posts made from trees (mostly aspen and balsam) harvested from their own and a neighbor’s property. With the help of a couple



of friends, they installed all the posts in a day (after water-sealing them and using a 5' concrete base for each). They then used inexpensive, easy-to-install plastic fencing to achieve an enclosure good enough to keep poultry in and deer out, at a cost of less than a thousand dollars in equipment rental and supplies. Later, they added an outer layer of chicken wire to the bottom of the plastic fencing to protect it from hares and rabbits, which chewed through the plastic. The chicken wire doesn't keep out the hares and rabbits, but it keeps the plastic fencing functional enough to keep out the deer.

- Cindy and Jeff established the "Currant and Nursery Beds" in 2010. The beds, located southwest of the house, contain all their currant bushes, blueberry plants (for personal use), two cherry trees, and a plum tree. They plan to convert part of this area to nursery beds for their orchards; other nursery beds are currently located within their personal garden to the southeast of the greenhouse.

Farmer's Perspective: On The Bookshelf

[Fences for Pasture & Garden](#)

By Gail Damerow

Published by Storey Publishing, this book is a guide to selecting, planning, and building fences intended to keep livestock in or wildlife predators out. It covers various types of fencing, provides illustrations, and addresses related topics such as alarm systems and zoning laws.

Farmer's Perspective: Lessons Learned

Orchard Establishment

Cindy and Jeff lost some information on early fruit plantings by not noting which varieties were planted where, a situation they have rectified with improved record keeping and the use of tree tags. They have also learned important lessons about preparing sites for plantings, especially considering they have to deal with poorly drained soils on their site. So far they feel that the combination of grazing hogs through an orchard site in the year preceding a planting, plus their own tilling efforts and soil amendments, has produced good results and will help them revitalize other planting sites in the future.



Spotlight on: Outreach

Orchard Establishment

Cindy has been working to restore abandoned trees with neighbors who have heritage orchards and at a historic seedling trial orchard at the old University of Minnesota Duluth agricultural field station, part of the newly formed [Sustainable Agriculture Project](#). It has been a great opportunity for her to learn the skills of orchard restoration and about heritage fruits in the region. These projects dovetail with her personal interests and were instrumental in giving her the courage to try planting her own orchard using her own trees! She has begun offering a course to help others in the region learn the skills she has found so valuable on the farm.



Integrated Pest Management: Jeff and Cindy use integrated pest management (IPM) to manage pests in their fruit operation. As mentioned earlier, their farm's location puts them out of range for two of the most destructive pests that plague other Minnesota growers: the plum curculio, a weevil that pierces and damages the fruit, causing it to be misshapen; and the codling moth, whose larvae burrow inside and eat their way out, leaving a hollow rotten core to the fruit. Both pests render the fruit unmarketable.

Cindy and Jeff helped to demonstrate that they were out of range of these pests by participating in the MDA's IPM Program. They do weekly monitoring of pest traps (Figure 7a) during the growing season and report to the MDA. Clover Valley Farms is one of two monitoring sites in St. Louis County.

Educator's Perspective: Resource Tip

Integrated Pest Management

According to the [Minnesota Department of Agriculture's IPM Program](#), the goal of IPM is to mitigate pest damage while protecting human health, the environment, and economic viability. IPM is a stepwise approach involving proactive planning, setting thresholds for management actions, conducting ongoing monitoring for pests, properly identifying pests, implementing control actions, and evaluating effectiveness. Actions may include biological control (releasing or promoting beneficial organisms), cultural control (such as mowing, trapping, or destruction of pest habitat), chemical control (such as insect pheromones), and genetic control (use of resistant varieties).

The primary pest for which Jeff and Cindy have needed to take action is the apple maggot, a mid-to late-summer fly that lays its eggs in the developing fruit. They use a combination of trapping (Figure 7b) and spraying with kaolin clay. Kaolin clay is a naturally occurring mineral that forms a white film that suppresses pests. The film can be removed by washing before eating the fruit.



Figure 7a (left): MDA IPM trap; Figure 7b (right): apple maggot trap.

They have been able to control apple scab, a fungal disease that can damage both fruit and leaves, using orchard management techniques. The fungus overwinters in leaves and wood, so by removing pruned and fallen branches, mowing, and allowing poultry to forage in the orchard, they can break the fungal life cycle. They also keep a close watch on their Honeygold apples, the “canary in the coal mine” for apple scab; it shows signs of the disease before other varieties.

Farmer's Perspective: Lessons Learned

Program Participation

Cindy feels that participation in programs like the MDA's IPM program is important for beginners. Even with her scientific background, she confesses that she would be likely to let weekly orchard monitoring slip if she hadn't committed to the program. They now have two years of useful data from monitoring their own orchard, plus a neighbor's orchard and the orchard at the University of Minnesota Duluth.

Cindy also feels that the process of writing proposals for, and carrying out, on-farm research has been very valuable to them. It has given them access to helpful contacts and forced them to think through questions and issues on the farm that they might not otherwise address. She encourages other beginners to explore similar opportunities, even without previous grant writing experience.

Greenhouse

Cindy and Jeff grow a wide variety of annual and perennial flowers and vegetables in their greenhouse (Table 7). Although the greenhouse looks small at first glance, careful rotation planning allows them to have diverse products throughout the year.

Table 7. Greenhouse inventory (2010)

Herbs grown for sale	Vegetables and herbs grown for personal consumption	Flowers grown for personal use
garlic herb fennel lavender oregano rosemary sage thyme	beets (incl. greens) broccoli cabbage carrots cilantro garlic greens (arugula, Asian greens, collards, mustard, spinach, Swiss chard) peas sweet & hot peppers turnips (incl. greens) wax beans	<i>Amaryllis</i> <i>Anemone</i> Aztec lily Calla lily crocus daffodil hen & chicks hyacinth <i>Ipheion</i> iris <i>Nasturtium</i> pansy paper white parlor maple petunia rain lily snow drop stock sweet pea

It has taken several years of trial and error to determine which plants work best and when to grow them in this particular setting. Table 8 shows Jeff and Cindy’s greenhouse crop rotations. The bulbs flower in February; the annual flowers are generally started in flats and then inter-planted with other crops in late winter/early spring and/or in the fall.

Table 8. Greenhouse crop rotations

Rotation name (planting time)	Representative plants	Keys to success
Winter (August)	cole crops (e.g., cabbage, broccoli) root crops (e.g., beets, carrots, turnips) peas & beans (late crop) greens	These crops can tolerate low air temperatures. Planting them in August gives them time to grow to maturity before light levels get low. They then spend the winter holding their own, acting as a “living root cellar” until harvest.
Summer (May)	annual herbs (e.g., basil) melons peas & beans (early crop) peppers squash tomatoes	Raising these heat-loving crops in the greenhouse provides a “jump-start” on the outdoor garden, though some are kept inside and can tolerate the higher temperatures of the summer greenhouse.



Harvest & Processing

Poultry

In 2010, Jeff and Cindy purchased a mobile poultry processing unit. Prior to that, they rented the “chicken bus” from SFA’s [Lake Superior Chapter](#). They have not had birds processed at off-farm facilities due to distance and cost (see [Marketing > Models > Direct Sales](#)). While access to a rented mobile unit was helpful during their first years of poultry operation, they found its availability became limiting as their operation expanded. With their own unit, for example, they could plan early-season processing of ducks and late-season processing of turkeys. Their customers had been asking them to produce turkeys for years, but they were unable to do so until they had their own equipment. The capital cost was high at around \$14,000, but they mounted the equipment on a trailer and are making plans to rent out the equipment, thereby creating another revenue stream for their farm.



Spotlight on: Outreach

Jeff and Cindy would like their mobile poultry processing unit to become a community resource. They are working on a rental protocol and accompanying manual. In 2010, they lent the unit to two other farmers as a way of learning what issues arise when others use the equipment. Renters would be required to spend at least one day processing with Jeff and Cindy before being allowed to rent the unit.



Now with their own processing equipment, plus the knowledge gained from several years of production, they can plan out a staggered schedule for the growing season that maximizes efficiency. Ducks, for example, can be put out on pasture as early as April; with only 7 weeks’ growth until processing, Cindy and Jeff can be mostly finished with duck production before broiler production ramps up. Besides spreading out the labor involved in processing, this staggered approach allows them to cycle different species through the brooder at different times. This keeps equipment needs to a minimum and distributes husbandry tasks throughout the season. Cindy and Jeff kept their 2010 schedule similar to previous years while they adjusted to having their own mobile processing unit, but then planned to solidify a duck/early broiler/late broiler/turkey rotation through their production and processing regime.

Educator's Perspective: Resource Tip

Feed Withdrawal

Feed withdrawal is an important issue in poultry processing, as it reduces the amount of food in the birds' digestive tracts and thus the potential for carcass contamination if the digestive tract is torn during processing. Withdrawal times can vary based on several factors, and producers need to find the right balance for their situation. The key is to empty the digestive tract without sacrificing live weights or carcass yields.

[Optimizing Feed Withdrawal Programs](#) is an extension bulletin, written by Kristi Thompson and Todd Applegate and published by Purdue University.

[Feed Withdrawal: A Practical Look at Its Effect on Intestinal Emptying, Contamination, and Yield](#) is an article written by Stan Savage, a University of Georgia Extension Specialist and made available at the Manitoba Agriculture, Food, and Rural Initiatives Web site.

[A Picture Guide of Chicken Feed Withdrawal](#), by Carlyle Bennett, is another article from the Manitoba Agriculture, Food, and Rural Initiatives Web site.

Jeff and Cindy have learned that, like so many aspects of farming, many of the choices they need to make come down to personal preference. The SFA mobile unit was equipped with killing "cones," while the unit they purchased has a killing "cabinet" (Figure 8). They haven't seen a significant difference in wing breakage between the two types of equipment. Cornish Broilers are especially prone to wing breakage, and Jeff and Cindy have worked to minimize that problem in other ways. To minimize wing breakage during processing, they explored the use of large rubber bands (like broccoli bands) to keep the birds' wings close to their bodies. They also explored the use of rubber highway cones, which are softer and have more "give" than steel cones. Neither of those options worked well for them. By looking further, they found that most wing breakage was occurring when the birds were being collected from the pens, and more careful handling has greatly reduced the incidence. Some wing breakage does still occur during processing; Jeff and Cindy have found that having two people at the killing station (one to kill and one to hold birds until they stop flapping) is the best solution. They do still prefer the killing cabinet over the killing cones, because it involves fewer steps in moving birds to the scalding and thus saves time. They also feel it contains blood better and facilitates clean-up.



Figure 8. Left: A "killing cabinet" is part of Jeff and Cindy's mobile processing unit. It is simply a metallic box-like structure with a floor, ceiling, and walls but open on both ends. Birds are hung by their feet on shackles that initially hang inside the cabinet at one end. Hanging them upside down has a calming effect, allowing the processor to slit their throats quickly and accurately. Jeff and Cindy do not use gas stunning. The birds bleed out inside the cabinet. The shackles hang on an angled rack, so that any movement by the birds causes them to slide down the rack to the other end of the cabinet. The floor is V-shaped, funneling blood into a bucket at the other end, where the heads are removed before scalding. Right: The shackles from the killing cabinet also fit the scalding, allowing quick and easy transfer of the birds to the next step in processing.

Cindy and Jeff have also found there are important differences among species in terms of processing. It seems every year they tweak something about their production plans based on what they learn during processing. Some differences are obvious. For instance, you can fit fewer turkeys into the plucker than chickens, affecting overall processing time. Other lessons are more iterative. In 2009, for example, they processed Red Broilers, for which they have always raised both males and females, at 11 weeks. They ended up with a lot of 2-lb birds, whereas most customers prefer birds around 4½ lbs. In 2010, they let Red Broilers grow until 14 weeks, and then saw a lot of aggression between males starting around 12 weeks. The 2010 observations made them ponder raising only male Red Broilers, because they grow larger than females, and going back to processing them at 11 weeks, to achieve the goal of a more consistent-sized bird with limited intra-flock aggression. At the same time, they learned of another breed, the Red Ranger, which another farmer's study showed to have a better growth rate while maintaining good foraging behavior on pasture. In 2011, then, they took a combined approach, substituting Red Broilers with Red Rangers (see [Figure 10](#)) and raising males only. They also modified their idea of raising birds to a specific number of weeks. Instead, they selected birds to process by live weight, letting one batch go an extra week, and they ended up with more consistent finished weights (around 4 lbs).

Besides all the lessons learned about broilers, they have learned that when it comes to processing, ducks are a whole other story. Their pin feathers can be difficult and time-consuming to remove, requiring a LOT of extra soap in the scald and excessive plucking time if the birds are processed past 7 weeks.

Educator's Perspective: Resource Tip

Poultry Processing

The [Niche Meat Processor Assistance Network](#) (NMPAN) is a national network of people and organizations (university extension, government agencies, and non-profit groups) creating and supporting appropriate-scale meat processing infrastructure for niche meat markets. Small and mid-sized plants can lack capacity, equipment, appropriate inspection status, and the human and financial capital to upgrade or expand. NMPAN assists processors, producers, buyers, regulators, and others by coordinating, distributing, and developing information and resources to improve access to processing infrastructure and the long-term stability of niche meat markets.

[Small-scale Poultry Processing](#), by Anne Fanatico and published by ATTRA, covers small-scale processing, both on-farm and in small plants. This publication covers each step of poultry processing and offers examples of mobile processing units for the growing number of small producers who are raising poultry outdoors on pasture, processing the birds on-farm or in regional processing facilities, and selling the meat directly to customers at the farm or at a farmers' market.

A university extension bulletin, entitled [Processing Chickens](#), provides a step-by-step photographic guide to the safe handling and processing of chickens. It was written by Tony Pescatore, Steve Skelton, and Jacquie Jacob and published by the University of Kentucky College of Agriculture.

Farmer's Perspective: Lessons Learned

The Duck Stops Here

As of 2011, Jeff and Cindy decided to stop producing ducks. Although they may continue to raise ducks for themselves and friends, they don't plan to continue market production in the foreseeable future. After three years of trying, they feel the time required for processing and the appearance of the birds after processing makes the effort not worthwhile. They can process 120 chickens in the time it takes them to process about 30 ducks.

They have a group of customers who really want ducks and are willing to pay the premium price. Jeff and Cindy charged \$5.50/lb in 2011, to reflect processing time, the cost of organic feed, and the effort of producing ducks on pasture. Even so, they don't feel good about charging this price when the carcass skin is torn from pulling out pin feathers. Jeff and Cindy believe there is a reason many small, diversified poultry producers don't raise ducks and that duck processing is better suited to a specialized facility.

The use of on-farm processing by Cindy and Jeff relates to their focus on direct sales. Therefore the relevant poultry processing and regulatory details are provided under [Marketing > Models > Direct Sales](#).

Hogs

In 2010, Cindy and Jeff's hogs were sent to a custom processor on October 8. Because the processing regulations relate to Cindy and Jeff's use of direct sales, regulatory details are provided under [Marketing > Models > Direct Sales](#).

Apples & Other Fruits

Apple harvest begins in the fall and can span the two months from August through September because of the number of varieties Jeff and Cindy have. They sell marketable (aesthetically pleasing) apples through the fall at the co-op and start using unmarketable fruits to press cider and preserve products for family use in October. Jeff and Cindy are developing value-added products such as jams, sauces, cider, and culinary vinegars for sale. While their own apple production is still ramping up, they're working with friends and neighbors to glean apples, pears, and plums from other trees in the area. This allows Jeff and Cindy to sell more of their own production while still having enough fruit for personal use and for finishing poultry and hogs in the fall.

Spotlight on: Outreach

Community Fruit Gleaning

Jeff and Cindy's gleaning efforts inspired them to explore how they can integrate tree fruit gleaning into their operation as a way of helping provide jobs, training, and access to nutritious local foods for low-income members of the Duluth community (see [Farm Business > Professional Development](#)).

Federal law offers liability protection to farmers who donate produce from their farms to food shelves. Called the "[Bill Emerson Good Samaritan Act](#)," provisions of this legislation protect farmers against liability both for the products donated and for volunteer gleaners that come onto their property to harvest surplus produce. This legal protection depends on the farmer acting in good faith and does not apply in cases of negligence or willful misconduct on the part of the farmer.

University of Maine Extension offers a publication called [Gleaning Program Guidelines](#), which describes how to organize and carry out a gleaning operation using volunteer labor.



Currants start producing in mid-summer. As Cindy and Jeff's hedgerows expand, they plan to start limited sales, either direct to customers or wholesale to the local food cooperative. As with apples, Cindy and Jeff are exploring value-added products based on their small fruits. Currants, for ex-

ample, don't travel and pack well. Although the market for fresh currants seems to be opening up, Cindy and Jeff feel their currants are better suited for dehydrating and contributing to other products such as pancake mixes, mueslix, and culinary vinegars.

Spotlight on: Cider Pressing

Cindy and Jeff started out with a small wooden "backyard" cider press, which is built for about 30 gallons per year. They pushed it to its limits in 2009, using it to produce 110 gallons of cider that year. With increasing production, they got motivated to improve their pressing capabilities. They found few options between small backyard presses and large, unaffordable commercial presses, so they designed their own metal hydraulic press. This press allows them to press more apples at one time and also to get more cider out of the apples: about 5 gallons per 100 lbs, versus 4 gallons with the backyard press. They like its simple design, using a small off-the-shelf hydraulic pump. As with the absence of tractors on the farm, Cindy notes that this press illustrates their focus on avoiding mechanization and working toward a goal of providing food for themselves and the local community but not growing larger than that. They also like that cider pressing can be a community event itself, with friends and neighbors joining in the effort to get their own apples pressed and to create tasty combinations of cider using different varieties.



Yields & Profitability

Poultry

Cindy and Jeff sold 608 dozen eggs at \$3.00 per dozen in 2010, for gross egg sales of \$1,824.00. Because they process retired laying hens and males for meat, they calculate profitability of their laying enterprise based on both egg sales and meat sales. The calculations are complicated by the fact that hens live more than one year, so costs and sales are carried across years. Cindy and Jeff are still working out their methods for breeding and raising their own chicks and their approach to flock rotations so that they'll have more consistent laying and egg sales throughout the year. Table 9 shows that they experienced a net income of \$660.11 from their laying enterprise in 2010. This was the first year they showed a profit, though importantly, *they have not yet started accounting for labor costs in their profit calculations.*

Table 9. Laying hen processing income, egg sales, and costs in 2010

	Breed/Sex				
	Ameraucana Hens		Buff Orpington		Barred Plymouth Rock
	Old	New	Hens	Males	Hens
Cost per Bird¹	n/a ²	n/a ²	n/a ²	\$1.53	\$2.17
Chick Ration Cost³	\$0.00	\$7.38	\$0.00	\$1.47	\$14.75
Layer Ration Cost³	\$233.64	\$212.40	\$371.70	\$35.40	\$531.00
# Birds Sold¹	15	0	25	4	0
Sale Price (per lb)	\$2.50	n/a	\$2.50	\$2.50	n/a
Average Processed Weight (lbs)	3.0	n/a	3.4	3.5	n/a
Meat Sales Income	\$112.50	\$0.00	\$212.50	\$35.00	\$0.00
Total Costs⁴	\$233.64	\$219.78	\$371.70	\$44.52	\$654.25
			Egg Sales Income:		\$1,824.00
			Meat Sales Income:		\$360.00
			Total Income:		\$2,184.00
			Total Costs:		\$1,523.89
			Net Income:		\$660.11

¹Number of birds raised is shown in Table 2. Number of birds sold is generally lower than the number raised because of some mortality, because some stewing hens and males are kept for their own use, and because some males are kept as roosters for breeding.

²No cost for chick purchase because these chicks were hatched on the farm.

³Average cost of both rations was \$14.75 per 50 lbs in 2010. Ration sizes are given in Table 4. See "Customer Communications" Lessons Learned box about feed costs under Marketing > Models.

⁴Total costs include chick purchases and feed but **not** labor.

As discussed under [Assessing & Planning > Business Planning](#), 2010 was Jeff and Cindy’s fourth year selling broilers, their second year selling ducks, and their first year selling turkeys. Table 10 shows that they experienced a net income of \$1,433.67 from their meat poultry enterprise in 2010. They expect profitability to continue, though again, *it is important to note they have not started accounting for labor costs.*

Table 10. Meat poultry income and costs in 2010

	Species or Breed			
	Cornish Broilers	Red Broilers	Ducks	Turkeys
Cost per Bird¹	\$1.13	\$1.65	\$3.94	\$6.71
Chick Starter Ration Cost²	\$29.50	\$29.50	\$17.70	\$14.75
Chick Grower Ration Cost²	\$619.50	\$1,371.75	\$309.75	\$206.50
# Birds Processed¹	150	163	46	17
Sale Price (per lb)	\$3.00	\$3.00	\$4.25	\$2.50 ³
Average Processed Weight (lbs)	4.2	4.1	3.5	4.6
Gross Income	\$1,890.00	\$2,004.90	\$684.25	\$195.50
Total Costs⁴	\$824.15	\$1,648.75 ⁵	\$512.63	\$355.45
		Total Gross Income:		\$4,774.65
		Total Costs:		\$3,340.98
		Net Income:		\$1,433.67

¹Number of birds raised shown in [Table 3](#). Number of birds processed is slightly lower than the number raised due to pre-processing mortality. Two Red Broilers and one duck died on pasture in 2010, while three turkey poults and five Cornish broilers were lost in the brooder. With changes in brooder and pasture management, they have reduced their mortality rate well below 10% (often considered an expected level of mortality for broilers).

²Average cost of both rations was \$14.75 per 50 lbs in 2010. Ration sizes given in [Table 4](#). See “[Customer Communications](#)” Lessons Learned box about feed costs under [Marketing > Models](#).

³Charged low sale price because unhappy with size of birds, though customers reported very good flavor. Tried Broad-breasted Whites in 2011 (see [Table 3](#)). See also [Production > Poultry > Feed](#) for notes about species-specific rations.

⁴Total costs include chick/poult/duckling purchases and feed but **not** labor.

⁵Received 165 Red Broiler chicks but only ordered (and paid) for 150.

Hogs

As discussed under [Assessing & Planning > Business Planning](#), 2010 was Jeff and Cindy’s second year selling hogs. Table 11 shows that they experienced a net income of \$171 from their hog enterprise in 2010, though as with poultry, *the calculations do not account for labor costs.* The table assumes that all five hogs made it to processing, for a net income of \$34.20 per hog, though two were lost to vandalism (see [Production > Production Methods > Hogs](#)). Jeff and Cindy planned to try raising five hogs again in 2011 and hoped to increase to eight hogs by 2013. They are also exploring options for farrowing their own feeder pigs as a way to increase profitability.

Table 11. Hog income and costs in 2010

Cost per Feeder Pig¹	\$60.00
Starter Ration Cost²	\$582.00
Finish Ration Cost²	\$2,192.00
# Hogs Processed¹	5
Sale Price (per lb)	\$2.95
Average Processed Weight (lbs)	220
Gross Income	\$3,245.00
Total Costs³	\$3,074.00
Net Income	\$171.00

¹ Calculations assume all five hogs survived until processing time, though two were lost to vandalism in August (see [Production > Production Methods > Hogs](#)).

² Average cost of starter ration was \$14.55 per 50 lbs and \$11.85 per 50 lbs in 2010. Cindy and Jeff used an average of 40 lbs per week per animal of the starter ration for 10 weeks, then an average of 132 lbs per week per animal of the finish ration for 14 weeks. They were able to purchase finish ration by the ton and achieve substantial savings, but see “Eating Like A Pig” Lessons Learned box, below, regarding feed amounts.

³ Total costs include hog purchase and feed but **not** processing costs (paid by customer) or labor.

Farmer’s Perspective: Lessons Learned

Eating Like A Pig

As noted in Table 11, Cindy and Jeff went through 132 pounds of finish rations per week per hog in 2010. This equates to over 18 pounds per day, and with a 14-week finishing time, more than 1,800 pounds of feed to bring each hog to finish weight. This total amount of feed was over twice the industry standard of about 740 pounds (according to Wayne Martin with University of Minnesota Extension). Unfortunately, this was an expensive way to realize their feeding system needed to be modified. Up through 2010, based on consultations with other producers and with written sources, they used hopper feeders and gave the hogs free access. This approach resulted in about half the food being spilled and going uneaten, perhaps due to the hogs not liking some component of the ration. In 2011, Cindy and Jeff started filling rubber pails with feed twice per day and removing them after the hogs had eaten what they could right away; the hogs then foraged on pasture for the rest of the day. This approach may not work for someone with more hogs, but Cindy and Jeff feel it works well for their small numbers. The hogs in 2011 ate about 10 pounds each per day, cutting Cindy and Jeff’s feed costs by almost half and bringing them more in line with the industry standard for production.

Greenhouse

To date, Cindy and Jeff have not tracked greenhouse production in a way that allows them to calculate personal and business yields separately. With one to two plants of each herb species, they had total sales of wholesale herbs of \$276.20 in 2010. They are working to expand the number of herb plants so they can increase sales, and as noted in [Table 1](#), they started growing garlic in 2010 to add to their wholesale enterprise.

MARKETING

Models

Initially Jeff and Cindy sold products at a farmers' market; sales went well, and they felt it was a good experience for making initial customer contacts. Some of their farmers' market customers, for example, became ongoing egg customers. They switched to a focus on direct sales, however, because they felt the logistics of packing things up and devoting Saturdays to being away from the farm were not a good match for their lifestyle. The farmers' market was also not a good fit for their approach to meat sales.

Jeff and Cindy now sell products directly to customers and have a wholesale account. They also started using a Community Supported Agriculture (CSA) marketing model for eggs in 2011, which is working well. They may try a CSA model for fall fruits in the future. Apples have good storage ability, and Cindy and Jeff see good potential for value-added apple products that could be marketed on an ongoing basis.

Although Cindy and Jeff have customers coming to the farm for product pick-ups, they don't anticipate setting up an on-farm store in the near future, as they like their privacy.

Jeff and Cindy took advantage of their customer base to get feedback on customer satisfaction and ideas such as offering a meat CSA. They used the online tool Zoomerang, and print copies for customers without email, to conduct a customer survey in 2009 (Appendix IV). They received 58 responses out of a customer base of around 100. Jeff and Cindy were interested to learn that their customers liked the concept of a meat CSA but not the details. Few people said they'd actually subscribe, generally because of widely varying preferences in the amounts and types of meats that they like to eat. Although Jeff and Cindy have heard success stories about meat CSA models from other producers (largely beef) and may explore the option again in the future, they felt they could not offer a good fit for their customers at this time.



Farmer's Perspective: Lessons Learned

Customer Communications

Cindy and Jeff believe that ongoing communications with customers and honest explanations about pricing have helped them establish a loyal customer base. In 2010, for example, they explained what they had learned about the extra labor involved in processing ducks in 2009 (see "The Duck Stops Here" Lessons Learned box under Production > Harvest & Processing > Poultry) and how they needed to increase duck prices as a result, and they still sold out. In 2011, organic feed costs jumped up by 30%. Cindy and Jeff used an online survey to ask customers if they'd prefer to see a change in practices, such as the use of non-organic or transitional feed instead of certified organic feed, in order to keep costs down. The overwhelming response was that customers wanted their practices to stay the same and would pay more for the products. Cindy and Jeff adjusted their egg and meat prices according to feed costs, and 2011 orders have been strong.

Direct Sales

Jeff and Cindy sell eggs and meat from poultry directly to customers through on-farm pick-ups, or through deliveries for some egg customers. They also sell half or whole hogs directly to customers. They get most of their customers through word-of-mouth; many customers are co-workers, for example, or met Jeff and Cindy through involvement in different organizations (see [Farm Business > Professional Development](#)). Their emphasis on a direct-sales model is partly due to personal preferences, as described above, but it also relates to the regulations surrounding meat sales.

Eggs: Eggs are Cindy and Jeff's most consistently offered product throughout the year. They sold 608 dozen eggs in 2010; in 2011, they increased their laying flock from 50 to 70 hens, and they still can't meet the demand they have from co-workers. Cindy and Jeff feel the eggs are a classic case of a product that sells itself, which they credit to their hens' free-ranging diets and supplemental winter greens. One customer reported back that her teenage son (not the demographic one would expect of a discriminating egg connoisseur!) went to make himself some eggs. He didn't know they were different than any others he'd encountered in their refrigerator, but after eating them, he ran to his mom demanding to know where they'd come from, as they were the best eggs he'd ever had!

Poultry: Jeff and Cindy process poultry on the farm and sell fresh whole birds directly to consumers. State regulations allow this, up to 1,000 birds sold per farm per year. This approach to poultry meat sales works better for Jeff and Cindy than a farmers' market or wholesale; they feel the distance and cost of inspected processing at either a USDA or state Equal-To plant would significantly reduce profitability at their scale. Another strong advantage of a direct-sales approach is that they can decide the number of birds to raise each season based on customer demand. Each year, in late March or early April, Jeff and Cindy send out a pre-order form (Appendix I) to their customers after drafting their production plans for the season. Sometimes the numbers and types of birds available on any given processing date need to change mid-season, if birds aren't coming to weight as quickly as anticipated. But overall, Jeff and feel this pre-order system helps them manage their time and cash flow effectively.

Educator's Perspective: Resource Tip

Meat Processing

According to the MDA's [Official State Inspection Program](#), Minnesota is one of 28 states that have an "Equal-To" inspection program. State-inspected products may only be sold within Minnesota while federally inspected products may be sold across state lines. The State Inspection Program is considered to be "equal to" that of federal inspection and is routinely reviewed to ensure the state is meeting the federal meat inspection requirements.

Links to lists of Custom-Exempt, Minnesota Equal-To, and USDA processing plants in Minnesota are on the MISA Web site's [Meat Processing Plants page](#).

Farmer's Perspective: Lessons Learned

How Much Information Is Too Much?

Cindy and Jeff have found that their customers appreciate the transparency of their operation, and some even want to contribute – for example, by volunteering on poultry processing day (see [Farm Business > Human Resources](#)). Cindy and Jeff have learned, however, that there is a fine line between what most customers want to *know* and what they want to *see*. Based on feedback from 2010, for example, they moved their mobile unit to a different location on processing days. Customers generally liked seeing where the processing was done, but many balked at having to walk right by the mobile unit when they came to the farm to pick up their birds. Cindy and Jeff agree with others (such as Chris Duke of [Pastured Perfect Poultry](#), who speaks on this topic) that, to a degree, farmers like themselves are selling certain ideas of what small diversified farms look like. Cindy and Jeff strive for the right balance. They don't hide anything or "whitewash" their operation to their customers, but they also take reasonable steps to make patrons feel comfortable.

Educator's Perspective: Resource Tip

The <1,000 Bird Exemption

Clover Valley Farms, LLC, sells fewer than 1,000 poultry per year directly from their farm premises, and they slaughter and process the birds on the farm. This puts them into Minnesota's "fewer than 1,000 poultry per year" exemption category, which involves registering with the state but not licensing (see "[Licensing, Inspections, and Registration for Poultry and Egg Producers](#)" Resource Tip box).

This exemption category allows them to:

- Slaughter and process poultry on their farm in sanitary conditions, which may include outdoor processing.
- Sell to individual customers, but not to food businesses.
- Sell from their farm premises, but not at a farmers' market or any other off-farm location.
- Process and sell up to 1,000 poultry per year, if packaged according to requirements for exempt producers.
- Sell whole or cut-up poultry without a food handler's license.
- Store frozen birds in a freezer on their property prior to sale.

The on-farm processing exemption exists only for poultry. Any other kind of meat for sale cannot be processed and packaged by the farmer on the farm, unless the farm includes a licensed and inspected processing facility. This is true no matter how little meat is sold.

According to the Food Safety and Inspection Service (FSIS) of the USDA, Code of Federal Regulations, [Title 9 CFR part 381.1](#), "Poultry" means any domesticated bird (chickens, turkeys, ducks, geese, guineas, ratites, or squabs, also termed young pigeons from one to about thirty days of age), whether live or dead."

When birds are processed on the farm under the <1,000 poultry exemption, there is normally no inspection of the slaughter and processing set-up or of the freezer facility if a freezer is used to store processed birds. The MDA may inspect if they receive a complaint or if there is an illness outbreak traced to the farm.

The on-farm slaughter and processing must be done in sanitary conditions. It may be done outdoors, but care should be taken to prevent contamination of the birds by flies and other potential airborne or soil-borne contaminants.

There are two situations that would require an on-farm poultry processing operation to move indoors: (1) the farm starts to sell more than 1,000 poultry per year; or (2) the farm starts to sell poultry away from the farm premises (see "[Meat and Poultry Regulations: Specific, Detailed, Confusing?](#)" Resource Tip box). In both of these cases, processing must move indoors and the MDA must inspect and approve the processing facility.

For more information, see the MDA Dairy and Food Inspection Division's [Sale of Home or Farm Raised Poultry Fact Sheet](#).

Educator's Perspective: Resource Tip

Meat and Poultry Regulations: Specific, Detailed, Confusing?

Getting your operation into compliance with all relevant state and federal regulations can be a daunting aspect of beginning farming. It can be especially challenging for small-scale, diversified farmers. Some regulations are geared toward larger producers and food businesses. There are exemptions that apply to small-scale farmers who market their own products, but these can be confusing to sort out.

One common pitfall of direct-marketing farmers is learning the rules for one type of meat sales, then making a change to the operation without considering regulatory impacts. Even a small change in the way you market meat can put you into a different regulatory category. When you change to a different regulatory category that requires a different level of licensing or inspection, you need to get new approval from the MDA (or comparable agency in other states).

Clover Valley Farms, for example, does on-farm processing of poultry outdoors, with a scalding and plucker mounted on a trailer. This is legal for them because they are selling the processed birds directly from their farm premises and are selling fewer than 1,000 birds per year (see “[The <1,000 Bird Exemption](#)” Resource Tip box). If Cindy and Jeff decided to start selling poultry at the farmers’ market, they would be required to move their processing set-up indoors and get it inspected, even if they were still selling fewer than 1,000 birds per year. Doing poultry sales off the farm premises is a trigger for inspection of facilities. If they started selling more than 1,000 birds per year, that would also require moving indoors for processing and getting the processing set-up inspected.

Similarly, Cindy and Jeff do not need a license to sell their poultry, because they are selling a product that they raise themselves and are not adding any off-farm ingredients to it (see “[Licensing, Inspections, and Registration for Poultry and Egg Producers](#)” Resource Tip box). But if they started to add an off-farm ingredient, such as herbs or spices or even salt, they could no longer sell the product without a license. They would have to become licensed food handlers and have the poultry processed at a state Equal-To (see “[Meat Processing](#)” Resource Tip box) or USDA plant that has a Hazard Analysis and Critical Control Points (HACCP) plan for the addition of those ingredients to the poultry. Producers should check that their processing plant has an approved HACCP plan on file for the product they want to have made, signed by an MDA Dairy & Food Inspection supervisor for a state Equal-To plant or by a USDA supervisor for a USDA plant.

Cindy and Jeff do not need either a license or an inspection to sell their pork, because they are taking orders for animals (not meat) and having all animals pre-sold before slaughter and processing at a custom-exempt facility. If they decided to sell cuts of pork either from their farm or at a farmers’ market, they could no longer use a custom-exempt facility. The animals would need to be slaughtered under inspection at a USDA facility or state Equal-To facility. Cindy and Jeff would not need a license to sell cuts of plain pork, but they would need a license if they were selling a processed product such as bacon or sausage that included off-farm ingredients.

Food regulations are complex, especially for sales of meat, poultry, and eggs. For the protection of both you and your customers – and to contribute to a positive image of sustainable farmers everywhere – it’s important to understand them thoroughly. Farmers who want to raise and sell meat, poultry, or eggs should plan to spend some time finding and reading the regulatory information that is available, learning the handling and labeling requirements, contacting the MDA, filling out the required forms, and scheduling an inspection if that is needed for their type of operation.

The MDA [Dairy and Food Inspection Division](#) is the ultimate source of information on regulations for Minnesota farmers of poultry and other food products. See the MDA web page on [Meat, Poultry, and Egg Inspection](#) for fact sheets, forms, and contact information. Contact the Dairy & Food Inspection Division at 651-201-6027. Other states have comparable agencies.

Materials available on the MDA Web site can be confusing or difficult to find. Beginners are encouraged to contact MISA through the [Ask MISA](#) form for help in navigating information about regulations.

Educator's Perspective: Resource Tip

Licensing, Inspections, and Registration for Poultry and Egg Producers

An important part of complying with regulations is understanding the distinctions between a *license*, a *registration*, and an *inspection*. The requirements for these things are different for poultry than for red meat (see “[Licensing and Inspections for Meat Producers](#)” Resource Tip box).

In Minnesota, small farmers selling fewer than 20,000 birds per year from their own farm generally do not need a license. Even if a farmer is exempt from *licensing* for the sale of their birds, the MDA still requests these producers to *register* their operations with the state. Depending on where the farmer is selling poultry and how many birds are sold, the farmer may need an *inspection* of his or her facility, even if no *license* is required (see “[Meat and Poultry Regulations: Specific, Detailed, Confusing?](#)” Resource Tip box).

The [registration form](#) for farmers who are exempt from licensing can be found on the MDA Web site. It is titled, “Egg Grading and Sales for Small Producers Exempt from Licensing Poultry Slaughter and Sales Direct to Consumers Exemption,” and is a very simple one-page, no-fee form that asks for contact information and the number of birds or eggs you plan to sell.

One exemption category is for farmers who raise fewer than 1,000 birds per year (see “[The <1,000 Bird Exemption](#)” Resource Tip box). These exempt farmers are encouraged to register with the MDA as “Exempt Poultry Producers” using the form linked above.

Farmers who want to sell between 1,000 and 20,000 poultry per year have options for doing that. A farmer who invests in approved on-farm slaughter equipment and facilities can *register* as an exempt producer; have an *inspection* of their slaughter facility by an MDA inspector; and slaughter, process, and sell up to 20,000 birds per year to individuals within their state. The packaged birds must be labeled according to the requirements for exempt poultry. If processed birds will be stored in an on-farm freezer before being sold, that freezer facility also needs to be *inspected* by an MDA inspector. *Licensing* is not required so long as the farmer sells only his or her own birds and adds no off-farm ingredients.

Farmers can also have birds processed at a USDA or Minnesota Equal-To facility (see “[Meat Processing](#)” Resource Tip box) and sell birds to individuals, restaurants, grocery stores, or other food businesses. The poultry are labeled as “inspected and passed” rather than as exempt poultry. Farmers can sell whole birds, cut-up birds, or parts of birds that are processed in a USDA or Minnesota Equal-To facility. In this case, the farmer is still *exempt from licensing* so long as no off-farm ingredients are added, but he or she should still *register* with the MDA as a poultry producer using the form linked above. If the farmer will store birds processed under inspection (USDA or Equal-To) in an on-farm freezer facility, that freezer facility must be *inspected* by an MDA Dairy and Food Inspector.

Registration is also encouraged for small-scale egg producers with fewer than 3,000 laying hens who want to sell eggs to grocery stores, restaurants, or other food businesses. An egg producer selling directly from the farm to individual customers does not need to register, but if that producer begins selling eggs to food businesses, they should register at that point. There are egg handling and package labeling requirements that exempt egg producers must follow. Again, there is no fee for registration and normally no inspection. The form for registering as an exempt egg producer is the same [registration form](#) as the one for exempt poultry producers. For more information, see the MDA's fact sheet [Sale of Locally Raised Eggs to Food Facilities](#).

Contact the MDA Dairy and Food Inspection Division for more information: 651-201-6027.

Farmer's Perspective: Lessons Learned

It's Never Too Late!

Cindy and Jeff learned about the form for registering with the MDA as “Exempt Poultry Producers” (see [“Licensing, Inspections, and Registration for Poultry and Egg Producers”](#) Resource Tip box) while this case study was being prepared. It was a surprising discovery, because they felt they had done their homework. They had reviewed regulations, talked with experts, attended Webinars, and participated in seminars related to the laws surrounding poultry production, but they had not come across this particular form. As soon as they discovered the form, they registered and got their exemption permit promptly from the MDA without repercussions. Being able to show they had done their “due diligence” was an important part of the positive outcome. They hope their story will prompt beginning poultry farmers to get registered right away and also encourage more advanced farmers to get it taken care of too.

Pork: Cindy and Jeff sell pork by the half or whole hog because selling individual cuts of meat (rather than half or whole animals) through retail or wholesale would require them to have the hogs slaughtered and processed at a USDA-inspected processing plant or a Minnesota Equal-To processing plant (see [“Meat Processing”](#) Resource Tip box). The closest one of these to Clover Valley Farms is near Minneapolis-St. Paul, not a feasible distance for them. As with poultry, Cindy and Jeff have found sufficient direct-sales demand that they are not motivated to pursue wholesale or other markets that would be less profitable at their scale. State regulations allow them to sell pork directly to consumers by the half or whole animal, as long as the entire animal is sold before slaughter. As a courtesy to their customers, they arrange for custom processing of the meat at a local custom-exempt processing plant. They often refer their customers to an Iowa State University publication called the [Beef and Pork Whole Animal Buying Guide](#) for further information. Cindy and Jeff base their final price for the animal on the hanging carcass weight. Their customers pay them for the meat and pay the processor for processing costs.

Educator's Perspective: Resource Tip

Licensing and Inspections for Meat Producers

As with poultry, understanding the distinction between a *license* and an *inspection* is an important part of complying with regulations for red meats such as pork, beef, and lamb. There are differences between the regulations for red meat and for poultry (see [“Licensing, Inspections, and Registration for Poultry and Egg Producers”](#) Resource Tip box).

In Minnesota, farmers have several options for selling red meat. The option with the least regulatory oversight is sale of live animals and processing at custom-exempt processing plants. In this system, a farmer takes orders for whole animals or portions of whole animals. A typical scenario is sale of quarters of beef or halves of hogs; but farmers can sell animals in other portions as long as they have the entire animal pre-sold before it is slaughtered and processed. Each customer's portion must be identified at the custom-exempt facility. Farmers can arrange delivery of the animals to the custom-exempt facility. Customers should pick up their own finished meat from the facility and should pay the farmer and the custom-exempt processor separately. The meat packages are marked with the customer's name and are stamped “Not for Sale.” The customer may not re-sell any of the meat. It is for use only by the customer, the customer's household, and non-paying guests. The farmer does not need either licensing or inspection in this system, because the farmer is not responsible for handling the meat. The farmer's customer becomes the owner of the meat before the animal is slaughtered.

Farmers who want to sell cuts or bundles of meat without pre-selling an entire animal must have their animals slaugh-

tered under inspection and processed at either a USDA facility or a state Equal-To facility (see “[Meat Processing](#)” Resource Tip box). From that point of inspected slaughter and processing, the farmer has several options for marketing the meat:

- If the farmer sells only plain “muscle meat” with no off-farm ingredients added, the farmer does not need a license. Sales can be to individuals, retail food businesses, or wholesale food businesses.
- If the farmer will sell a processed meat product with off-farm ingredients added, such as bacon or sausage, the farmer needs a food handler license. Sales can be to individuals, retail food businesses, or wholesale food businesses.

Whether or not the farmer needs a *license* is a separate issue from whether or not a farmer needs an *inspection*. If the farmer will store meat in an on-farm freezer facility, or if the farmer will transport meat for sale in a mobile freezer or cooler, the farmer needs to have an *inspection* of that freezer facility or mobile unit.

Food handler licenses are available for retail sales and for wholesale sales of meat. The type of food handler license a farmer would need depends on their customers; providing meat to food businesses is outlined in the MDA fact sheet [Approved Sources of Meat and Poultry for Food Facilities](#). Sales to grocery stores, restaurants, schools, or other food businesses would generally require a wholesale food handler license. Sales to individual customers would generally require a retail food handler license. A farmer’s meat sales business that includes both types of sales could be licensed under either a retail or wholesale food handler license, usually depending on what percentage of sales are retail vs. wholesale. Farmers with food handler licenses must renew their licenses annually and are subject to inspection by the MDA’s Dairy and Food Inspection Division.

Farmers who are selling only muscle meat with no off-farm ingredients added, and who therefore are not required to have a food handler license, may find it difficult to sell their products to food businesses. Food businesses may want to see a license before they purchase product from a farmer. It is the policy of the MDA to make food handler licenses available to farmers who want them for this type of marketing purpose, even if the farmer is not technically required to have it. Farmers who choose to get a food handler license are expected to comply with the usual inspection and renewal requirements associated with that license.

Contact the MDA Dairy and Food Inspection Division for more information: 651-201-6027.

Additional information is available at MISA’s [Meat & Poultry Sales](#) Web page, which includes links to MDA fact sheets.

Wholesale

Herbs: Cindy and Jeff approached [Whole Foods Co-op](#) in Duluth (an independent grocery store, not to be confused with the national chain) in 2008. The co-op is very accommodating for local growers and is flexible in terms of product availability. No other truly local producer was providing the co-op with local herbs or other seasoning items, such as garlic, out of season. Cindy and Jeff deliver products to the co-op about five times a year throughout the year.



THE FARM BUSINESS

Human Resources

Jeff and Cindy do not formally track their time spent on the farming business. It generally takes two hours in the morning and two hours in the afternoon to do chores when the season is in full swing. They're working toward setting aside at least an hour per day to handle emails and other office work during the summer. There are pulses of activity, generally involving whole weekends, surrounding poultry processing, fruit harvesting, and cider pressing. They also try to plan one big project, such as developing a new brooder or planting a new orchard, per month, to move various initiatives forward.

As described under [Assessing & Planning > Getting Started](#), Jeff works on the farm full-time during the summer while Cindy continues working close to half-time at her academic appointment. They are 1½ years into a 3 to 5 year plan, in which the goal is for Cindy to increase the percent of time she is on the farm both during the school year and in the summer. If they could figure out how to get affordable health insurance while being self-employed, they might consider having Jeff work full-time on the farm, too. They have never expected the farm to support both of them, but they realize the future is uncertain and are open to the possibilities! Both Jeff and Cindy already work to integrate their off-farm careers with Clover Valley Farms, and Cindy sees good potential for research or teaching opportunities to present themselves as the sustainable agriculture movement continues to grow (see [Professional Development](#), below).



Cindy manages most of the communications, record keeping, and other administrative work. Jeff manages most of the greenhouse production. They divide responsibilities for planning, scheduling, poultry and hog care, orchard establishment and maintenance, fruit harvest, poultry processing, cider pressing, and equipment maintenance. Cindy and Jeff feel that ideally each of them would be able to perform all tasks, and they work toward this goal. Jeff, for example, is learning QuickBooks and helping more with bookkeeping so he feels more connected to that part of the business. In reality, they recognize each of them has different strengths. They get help with farm tasks from daughter May, who likes to collect eggs, feed chickens, and work in the garden. She is also a huge help at cider pressing time, and Cindy and Jeff think it won't be too much longer before she's moving poultry pens across the pasture!

“As far as May knows, there’s no difference between work and play.”

Jeff and Cindy had an intern for the first time in 2010. Until then, they had called on neighbors to cover chores if they had to be off-farm for a few days, but in 2010 they needed to be absent from the farm for a longer period of time. Their first intern, who lived nearby, was paid and worked an intermittent schedule, helping with chores when they were gone and with projects as needed. Jeff and Cindy quickly saw how the extra help could allow them to explore new revenue streams and expand their current enterprises further, and they liked being able to contribute to the growth of a future farmer. They envisioned a more structured approach for the future, where interns would have designated areas of responsibility tailored to their goals and abilities.

Educator's Perspective: Resource Tip

Being an Employer

Small farmers often underestimate the responsibilities involved in being an employer. Although most farmer-employee relationships go well, the rare cases in which someone is injured or feels mistreated can cause big problems. Tax penalties and audits are also bad for business! Calling someone an intern or an independent contractor is not the easy way out that many hope it would be.

For the protection of themselves as well as those they are intending to help through employment and educational opportunities, it is strongly recommended that small farmers understand hiring rules and regulations.

Jennifer Jambor-Delgado with the [Farmers' Legal Action Group](#) held a session, called "Know the Law," on this subject at the SFA conference in 2011.

The Northeast Organic Farming Association of New York published [Internships In Sustainable Farming: A Handbook For Farmers](#) in 1999. It includes an overview of dealing with labor regulations.

Although not specific to farmers, [An Employer's Guide to Employment Law Issues in Minnesota](#) provides a starting point for understanding requirements and issues such as verifying eligibility to work, wages, workplace discrimination, workers' compensation, occupational safety, and unemployment insurance. There are similar guides in other states.

As business owners, farmers also need to be aware that the U.S. Internal Revenue Service (IRS) has strict rules about whether someone providing services can be considered an independent contractor rather than an employee. Farmers are encouraged to review the IRS's [Common Law Rules](#) carefully and consult a tax professional, rather than assuming that the "independent contractor" label can save them the hassle of employment taxes.

In 2011, Cindy and Jeff hired two interns who lived on the farm. They worked with the interns, who had no prior farm experience, to select topics that each intern could explore in depth, often related to developing new resources or products for the farm. For example, the interns took the lead on using rooster feathers to make hair extensions, which have become popular in hair salons. They experimented with a range of materials, and their designs, plus others created by Cindy, are now being sold through a local hair salon. The interns also took the lead in developing materials, such as handouts, displays, and signage, used for field days on the farm. An informational poster they developed even became the basis for Cindy and Jeff's new Web site. The interns were also involved in communicating with customers so they could learn the people skills of direct marketing. Cindy and Jeff concluded the internships with a day of picnicking and hiking, using the time to "debrief" the summer with their interns. They felt this step was an invaluable two-way exchange of ideas that gave them an understanding of what worked and what didn't about the experience and left them feeling more prepared to provide an even better learning experience for interns in 2012.

Spotlight on: Intern's Perspective

Matt worked with Cindy and Jeff in 2010. He has a background in horticulture and liked learning about not only the details of Cindy and Jeff's fruit production but also helping with their on-farm research. Matt lives nearby and is experimenting with starting his own orchard on family land. He is especially interested in cider production, because the management focus doesn't have to be on producing aesthetically pleasing apples – just healthy apples that can be used in a variety of value-added products. One of the lessons Matt takes away from the intern experience is seeing firsthand how everyone does things a little differently. He didn't learn this in his textbooks, but when it comes to farming, there is often more than one way to do something and get it right.



Volunteers have always played an important role at Clover Valley Farms. They are especially crucial on poultry processing day, when the right number of people is key to avoiding bottlenecks. Four people is considered the minimum, but six to eight is ideal. With more people to help at the processing table, the initial steps don't get as backed up. Cindy and Jeff recruit volunteers from a variety of acquaintances – friends, colleagues, neighbors, and customers. They've found that on-farm processing attracts considerable interest from customers who want to learn more about where their food comes from and who are willing to help in exchange for reduced price or free birds. Cindy and Jeff feel volunteers offer a win-win situation; they get the quality help they need at peak times, and the volunteers get a positive experience plus a break on poultry costs.

Business Structure

Jeff and Cindy initially structured Clover Valley Farms as a sole proprietorship. They formed a Limited Liability Company (LLC) in 2010 as a way to protect their personal assets from farm liability (see also Risk Management, below). They were also motivated by the record keeping requirements that would be reinforced by being an LLC (see also Finances, below).

Educator's Perspective: Resource Tip

Business Structures

The decision about whether to incorporate a farm or use another business structure tends to be very specific to each farmer's set of circumstances. Advice from a tax or legal professional is highly recommended, but the resources below provide a starting point for understanding the different options.

Michigan State University's Beginning Farmers Web site has a useful post about [Farm Incorporation](#).

The University of Wisconsin Center for Cooperatives has a [comprehensive comparison chart](#) of business structure types that is tailored to agriculture.

Risk Management

As described above under Business Structure, risk management was one of the factors that motivated Cindy and Jeff to establish Clover Valley Farms as an LLC. They feel selling to friends and acquaintances reduces their risks somewhat. They also feel that having a small-scale, simple infrastructure helps them manage risk because it means losses, such as those due to severe weather, would be relatively minor.

They anticipate that Jeff will keep his job if or when Cindy moves to working full-time on the farm. Keeping an off-farm job would, in part, be to maintain their health insurance, though Jeff finds his off-farm work rewarding and would be staying for other reasons as well. Cindy and Jeff do not carry commercial liability insurance; they have found the cost to be prohibitive for poultry.

Educator's Perspective: Resource Tip

Liability Insurance

Getting insurance policies in place for liabilities on the farm can be more complex than getting coverage for your car or home. Because these liabilities can pose important risks to your farm, it's critical to understand the different types of liabilities:

- liability for products sold
- liability for visitors to the farm
- liability for farm workers*
- coverage for the value of crops grown
- coverage for property and equipment owned

Consult with your insurance agent on options and costs, or get referrals to another agent who is familiar with agricultural insurance needs. MISA's publication [Marketing Local Food](#) has a helpful overview of liability insurance on pages 91-94.

*See also the "Being An Employer" Resource Tip box under Human Resources.

Finances

To cover start-up and capital costs, Cindy and Jeff have generally invested personal funds. They did take out an [AgStar](#) loan to help with the purchase of their mobile poultry processing unit.

Jeff and Cindy also provided the initial capital required when forming the LLC in 2010, to cover expected costs through the first year in combination with projected income. Their 2010 Balance Sheet (Appendix V) shows their Total Assets and Total Liabilities and Equity as \$20,941.72.

Educator's Perspective: Resource Tip

Managing Farm Finances

The [Center for Farm Financial Management](#) (CFFM) at the University of Minnesota provides educational programs and software tools, such as [Interpreting Financial Statements and Measures](#), an online video workshop that helps producers understand and use the 4 major financial statements and the 21 financial measures recommended by the Farm Financial Standards Council.

CFFM works with other groups to manage [FINBIN](#), a farm financial database that provides benchmark financial information to farm producers, educators, lenders, and other agricultural professionals.

Use the USDA [Service Center Locator](#) to find a local office with information on [Farm Service Agency](#) (FSA) loans and other farm support programs. A new program, called the [Beginning and Socially Disadvantaged Farmer and Rancher Land Contract Guarantee Program](#), was launched in 2012. It provides federal loan guarantees to retiring farmers who self-finance the sale of their land to beginning or socially disadvantaged farmers and ranchers, and it is administered through local FSA offices.

Cindy and Jeff don't consider themselves very "tech-savvy" but have become fans of [QuickBooks](#) software, which helps them streamline their accounting. They hired a consultant to help them set up the system for their specific needs and found it well worth the few hundred dollars it cost!

Although Cindy and Jeff have started seeing profitability in certain enterprises (see [Production > Yields & Profitability](#), keeping in mind that *those calculations do not account for labor costs*), the business as a whole is not yet profitable (Figure 9). Clover Valley Farms' Profit and Loss Statement from 2010 (Appendix VI) shows Ordinary Income of \$8,244.93 and Other Income of \$7,867.00, for a total income of just over \$16,000. With their Cost of Goods Sold at \$9,795.00 and other Expenses at \$11,640.24, their net income in 2010 was -\$5,323.31.

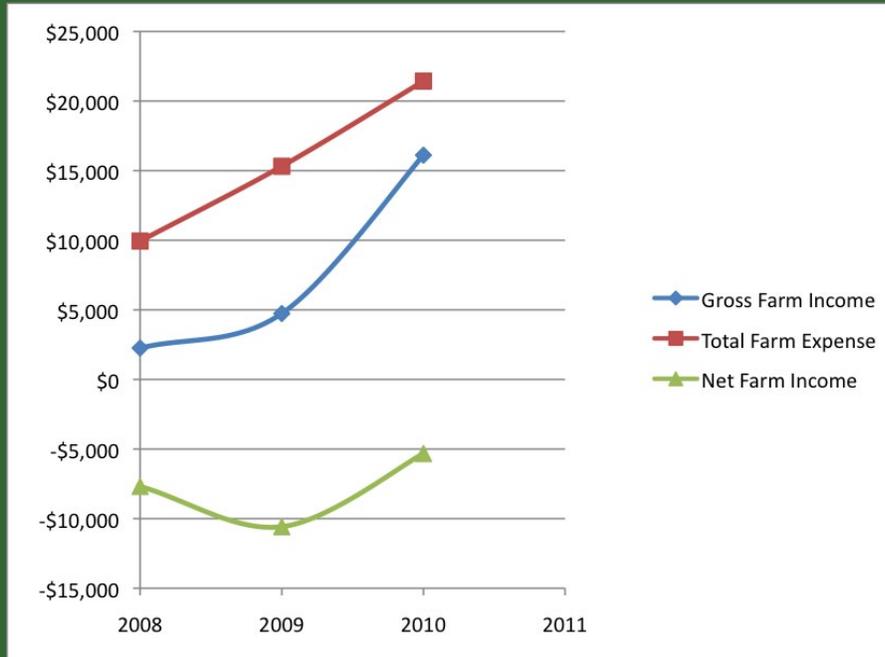


Figure 9. These figures from Cindy and Jeff's income tax filing suggest that the gap between farm expense and farm income was narrowing as they headed into 2011.

Jeff and Cindy's off-farm income has allowed them to invest in the farm business and grow gradually while working part-time on the farm. Although they are anxious to realize a profit – and one that includes labor costs, to be true to their vision (see [Assessing & Planning > Business Planning](#)) – they have preferred to follow a gradual growth model and avoid significant debt. Their ongoing commitment to improving their production practices, such as adapting feeding methods to reduce ration costs, along with what they've learned about breed choices and the timing of certain activities, will help them to continue improving the productivity of the animal units they have.

Professional Development

Jeff and Cindy's current professional memberships include the Sustainable Farming Association of Minnesota's [Lake Superior Chapter](#), the [Land Stewardship Project](#), [MOSES](#), the [American Pastured Poultry Producers Association](#), and the [Organic Tree Fruit Association](#) (OTFA). Cindy and Jeff also pay attention to what's going on with the [Minnesota Apple Growers Association](#) and the [Minnesota Fruit and Vegetable Growers Association](#).

Farmer's Perspective: On The Bookshelf

In addition to reading the newsletters published by various groups to which they belong, Cindy and Jeff stay up to date with resources, events, and methods through several electronic mailing lists: MISA's [Sustag Listserv](#), the University of Minnesota's [Poultry Listserv](#), and the OTFA and MOSES Listservs.

As described under [Assessing & Planning > Getting Started](#) and [Business Planning](#), Cindy and Jeff used a [Farm Beginnings](#) program and a mentoring program to strengthen their knowledge base. In addition to the planning tools they acquired from Farm Beginnings, an important insight gleaned from the wide range of speaker experiences was where they fit into the realm of financial situations. Some farmers rely on off-farm income, for example, and others have their land paid for. Cindy and Jeff appreciated the chance to explore how these and other factors affect what you can do and how fast you can do it.

Cindy and Jeff also regularly attend conferences, such as the [MOSES Organic Farming Conference](#), the [Minnesota Organic Conference and Trade Show](#), and workshops held by other organizations such as the [Sustainable Farming Association of Minnesota](#), the [OTFA](#), and the [University of Wisconsin Center for Integrated Agricultural Systems](#). They credit many of their “lessons learned” to conference attendance, such as adding carbon to their chicken compost to keep the ammonia down, or feeding broilers at night (when they need energy for warmth) instead of in the morning. They have also found conferences to be a helpful way to learn what *not* to do. At one point they were considering adding sheep to their farm, in response to ongoing customer requests. But after three days at a regional conference, they realized sheep were not a good fit for them at the time, and they were grateful for the opportunity to rule out the possibility before having invested time and money in it on the farm.

Jeff and Cindy devote considerable time to networking and to creating synergies between the farm and their off-farm careers. Their contacts have played various roles in their farming efforts, such as encouraging them to try raising hogs, inspiring the design for their custom-made cider press, or providing feedback on use of the mobile poultry processing unit so Jeff and Cindy could develop a manual and a rental protocol. Jeff works with the school district’s food-to-farm program and provides farm tours for school groups. Cindy is on the steering committee for a [Seeds of Success Urban Agriculture](#) program with [Community Action Duluth](#) to help develop a fruit gleaning project and a USDA proposal for a community food systems project (see also [Production > Harvest & Processing > Apples & Other Fruits](#)). She also serves as Orchard Manager for the University of Minnesota Duluth [Sustainable Agriculture Project](#).

CONCLUSION

As of 2010, Cindy and Jeff were five years into poultry sales, which marked their formal entry into farming as a business. They’ve been on the path for much longer, however, and are excited to be realizing their vision statement (see [Assessing & Planning > Business Planning](#)). As Jeff likes to say, “It’s about progress, not perfection – and we’re making progress!” They are on the way to showing profitability with poultry sales, they’ve been managing communications and minimizing stress, and they are definitely seeing results in the health of the environment on their farm.

Ideas for the future include adding a commercial kitchen. They would be able to rent one in a church in Duluth first at very low cost to start evaluating the logistics and profitability of value-added fruit products, such as applesauce, jams, and jellies. They’re also always thinking about adding different plants and animals to their collection. They like exploring different fruit tree varieties and grafting options. They would like to explore expansion of different aspects of production for animals they already raise, such as breeding their own laying flock (as described under [Production > Production Methods > Poultry](#)) or farrowing hogs. Customers ask for other products such as beef and lamb, which may have good income potential down the road but which need more of a year-round time commitment, thus requiring at least one of them to have a different balance with off-farm work.

Jeff and Cindy have learned their share of lessons and now hope that their experience offers tips or useful models to other beginning farmers. Jeff's "favorite mistake" was the day the pigs got out; he describes how they ran and ran through the field, looking so happy (he even swears they were giggling)! His initial concern subsided when they steered clear of the road. When they were done playing about 30 minutes later, they simply came back to their pen. On a more serious level, Cindy learned that when the books say, "Site selection is the most important part of any orchard" – they're not kidding! And they both felt that raising Red Broilers in 2010 was an important example of how adjustments to their production system will be an ongoing challenge (see [Production > Harvest & Processing > Poultry](#)). Whether it's establishing a now-thriving orchard or watching broiler productivity improve (Figure 10), they both look forward to further improvement on all fronts.



Figure 10. Cindy and Jeff's farming practices are ever-evolving, as demonstrated by the Red Rangers they chose to raise in 2011 (shown as chicks, above; see also [Production > Harvest & Processing > Poultry](#)) and the plant sampling they are doing as part of their on-farm research (at left; see also [Production > Production Methods > On-Farm Research](#)).

Appendix I

Clover Valley Farms Poultry Pre-Sale Order Form - 2011

Name:
Address:

Phone(s):
Email:

Prices for Pre-ordered birds: Cornish and Red broilers are \$3.90/lb, ducks and turkeys are \$5.50/lb due to the extra cost of the chicks and time required for processing. A non-refundable \$5 deposit per bird is required. If you are unable to arrange for pick up of your birds on any of the dates listed, we can freeze & store them for additional fee of \$1.00/bird.

Expected Weights: Cornish and Red Broilers generally range between 4.5 to 6 lbs, ducks are approx. 4.0 to 5.0 lbs, and turkeys are expected to be 10 to 15 lbs. We do our best to accommodate size preferences, but you will need to be willing to take what is available.

Processing and Packaging: All processing will take place between 8am-2pm on the Friday of a given delivery weekend. All birds will be doubled bagged and freezer ready. ***BUT, plan on keeping your birds refrigerated for 24-48 hours to allow the meat to "rest" before cooking or freezing them or they can become tough and dry.***

Delivery Locations and Times:

- 1) **On Farm Pick-up, 4-6pm:** at Clover Valley Farms, 6534 Homestead Road. Driving from Duluth, go up the expressway towards Two Harbors 14 miles to the Homestead Rd., turn left (north, away from the lake) and go just over 4 miles to our farm on the right.
- 2) **Duluth Pick-up, 10am-noon:** 1520 N. 9th Ave. E. (up the hill from Grant School and that 5 way intersection at Kenwood).

Bring a cooler, with ice, large enough for the number of birds you ordered!

Final Payment (check or cash) is due at pick up.

PLEASE, circle your desired delivery dates & locations below for the bird you order:

<u>Dates of "on Farm" Deliveries (4-6pm):</u>	<u>Dates of "Duluth" Deliveries (10am-noon):</u>	<u>Indicate the number of each type of poultry of you want to reserve:</u>	<u>\$5 deposit per bird:</u>
Friday, July 29 th	Saturday, July 20 th	White Pekin Ducks <input style="width: 40px; height: 20px;" type="checkbox"/>	
Friday, July 22 nd	Saturday, July 23 rd	Cornish Broilers <input style="width: 40px; height: 20px;" type="checkbox"/>	
Friday, August 5 th	Saturday, August 6 th	Cornish Broilers <input style="width: 40px; height: 20px;" type="checkbox"/>	
Friday, August 12 th	Saturday, August 13 th	Cornish Broilers <input style="width: 40px; height: 20px;" type="checkbox"/>	
Friday, August 19 th	Saturday, August 20 th	Red Broilers <input style="width: 40px; height: 20px;" type="checkbox"/>	
Friday, August 26 th	Saturday, August 27 th	Turkey <input style="width: 40px; height: 20px;" type="checkbox"/>	
For ordered that need to be frozen for later pick up, add an additional \$1 per bird:			
TOTAL DEPOSIT ENCLOSED:			
We expect to have a few pastured hogs for sale by the half or whole. We will provide custom processing, but you cannot select individual cuts. We are not taking pre-orders or setting prices at this time. Check here to be notified when we know what we will have available...			<input style="width: 40px; height: 20px;" type="checkbox"/>



Make Checks Payable to: Clover Valley Farms, LLC

Mail completed order form with deposit to:

Clover Valley Farms, LLC
6534 Homestead Road
Duluth, MN 55804
218-525-0094

Appendix II

Clover Valley Farms Annual Calendar

	Apples	Layers	Broilers	Turkeys	Ducks	Hogs
Dec	Year end assessments & planning	Year end assessments; daily hen care, collect & market eggs	Year end assessments			
Jan						
Feb	Pruning	Plan for coming year; daily hen care, collect & market eggs	Plan for coming year; conduct customer surveys if needed			
Mar	Bench grafting	Daily hen care, collect & market eggs	Order birds; send out customer order forms			Find source for feeders
Apr	Field grafting; set up IPM data logger	Acquire or breed hen chicks; daily hen care, collect & market eggs	Set-up brooders; repair field pens; ducklings arrive			Feeders arrive
May	Monitor for fruit set & development; do IPM	Hen chicks in brooder early, then into portable hen coop; daily hen care, rotate through paddocks, collect & market eggs	1st batch(es) of broiler chicks arrive	Turkey chicks arrive	Feed/water 2x daily, rotate through orchard/paddock	Feed/water 2x daily, move pens weekly
Jun		Daily hen/hen chick care, rotate through paddocks, collect & market eggs	2nd batch(es) of broiler chicks arrive; 1st batch(es) of broilers: feed/water & move on pasture daily	Feed/water daily, rotate in orchard/paddock		
Jul		Process cocks & stewing hens; daily hen care, rotate through paddocks, collect & market eggs	3rd batch of broiler chicks arrives; daily care for broilers on pasture; process & sell 1st batch(es) of broilers		Process & sell	
Aug		Harvest	Integrate new birds with wintering flock; daily hen care, rotate through paddocks, collect & market eggs	Daily care for broilers on pasture; process & sell 2nd & 3rd batch(es)	Process & sell	
Sep	Fall clean-up					
Oct	Pressing	Daily hen care, rotate through paddocks, collect & market eggs				Send for processing
Nov	Fall orchard preparations for winter; value-added products	Daily hen care, rotate in hoop houses, collect & market eggs				Product available to customers

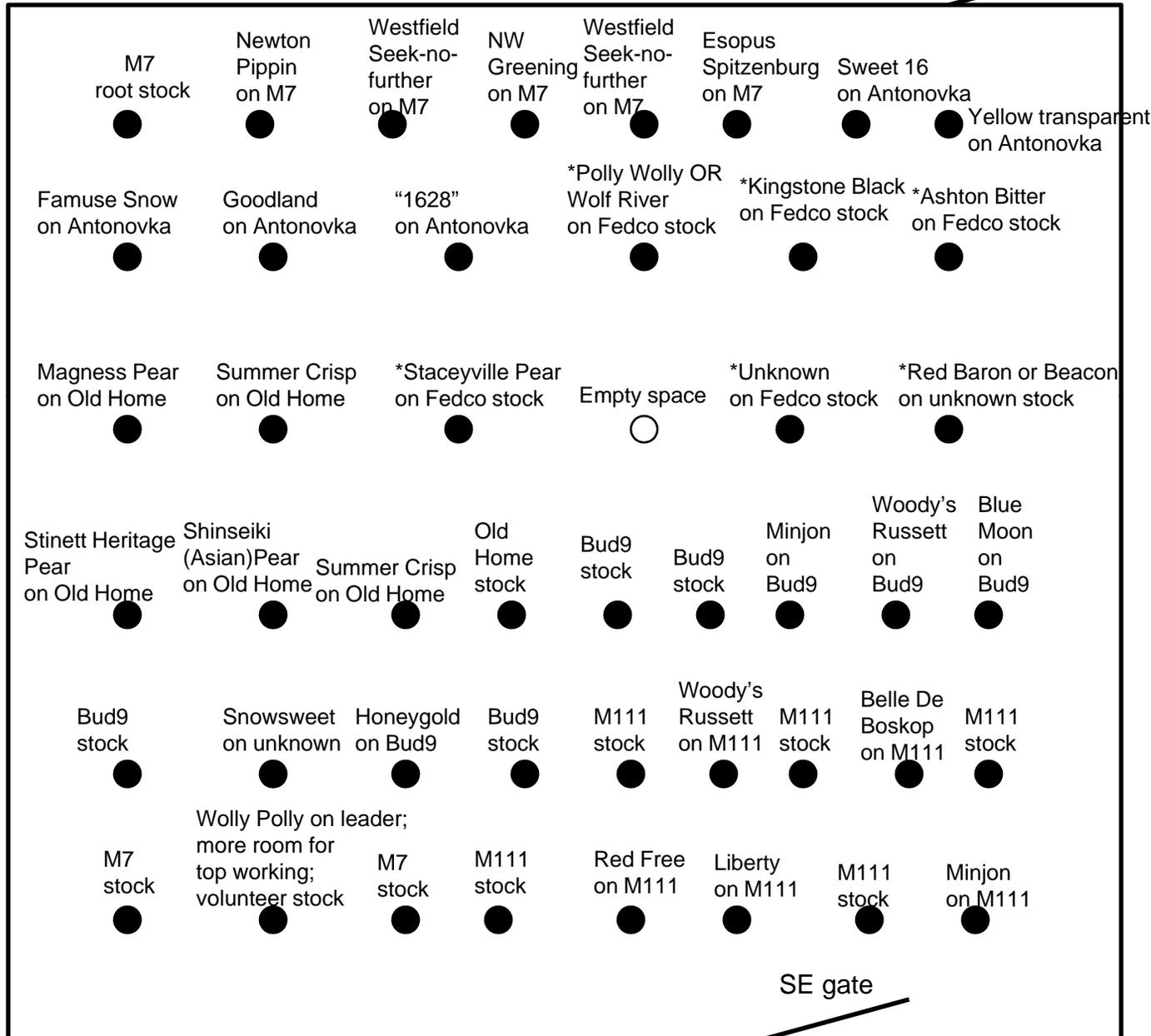
Appendix III



"New Fenced Orchard" – established 2010

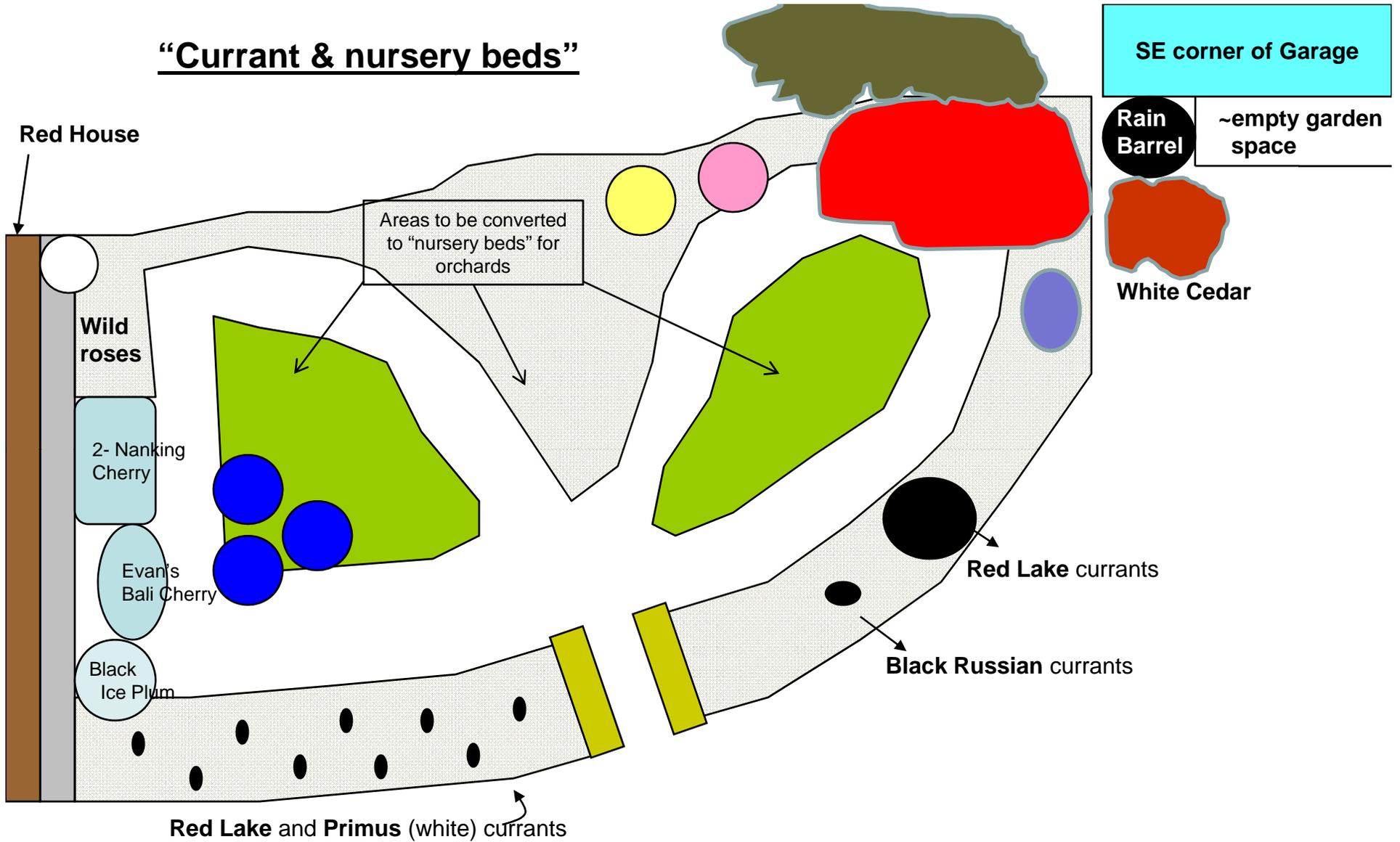
*= transplanted from the "old-new orchard" originally planted in 2005 - 2007;
all others planted as grafted whips

NE gate



SE gate

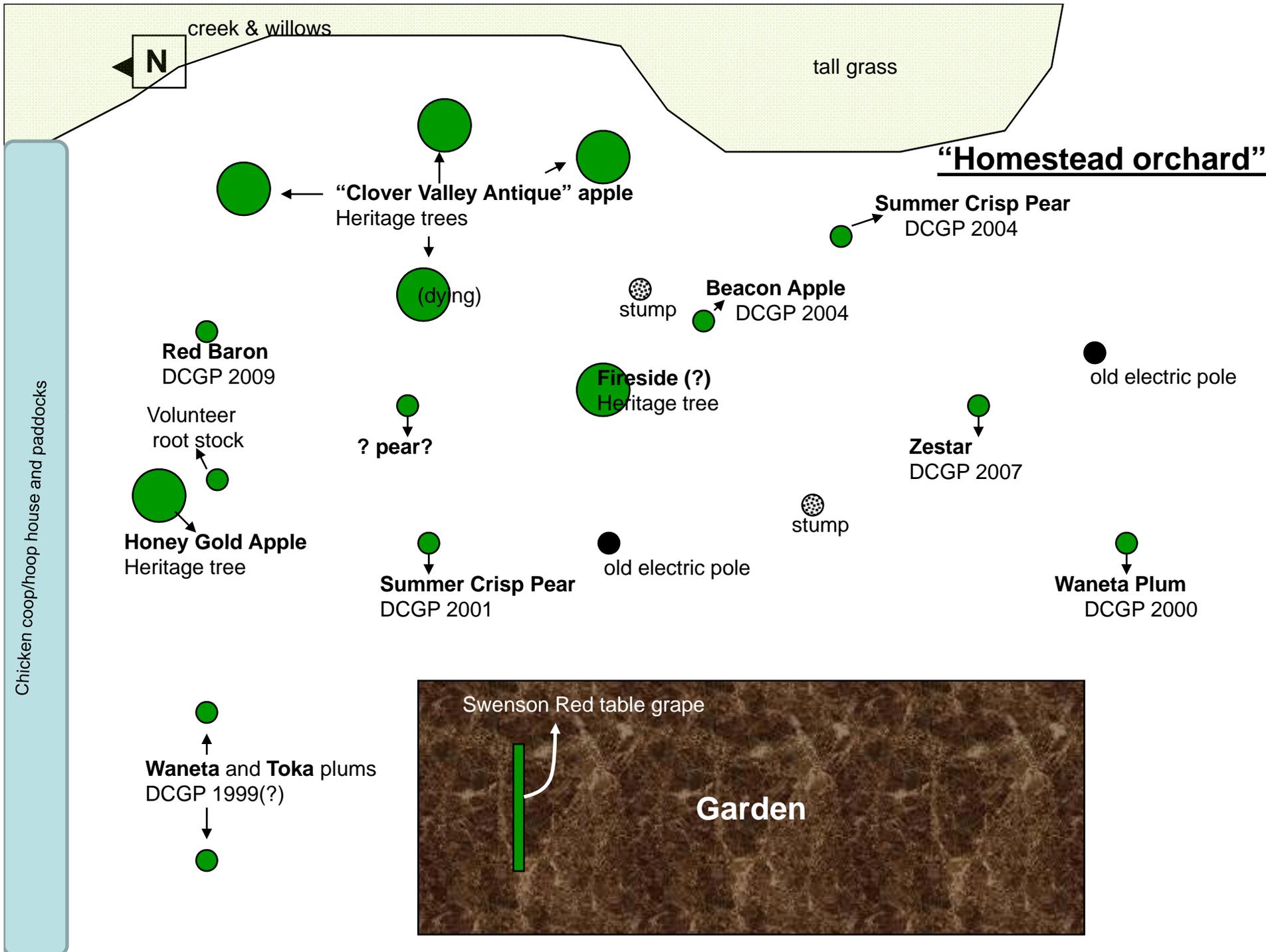
"Currant & nursery beds"

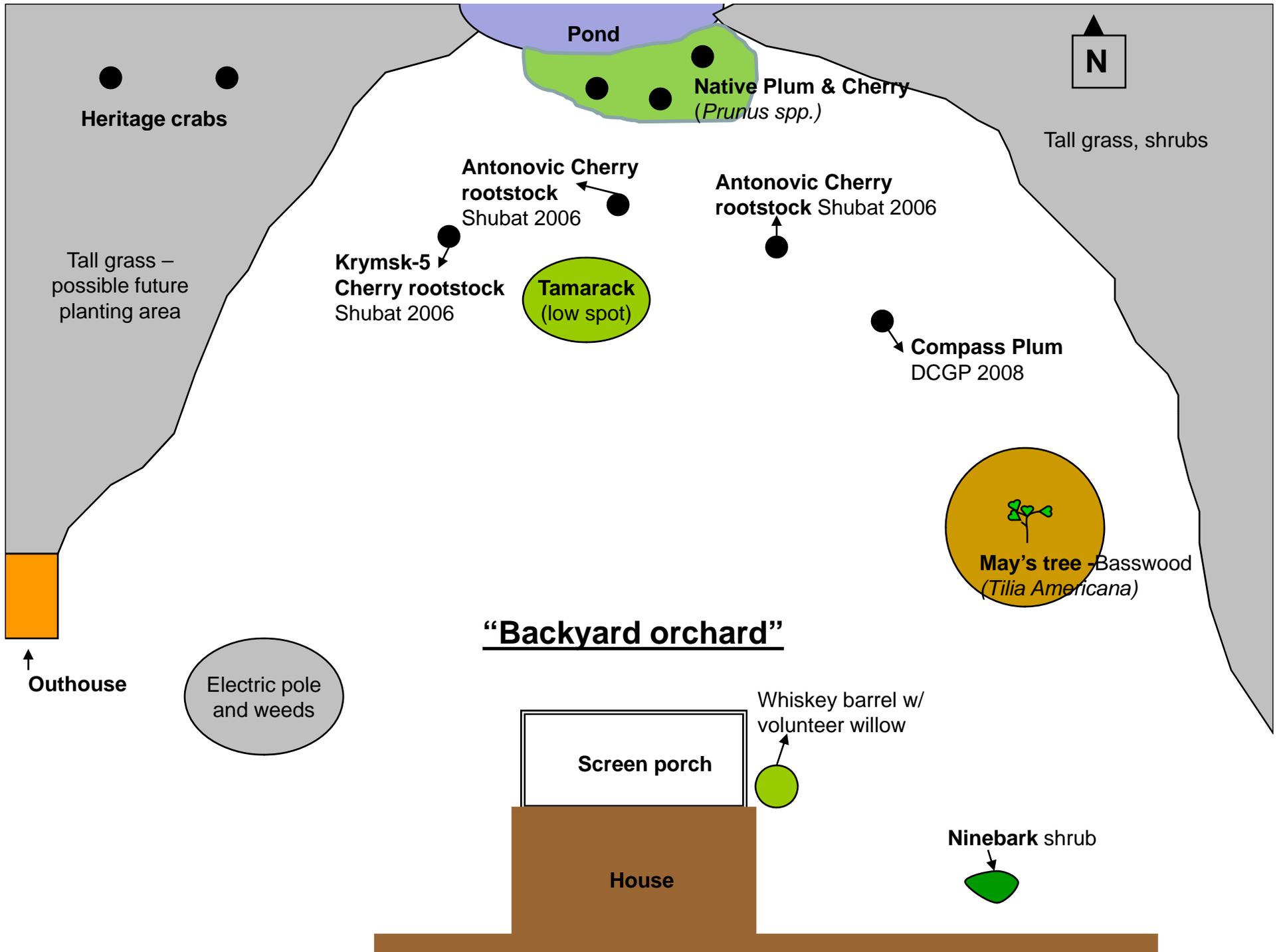


□ = empty
 ■ = Blueberries – mixed varieties

■ = Peony
 ■ = Clethra
 ■ = Roses
 ■ = Baptisia
 ■ = White Spruce





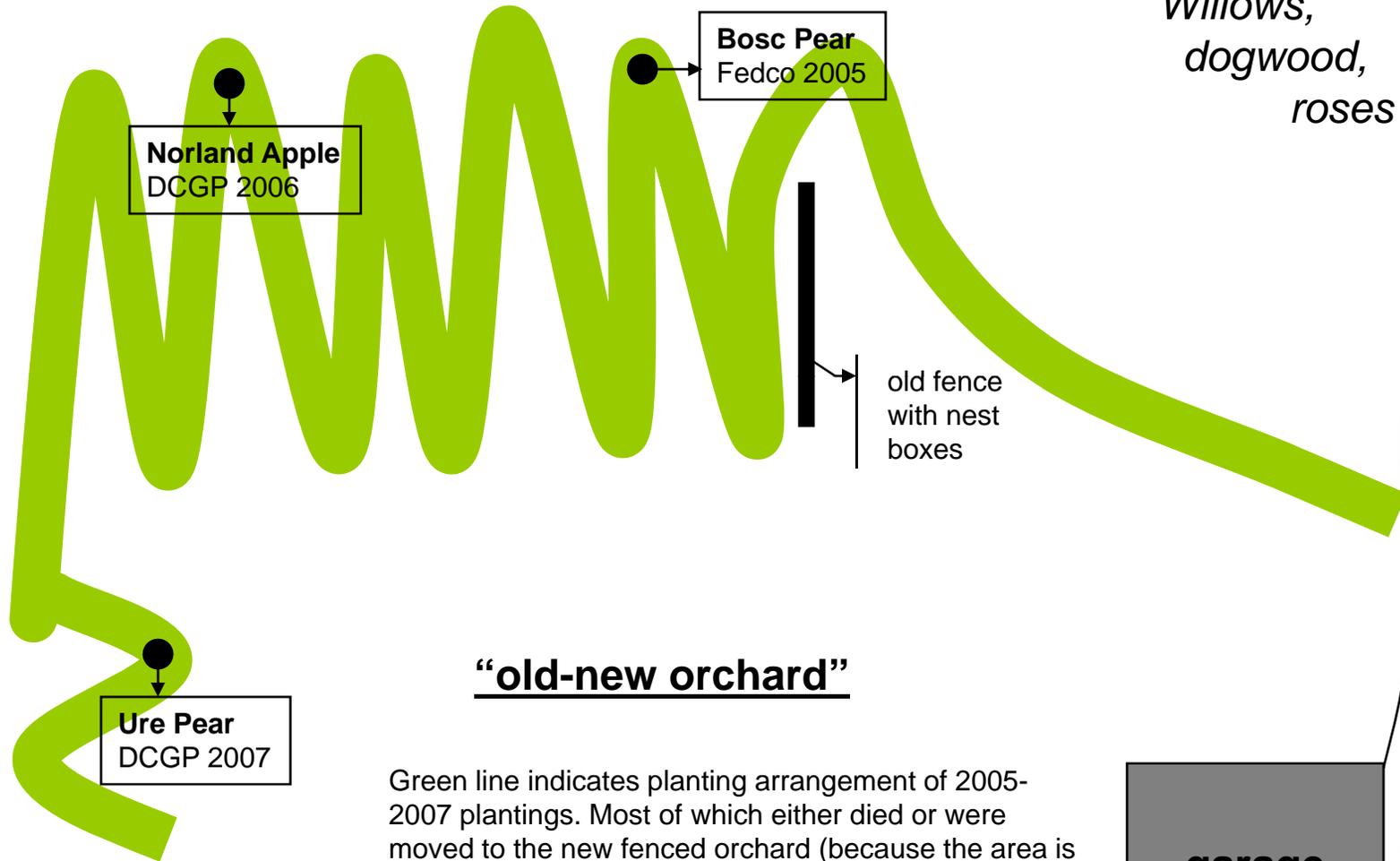


Homestead Road



Hedgerow of scotch pine, spruce, June berry and willow

*Willows,
dogwood,
roses*



“old-new orchard”

Green line indicates planting arrangement of 2005-2007 plantings. Most of which either died or were moved to the new fenced orchard (because the area is too wet overall). The three remaining are healthy and individually fenced for deer protection. This area may be prepared for future plantings, now that I know more to develop better drainage.

garage

driveway

Appendix IV

Clover Valley Farms Customer Survey 2009

- 1 What products did you purchase from Clover Valley Farms in 2009?
(check all that apply)

- Cornish Broilers
 Red Broilers
 Ducks
 Stewing Hens
 Eggs
 Other, please specify _____

- 2 Please rate the quality of each product you purchased from us.

	1	2	3	4	5	N/A
	very poor	below average	average	above average	excellent	
Cornish Cross	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Additional Comment	<div style="border: 1px solid #ccc; height: 20px; width: 100%;"></div>					
Red Broilers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Additional Comment	<div style="border: 1px solid #ccc; height: 20px; width: 100%;"></div>					
Ducks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Additional Comment	<div style="border: 1px solid #ccc; height: 20px; width: 100%;"></div>					
Stewing Hens	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Additional Comment	<div style="border: 1px solid #ccc; height: 20px; width: 100%;"></div>					

Eggs

1 2 3 4 5

Additional Comment

Other (please specify)

1 2 3 4 5

Additional Comment

-
- 3** As we plan for the coming year, what products would you anticipate purchasing from us again in 2010?

We anticipate that our prices will remain the same EXCEPT for duck which will go up to ~\$5/lb from \$3/lb due to increased cost of chicks and extra processing time required.

- none
 - cornish broilers
 - red broilers
 - ducks
 - stewing hens
 - eggs
 - Other, please specify
-

-
- 4** If we expand the products we offer in the coming years, please indicate what NEW products you would be interested in purchasing, check all that apply.

- turkeys
- rabbits
- pork
- duck eggs
- table apples (fresh for eating or cooking)
- processed apple & fruit products (applesauce, jams, jellies, etc.)
- Other, please specify

-
- 5 We are considering moving towards a CSA model for selling our egg & meat products with regularly scheduled deliveries of fresh & frozen meats.

For example, each month you might get 1 chicken (i.e. broilers), 1 cut of pork (i.e. burger, steaks, chops, roasts, hams, bacon) and 2 dozen eggs, with one additional meat type every other month (i.e. a turkey in the fall, duck, rabbit, stewing hen, lamb, salmon).

The price would be expected to range between \$550-\$650/year.

Interested? Give us your comments and suggestions!

Additional Comment

-
- 6 For an Egg & Meat CSA, what products would you want it to contain (check all that apply)

- cornish broiler
 - red broiler
 - stewing hen
 - duck
 - turkey
 - chicken eggs
 - duck eggs
 - rabbit
 - pork
 - lamb (purchased for the CSA from another producer)
 - salmon (purchased for the CSA from another producer)
 - a "surprise", for example, herbs or apple products
 - Other, please specify
-

7 For an Egg & Meat CSA, how often would you like to have delivery?

- monthly
 - every 2 months (6 deliveries a year)
 - quarterly (4 deliveries a year)
 - Other, please specify
-

8 For an Egg & Meat CSA, where would you prefer to get the delivery?

- on farm pick up
 - a business location in Duluth
 - a private home in Duluth
 - Other, please specify
-



Survey Page 1

Appendix V

Clover Valley Farms, LLC
Balance Sheet
As of December 31, 2010

	<u>Dec 31, 10</u>
ASSETS	
Current Assets	
Checking/Savings	
Savings-CloverValleyFarmsLLC	400.00
Total Checking/Savings	400.00
Accounts Receivable	
Accounts Receivable	4,278.50
Total Accounts Receivable	4,278.50
Total Current Assets	4,678.50
Fixed Assets	
Farm Equipment	16,263.22
Total Fixed Assets	16,263.22
TOTAL ASSETS	<u>20,941.72</u>
LIABILITIES & EQUITY	
Liabilities	
Current Liabilities	
Accounts Payable	
Accounts Payable	555.04
Total Accounts Payable	555.04
Other Current Liabilities	
Agstar - MPU loan	12,769.36
Total Other Current Liabilities	12,769.36
Total Current Liabilities	13,324.40
Total Liabilities	13,324.40
Equity	
Owners Draw	12,940.63
Net Income	-5,323.31
Total Equity	7,617.32
TOTAL LIABILITIES & EQUITY	<u>20,941.72</u>

Appendix VI

9:00 AM
02/22/11
Accrual Basis

Clover Valley Farms, LLC
Profit & Loss
January through December 2010

	<u>Jan - Dec 10</u>
Ordinary Income/Expense	
Income	
Crop Sales	404.70
Egg Sales	1,849.50
Feed Sales	502.70
Livestock Sales	5,480.58
Other Sales	7.45
Total Income	<u>8,244.93</u>
Cost of Goods Sold	
Equipment Rental	459.48
Feed Purchased	5,569.06
Livestock	1,168.43
Processing	498.69
Sales tax	246.16
Seeds and Plants Purchased	815.65
Small Tools and Equipment	1,037.53
Total COGS	<u>9,795.00</u>
Gross Profit	-1,550.07
Expense	
Advertising and Promotion	134.38
Car and Truck Expenses	1,565.85
Computer and Internet Expenses	199.99
Dues and Subscriptions	160.00
Educational Expenses	430.00
Farm Supplies & Materials	3,193.63
Freight and Trucking	346.11
Insurance Expense	34.00
Meals and Entertainment	26.92
Miscellaneous Expense	266.01
Office Supplies	118.97
Postage and Delivery	212.25
Professional Fees	1,450.00
Repairs and Maintenance	919.74
Total Expense	<u>9,057.85</u>
Net Ordinary Income	-10,607.92
Other Income/Expense	
Other Income	
Grants Received	7,867.00
Total Other Income	<u>7,867.00</u>
Other Expense	
Interest Expense	531.39
Intern Stipend	2,051.00
Total Other Expense	<u>2,582.39</u>
Net Other Income	<u>5,284.61</u>
Net Income	<u><u>-5,323.31</u></u>