

Farmer Rancher Grant Program

Final Report Form

Please fill out the final report form and post it on MySARE. If you do not have Internet access, return the form to the North Central Region-Sustainable Agriculture Research and Education (NCR-SARE) Missouri office. The report may be prepared on a computer or handwritten (please write or print clearly) but electronic reports are preferred. The final payment of your grant will be awarded when the final report and final budget report are received and approved.

Use as much space as needed to answer questions. You are not limited to the space on this form. The more details the better.

I. PROJECT IDENTIFICATION

- Name: Clover Valley Farms, LLC - Cindy Hale and Jeff Hall
- Address: 6534 Homestead Rd.
- City, State, Zip Code: Duluth MN 55804
- Phone: 218-525-0094
- Website: www.clovervalleyfarms.com
- Project Title: **Comparing the pasture restoration potential and financial viability of Cornish Cross vs. Red Broilers, in combination with heritage pastured hogs, for a small pastured poultry operation in NE Minnesota**
- Project Number: FNC09-758
- Project Duration: 3 year
- Date of Report: March 28, 2013

II. PROJECT BACKGROUND

1. Briefly describe your operation (i.e. how many acres, what crops, types of cropping systems, type of livestock or dairy production, grazing systems, family operation, etc.)

We began developing a small homestead farm 13 years ago, on 25 acres of mixed farmland and forest 20 miles north of Duluth, Minnesota. Our production methods are completely organic, though not certified, and we have currently have 5 acres are in organic (non-certified) hay field/pasture for poultry and hogs and 3 acres in gardens, orchard and greenhouse. In our year-round solar greenhouse we grow vegetables, greens, flowers and herbs for our own use and sell herbs (Rosemary, Thyme, Lavender, and Sage) to the local food cooperative. We restored a 6 tree orchard starting in 1996 and have since planted a 20+ tree orchard (apple, plum, pear and cherry) which we plan on continuing to expand. In 2009, we began participating in a statewide apple orchard IPM monitoring program with the Minnesota Department of Agriculture. In 2005, we began a small, non-certified organic, direct to consumers, pastured poultry operation. We use Salatin-style pasture pens (8 ft. x 10 ft.) and currently raising 300 Cornish Cross, 100 Freedom Ranger Broilers and 50 Broad-Breasted White turkeys. We previously raised ducks as well but gave them up due to high cost and difficulty processing. We also sell eggs from and 80+ hen flock. All products are sold direct to consumers. We pre-sell all poultry in the spring and do on

farm-processing for fall delivery. Eggs are sold via quarterly CSA shares at 4 different delivery locations weekly. We added pastured hogs to our operation in the summer 2009 and in 2013 will raise 8 hogs which are sold by the half/whole and custom processed for customers locally. We currently serve ~130 customers annually. We have been exploring value-added products including canned fruit goods, soaps, apple wood products, honey bees and culinary vinegars. When not farming, Jeff works as a teaching aid in the Duluth Public schools and as such has the summer months off to devote to full-time farming. With the growth of our business and the potential to develop other enterprises we have been exploring Cindy is expecting to begin full-time farming year-round starting summer 2013.

2. Before receiving this grant, did you carry out any sustainable practices? If so, briefly describe what they were and how long you had been practicing them.

We have always strived to integrate ecological principles and sustainable practices in all aspects of our farming operation. Before receiving the grant, we used these principles but since the start of the grant but we have added and improved these systems considerably. These include but are not limited to:

- No heavy equipment or resource intensive infrastructure. We use a small lawn tractor and tiller, and a few small engines (chain saw, string trimmer, etc.) and hand tools for all farm operations and choose not to take on practices that would require more. We feel this limits our carbon and resource use.
- A rotational pasture based animal operation. All of our animals are pasture raised (supplemental rations to ensure complete nutrition are used) and the rotational system prevents parasite problems, limits negative impacts on pastures and increases the pasture quality for not only our own animals but for wildlife as well. We were proud of the fact that three native species of grassland birds (Meadowlark, Dickcissel and Bobolink) that were once common in our area but had not been documented breeding for many years all successfully bred in our pastures in 2012!
- Integrated Pest Management is used in our fruit operation to monitor pests and address pest control with little or minimal spraying. When we spray, the sprays are highly targeted and products as minimally toxic as possible (i.e. Bt, dormant oil spray). Hygienic orchard management and grazing by our animals has been successful in largely controlling weeds, pests, disease and maintain fertility of our fruit operations.
- Rainwater harvesting is used for irrigation to limit ground water use
- Alternative energy systems are used to power fans in our greenhouse (PV panels) and heat our intern housing (direct air heat solar unit).
- We compost everything! As a result we have never had to add fertilizers to any of our production systems.
- In concert with pasture rotation, we minimize, perhaps eliminate soil loss and maximize water infiltration. In spring 2012 when everyone around us was flooding, our 3 week old Cornish chicks were dry on our pastures!

III. PROJECT DESCRIPTION

GOALS

The project goals were to measure the ability of two different chicken breeds (Cornish Cross and Red Broilers) to improve pasture quality of an unproductive hay field based on the relative changes in plant composition and productivity after grazing by chickens alone, following grazing by heritage hogs (Tamworth/Bershire crosses) and by a combination of grazing and seeding with a 50:50 red and white clover mix. Our specific objectives were to:

- 1) determine the impacts of grazing by hogs alone and in combination with Cornish Cross or Red Broilers on the relative changes in plant composition and pasture productivity.
- 2) determine the financial break-even point for each chicken breeds related to any changes in pasture forage quantity or quality (e.g. the lbs. of feed required per unit finished weight of chickens).

PROCESS

We used part of a 5-acre hay field for the study. This field has had no fertilizer applied for many years. In 2010, the first year of the study, the experimental field block (Figure 1) was set-up to create a strip that was pastured by hogs parallel to a strip that was not pastured by hogs. Half of the experimental area was grazed by hogs, followed by two breeds of chickens and half of the area was only grazed by chickens. Each “hog strip” contained three chicken treatments (e.g. Red Broilers, Cornish Cross Broilers, and no bird control). Every other pen/plot of chickens were followed by seeding or no seeding with a 50:50 white & red clover mix. The seeding was done after the chickens moved over the test plots so they would not eat the seed. The overall experimental design provides us with a minimum of 35 plots throughout the season from each of 12 treatments including:

- 1) grazing by hogs only (no chickens) - seeded
- 2) grazing by hogs and Cornish Cross Broilers - seeded
- 3) grazing by hogs and Red Broilers - seeded
- 4) grazing by Cornish Cross Broilers only (no hogs) - seeded
- 5) grazing by Red Broilers only (no hogs) - seeded
- 6) no grazing – seeded
- 7) grazing by hogs only (no chickens) - not seeded
- 8) grazing by hogs and Cornish Cross Broilers - not seeded
- 9) grazing by hogs and Red Broilers - not seeded
- 10) grazing by Cornish Cross Broilers only (no hogs) - not seeded
- 11) grazing by Red Broilers only (no hogs) - not seeded
- 12) no grazing – not seeded

The objective of this design was to allow us to test the pasture rejuvenation potential of hogs and two different breeds of broilers alone or in combination, and whether or not seeding was required to provide the desired forage enhancement following the various grazing treatments.

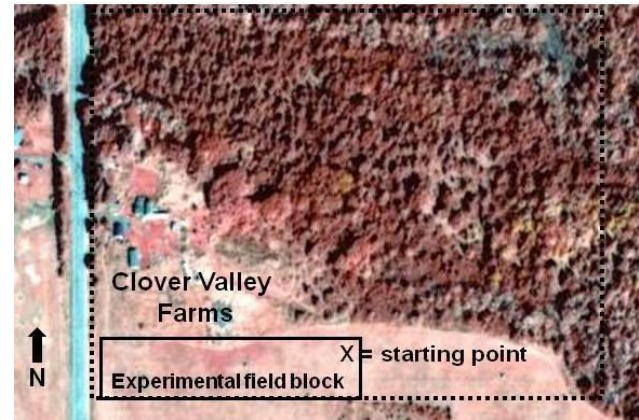
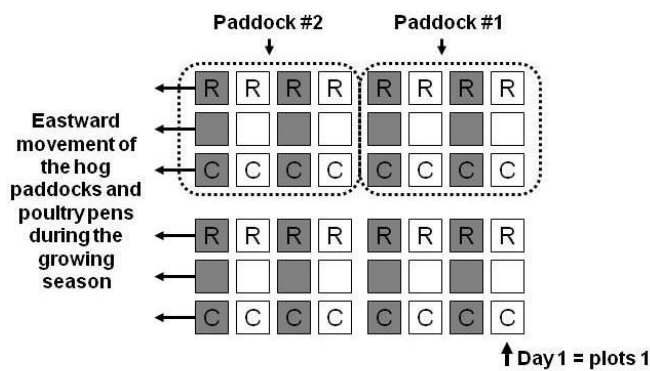


Figure 1. Hogs were placed on pasture in the NW corner of the experimental field block on April 25th, 2010 and moved every 7-15 days. Chickens were placed on pasture June 28th, 2010 using 8x10 ft Salatin Style pens established inside and outside the hog paddock area on the far west side of the block. “R” indicates pens containing 50 Red Broilers, “C” indicates pens containing 50 Cornish Cross Broilers and the blank boxes indicate the “no bird” controls. White boxes indicate pens/plots that were seeded with a 50:50 white & red clover mix and the gray boxes indicate pens/plots that were not seeded.



Figure 2. Young hogs on pasture (left) and hog paddock (right) showing portable perimeter fencing, Port-a-hut shelter, watering font, hogs at about ¾ finished size and our daughter/field hand May on the lawn tractor.

The field trial activities started April 25, 2010 with the establishment of the first of what would be 15 rotational hog paddocks. Figure 1 shows where in our pasture the experiment took place and the set-up and movement of the hog paddocks and chicken pens throughout the field season. The hog paddock was a portable electric fence with a 164 ft. perimeter set 30ft wide, to accommodate the establishment of 3 chicken treatments (Cornish Broilers, no bird control, and Red Broilers), and 40 ft. long to accommodate 4 plots of each treatment. So, each paddock covered approximated 12 experimental plots (four plots of each of the three bird treatments). The first hog paddock was established on April 25th with six ~40lb feeder hogs. An 8 x 14ft Port-a-

Hut provided shelter in the paddock and contained a 2 hopper, 300lb capacity feeder. An 80 gallon tank with 2 founts was used. The paddock and hogs were moved for the first time on May 15th and 7-15 days after that, based on the level of rooting/sod break up that had been achieved. We attempted to standardize the level of disturbance as best we could with of goal of ~80% disturbance before each move. In addition to the available pasture forage the hogs were fed a 16% transitional organic swine starter ration until they reach ~100 lbs. at approximately 10 weeks at which time they were switched to a 14% transitional organic swine grower ration for 14 weeks until finished. Hogs were grazed in the experimental area only in the first year (2010) due to the high level of disturbance; we wanted to have at least 1-2 years following their grazing to assess the nature of their impacts. However, the various treatments of chickens were applied for each of the 3 years of the study.



The chicken pens were 8x10ft (2.5 ft tall) Salatin style pens that contained 50 birds of each breed (Cornish Cross or Red Broilers), or an 8x10 control plot with no birds (Figure 1). All chickens were placed on pasture at 3 weeks of age, the specific date varied with each year (2010-2012). The pens were moved daily in the morning to encourage maximum foraging during the daylight hours. Each pen contained 5 gallon

galvanized water fonts that were filled in the morning and evening each day. Feed was provided in the late afternoon using two 22 lb capacity feed hoppers in each pen. The total amount of feed added to each pen each day was recorded (~10 lbs a day early in the season to ~25lbs a day at the end). Sufficient feed was added every day to ensure that some was left in the morning, when any uneaten feed was removed to prevent overheating of birds during the day, and to encourage foraging. In addition to the available pasture forage broilers were fed a 19% transitional organic poultry grower ration until processing (8 weeks of age for Cornish and 14 weeks of age for Red Broilers). Seeding of alternate plots was done in 2010 using a 50:50 red & white clover mix. Each pen/plot was flagged and labeled (wire stake flags on the N & S corners of each plot) after that section of the pasture was moved over by the hogs (plots in the no hogs strip were flagged at the same time) with every other plot designated to be seeded. Plots designated to receive seeding had a pre-measured amount of seed (.04lbs of each seed type which translated to a rate of ~3,200,000 live pure seeds/acre). Seed was spread by hand over the 8 x 10 ft. plot area after being grazed by hogs or after being grazed by chickens.



Two week old Cornish Cross chicks on pasture (left), day-old Red Rangers in brooder.

Each year, we compared the cost efficiency of the two chicken breeds on the areas previously grazed by hogs vs. not grazed by hogs, half of which was seeded with clover after the chickens pass over it. In year 2010, all chickens were grazing on unimproved pasture. In years 2011 and 2012, chickens were grazed on the same areas as in 2010. So the cumulative effects each treatment could be assessed after 3 years.

Cindy conducting plant sampling.



Plant sampling was conducted in June of 2009 prior to the study and in 2011 and 2012 just before putting birds on pasture. In 2011, plants were sampled to measure the biomass of different species/plant groups in each treatment area. A 4 inch wide x 4 ft. long strip of vegetation was clipped down the center of each 10ft x 10ft sample plot and collected in large flat (Photo 1). A total of 64 plots were sampled, between 8 and 13 samples were collected from each of the chicken and seed combinations. The samples from each plot were placed in labeled paper bags and oven dried at 60° C for 48 hours. The samples were weighed to determine the dried plant weights for each species/plant group in each plot. In 2009 and 2012, plants were sampled to measure the relative abundance of different plants in each treatment area. For each of the 64 plots sampled in 2011, visual estimates of percent cover (0-100%) were made for each species/plant group in each plot.

PEOPLE

- Wayne Martin, University of Minnesota, Integrated Livestock Production Systems Program, St. Paul, MN provided ongoing discussions with us on the project which helped us clarify the issues we faced and potential solutions.
- Craig Sheaffer, Professor, University of Minnesota, Department of Agronomy and Plant Genetics, St. Paul, MN provided very valuable insights and recommendations on how to conduct plant sampling and analysis for this project.

- Ryan Cox, University of Minnesota, Department of Animal Science, St. Paul, MN provided recommendation early in the project on how to survey customers to get feedback related to meat quality and customer preferences.
- Cree Bradley, Lake Superior Sustainable Farming Association, Lake Superior Farm Beginnings Program Coordinator, Two Harbors, MN assisted in organizing and advertising field days and outreach related to this project through the LS-SFA and their Farm Beginnings Program.

RESULTS and DISCUSSION

Pasture Rejuvenation

Aerial photos taken before the study (~ 2007, above) and after the first year in 2010 (Google Earth, below) clearly show a difference in vegetation in the area included in the study, outlined in yellow, and the surrounding pasture that has received no improvements. In the 2010 image you can see the Salatin pens, small white squares, and the tracks they moved along through the season. The small rectangular spots in the area grazed by hogs are the locations of the Port-a-Hut shelter in each paddock as they moved eastward that were associated with excessive rooting and the creation of wallows for and by the hogs. (Note: the bare areas and pens outside the yellow outlined area are from activities not part of this study).





Overall, we are very pleased with the pasture rejuvenation results achieved through this study as a whole and in particular through grazing of chickens using the Salatin pens. Within 3 years we saw substantial increases in the quality and quantity of forage available and improvement in the key soil measures of % organic matter, Phosphorus and K (potassium). Additionally, the habitat quality of our pasture remained high or perhaps improved. Our pasture is used extensively by native grassland breeding bird species and 2012 was a high water mark in that we were able to document breeding by Sedge Wrens, Dickcissels and Bobolinks for the first time. Local birders made our field a regular stopping place to view these rare species that used to be common. We also continued to see high levels of nesting success in 4-5 sparrow species and bluebirds (nest boxes along field edge).

The average number of plant species and the specific species present in plots did not change throughout the study. However, the relative proportions of different plant groups changed as the study progressed (Table 1). Preliminary survey of the plant community in 2009 prior to the study showed that narrow-leaved grass and grass-like species (e.g. *Poa* spp., *Carex* spp., *Juncus* spp.) dominated the plant population. Broad-leaved grasses composed only a small proportion including Timothy grass (*Phleum pretense*), Native Canary grass (*Calamagrostis canadensis*) [note: commonly referred to as “reed canary grass” but not the exotic species *Phalaris arundinacea*]. A diverse mix of forb species composed just under ¼ of the plant community including Hawkweed, Buttercup, Ox-eye Daisy, Yarrow, Asters, Plantain, Wild Strawberry and Chickweed. Legumes (e.g. white & red clovers and field pea) made up the smallest component.

As the study progressed, overall the grass community shifted from being dominated by smaller, narrow-leaved grasses and sedges toward larger, broad-leaved species. However, this shift was significantly greater in the area that was grazed by hogs and chickens compared to the area only grazed by chickens (Table 1). Recall that hogs were grazed on one half of the experimental area only in 2010 but chickens were grazed on both halves in all 3 years of the study (2010-2012). Clearly the hogs have a large impact on the long term trajectory of the plant community. This is particularly noteworthy since they grazed any given paddock for only 7-15 days. The disturbance even in that short period can set the stage for long-term changes. So when managing a rotational pasture system with hogs this needs to be taken into account. Even in 2012, though independent estimates were not made for narrow vs. broad leaved grasses, field notes indicate a dominance of Timothy and Canary grass in both the grazed areas. The proportion of sedges and rushes decreased proportionally as the larger grass species expanded. The relative amounts of forbs and legumes did not significantly change throughout the study. Though the averages reported here look substantial, there was a great deal of variability (i.e. some plots had a lot and some very little) so the averages are not significantly different. One example of this variability resulted from obvious patches of increased vegetative growth around the feeders and watering fonts where the chickens pooped the most. Also, overall plant biomass responses to grazing by chickens appear to increase as the birds aged and produced more manure each day.

Table 1. The average proportion of forage in each of 5 plant categories for the entire pasture before the study began (2009) and compared between the area grazed by hogs and chickens vs. the area grazed only by chickens.

Year of study	% Narrow Leaved Grasses	% Broad Leaved Grasses	% Sedges & Rushes	% Forbs	% Legumes
2009*	42%	6%	28%	21%	3%
2011 [#] chickens only	34%	27%	13%	19%	7%
2011 [#] hogs & chickens	25%	43%	5%	19%	7%
2012* chickens only	47% (all grasses combined)		19%	32%	3%
2012* hogs & chickens	62% (all grasses combined)		6%	28%	3%

*Values based on visual estimates of percent cover

[#]Values based on measured biomass

The average total biomass of forage available to the chickens in each treatment was measured directly in 2011 (Table 2). There was no difference in total biomass among the seeded vs. not-seeded treatments so they were combined when analyzing for the impacts of hogs and each chicken breed compared to the no grazing control. The plots grazed by hogs alone, Cornish alone and hogs followed by Cornish had significantly more biomass available than the control area that had not been grazed. Grazing by Red broilers was not associated with a significant increase in plant biomass. Although the Red Broiler treatments had a higher average biomass

value than some other treatments, the range of values was such that there was no statistical difference in the plant biomass based on grazing by that species.

Table 2. Plant biomass sampled for each grazing treatment in 2011

Grazing Treatment Categories	Average total plant biomass (grams of dry weight per square foot)
Control: no hogs or chickens grazed	*24.4 g/sq. ft.
Cornish Cross only (no hogs)	*32.7 g/sq. ft. (26% increase over Control)
Red Broiler only (no hogs)	29.2 g/sq. ft.
Hogs only (not followed by chickens)	*40.5 g/sq. ft. (40% increase over Control)
Hogs followed by Cornish Cross	*48.3 g/sq. ft. (50% increase over Control and 16% increase over hogs only)
Hogs followed by Red Broiler	35.9 g/sq. ft.

*Statistical analysis indicated that the differences between these categories had a 95% likelihood of being the result of the treatment and not due to chance.

Soil sampling and analysis was conducted for the unaltered field conditions prior to study in 2009 and in each of the six treatments (see Table 2) at the completion of the study in 2012. All soil samples were collected in October, at the end of the growing season. >. Each sample was analyzed for soil texture, % organic matter, pH, buffer index, Phosphorus and K (potassium).



Soil Sample Collection: Soil samples collected included ~ 2 inches of mineral soil below the upper layer where there was substantial root growth and any accumulated surface organic matter, as indicated by the gloved fingers. The samples were broken apart and any stone or roots removed. Samples from each treatment were a composite of 10 soil cores collected in the field and them homogenized for a single sample sent for analysis to the UMN soil testing lab <http://soiltest.cfans.umn.edu>.

There was no difference in soil results between the seeded and not seeded treatments so they were combined in the results reported here (Table 3.). Soil texture (medium) remained the same throughout the study and all samples. The grazed plots have a notable increase in P and K compared to the pre-study 2009 results. Grazing by chickens alone led to an increase in organic

matter but grazing by hogs led to a decrease, presumably because the hogs root so extensively in the upper soil layer, they remove a substantial proportion of the organic matter. It is unclear how to interpret the fact that the 2012 control data also shows increases in organic matter, P and K relative to the 2009 control. The control plots were not hayed during the study which may have contributed to a moderate increase in % organic matter since hay was not being removed. Leaving the uncut vegetation may have also contributed to the increases in P and K. However, we would not recommend leaving a hay field or pasture uncut since there was substantial establishment of undesirable shrub and tree saplings (willow, alder, scotch pine) in the those plots. By grazing with chickens, undesirable trees are kept out of the pasture, P and K increase and % organic matter increases more than the uncut control plots. Remember, the chickens grazed on any given plot for only 1 day! So, the plots were able to re-vegetate and incorporate the manure the chickens had left behind. On contrast, grazing by hogs can clearly have a negative impact on soil qualities, therefore, limiting the time and intensity of their grazing in any given location would be highly recommended. Following the hogs with chickens, especially the Cornish, increased recovery rates of desirable soil characteristics.

Table 3. Soil analysis results prior to the study (2009) and in each grazing treatment in 2012.

Year/treatment	% organic matter	pH	buffer index	P (ppm)	K (ppm)
2009 - Control	5.0%	5.6	6.1	1	93
2012 - Control	6.0%	5.2	6.0	7	152
Cornish (no hogs)	6.8%	5.1	6.1	9	131
Red Broiler (no hogs)	6.7%	5.2	6.0	8	152
Hogs only	5.2%	5.3	6.1	7	123
Hogs followed by Cornish	5.9%	5.2	6.1	9	153
Hogs followed by Red Broiler	5.2%	5.3	6.1	7	122

Financial Break-Even Point for Each Chicken Breed

Overall, we have made good progress on maintaining or increasing the profit we make on our birds despite ~30% increases in feed costs. Through a combination of improved grazing which decreases the total amount of feed needed, and buying feed in bulk we managed to keep our production costs about the same for the Cornish Cross and substantially decreased costs of the Red Broiler/Freedom Ranger as the study progressed (Table 4). The production costs provided are comprehensive and include the cost of the chicks, feed, field & processing labor, transportation and misc. supplies. There was no significant difference in the growth rates or financial break even points among chickens raised in the area previously grazed by hogs and the area ungrazed by hogs.

Table 4. Comparison of Weight, Age, Costs and Profits of Broilers

Year: Breed	Average Market Weight (lb)	Age at Market	Average Cost/Bird	Average Sale Price/Bird	Average Profit/Bird
2010:					
Cornish Cross – straight run	4.1	8 weeks	\$11.35	\$12.30	8%
Red Broilers – straight run	3.8	14 weeks	\$17.80	\$11.40	(-56%)
2011:					
Cornish Cross - pullets	4.3	8-9 weeks	\$14.97	\$16.58	9%
Cornish Cross - cocks	3.8	7-8 weeks	\$12.33	\$14.82	17%
Freedom Ranger - cocks	3.8	9-10 weeks	\$16.37	\$14.82	(-11%)
2012:					
Cornish Cross – straight run	3.8	8-9 weeks	\$14.05	\$14.92	6%
Freedom Ranger – straight run	3.4	9 weeks	\$13.78	\$13.26	(-4%)

In second year of this study, 2011, we used the same hatchery for Cornish Cross, but raised pullets only on the experimental section of the pasture. This change was in response to high mortality with cocks near weeks 6-7 in 2010. Due to generally poor growth rates in 2010 with the “Red Broiler”, in 2011 we switched to the “Freedom Ranger” breed which has been reported to perform better on pasture and so we could shorten their time to finish from 14 weeks to 9-10 weeks. For comparison, in 2011 we also raised Cornish Cross cocks on an adjacent pasture not part of the seeding/grazing trial. In the final year of the study we raised straight run of both the Cornish Cross and Freedom Rangers.

We raised 50 Cornish Cross or Freedom Rangers in each pen. There were substantial differences in both the costs and finished weights between the Cornish Cross cocks, pullets and Red Broilers/Freedom Rangers. The Cornish Cross not only outperformed the Red Broilers in the costs/bird, finished weights, and the time to get to finished weight, but also in profitability. While each season varies, and the summer of 2012 was very hot and dry, we still feel that we could have had better overall profitability if we had raised cocks only for both breeds and anticipate doing so in 2013.

Cornish Cross were put on pasture (out of the brooder) at 3 weeks of age in 2011 and at 2 weeks of age in 2012. The cocks were processed at 7-8 weeks of age while the pullets and straight run birds were processed at 8-9 weeks of age. The Freedom Ranger cocks were put on pasture after 4 weeks in the brooder in 2011 while in 2012 the straight run chicks were put on pasture at 3 weeks of age and they were processed at 9 to 10 weeks of age.

The average feed cost per bird per day was the same for both breeds in 2011 at \$0.06/day (0.17lb.) while in brooder and \$0.12/day (0.40lb.) while on pasture which were comparable to what the hatchery and the feed producer estimated/recommended. In 2012, the feed costs were substantially lower for both breeds. The daily feed cost for the Cornish was \$0.02/day (0.05 lb.) while in brooder and \$0.11/day (0.32 lb.) while on pasture. The daily feed cost for the Freedom Ranger was \$0.02/day (0.06 lb.) while in brooder and \$0.09/day (0.26 lb.) while on pasture.

Customer Preferences of Chicken Breeds

A large proportion of our customers purchase both Cornish Cross and Red Ranger broilers. Surveys conducted from our ~120 customer list in winter 2011, prior to ordering birds and sending out customer order forms. We got responses from 78 customers who received surveys. Among other questions we asked them if we should keep offering both Cornish Cross and Red Ranger broilers. The majority responded “yes” and a large proportion of them ordered both breeds. Only 1 customer ordered the Red Rangers exclusively.

Informal questioning of customers when they picked up their birds in the summer indicated that they liked both breeds, but that there were definite differences in flavor, the color of the meat, and the shape of the carcasses. Those who purchased both reported using them in different ways and for different dishes (i.e. Cornish Crosses for traditional roasting, Red Rangers for ethnic dishes).

In response to 30% or more increases in organic feed costs we also asked our customers if they would be willing to pay 30% more or if we should shift to a non-organic feed. They overwhelmingly said to continue using organic or transitional organic feed and they would be willing to pay the higher price. In 2012, we sold out early so our customers clearly value the quality of the birds we produce.

Hog Production



The average hanging weight of our hogs in 2010 was 220 lbs, the quality of the meat excellent! The total average cost per animal was \$615 (excluding labor) and the average gross income per hog at \$2.95/lb. was \$650. Despite substantial increases in piglet and feed costs, with improved management and less feed waste, by 2012, we had the cost per hog down to about \$495 including labor. We increased our pricing to \$3.25/lb. and subsequently have shown a profit of about \$150 per hog. We are exploring alternative feed sources for the hogs to try to bring down feed costs, and hope that the improved pasture will also yield better growth with less feed. We enjoy raising hogs and our customer waiting list is long, so we expect to continue working with them to improve both quality and our bottom line.

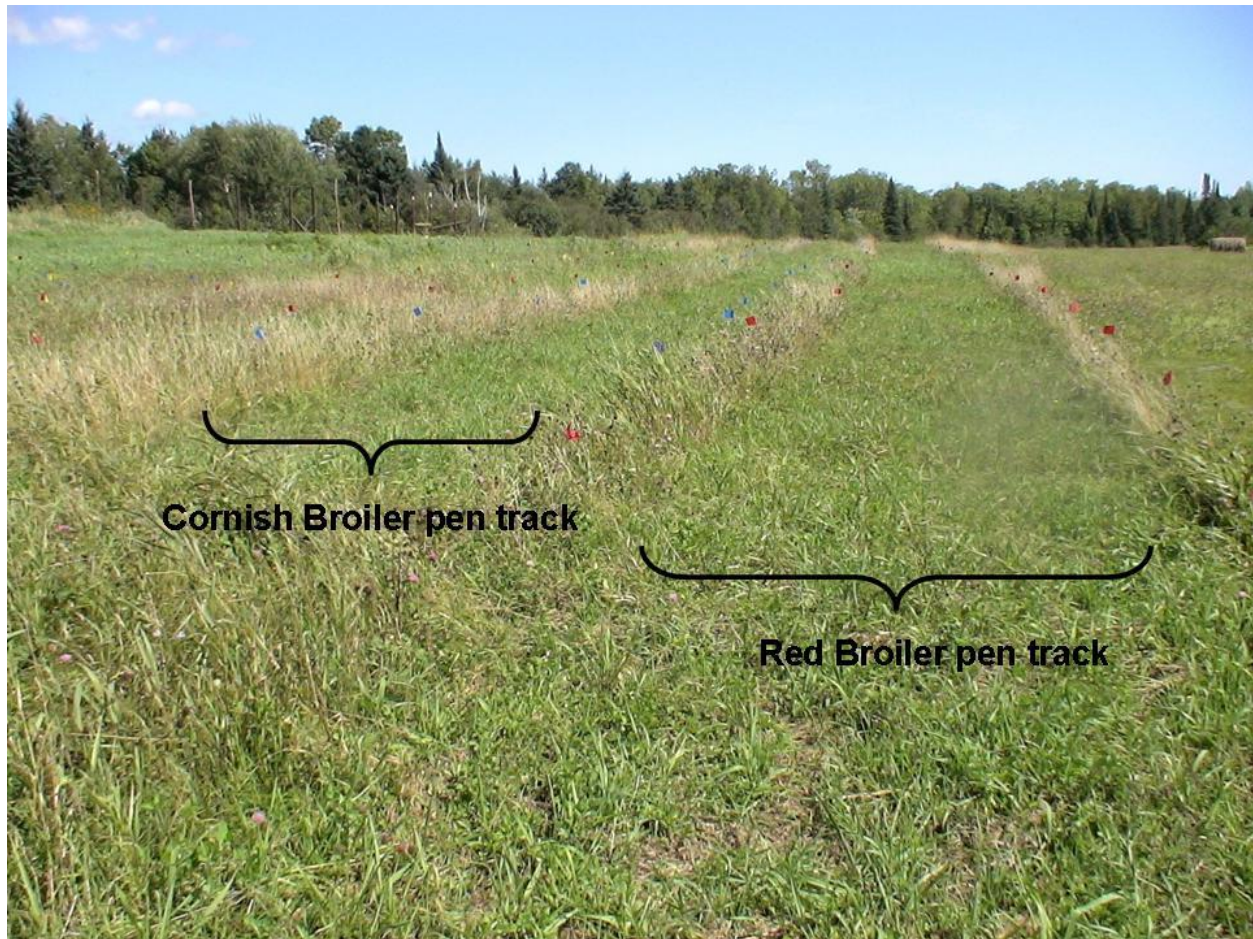


Figure 4. Grazing strips. The right path grazed by Red Broilers, the path on the left by Cornish Cross

The strip on the right (large bracket) is the path followed by the pen containing Red Broilers; the strip on the left (small bracket) is the path followed by the pen containing the Cornish Broilers. The narrow margin between the strips and the area to the far left in the picture show areas ungrazed by the chickens.

Finally, there was substantial variability in the level of rooting and compaction by the hogs depending on the position of the Port-a-Hut shelter in the portable paddock and whether or not there was substantial rain during the time the paddock was in a given place (7-10 days) and as the hogs aged. Therefore, the position of the Port-a-Hut relative to a given treatment (i.e. Cornish vs. Red Broilers vs. no bird control) was intentionally changed with each paddock move so one treatment did not receive disproportionately large levels of rooting and compaction simply due to the location of the hog shelter. Detailed notes were kept as to the location and the plots that were affected by the shelter and will either be dealt with differently or perhaps excluded from analysis to address this issue. Similarly, as the hogs aged they rooted the area much more quickly so we moved the paddocks more frequently in order to try to standardize the level of disturbance plots received throughout the season. However, following two particularly heavy rain events the subsequent soil disturbance was much greater than during drier periods. Again detailed notes will allow us to address this issue in analysis.

MANAGEMENT TIPS

1. Ask hatcheries and hog breeders about the breeding of animals they offer for sale and only buy from those breed themselves. This is particularly relevant for hatcheries which often contract out their breeding.
2. Depending on the chicken breed and your management goals, you may want to raise pullets only, cocks only, or straight run. Cocks and pullets mature at different rates. Also, cocks can have a higher mortality during the last 2 weeks before processing.
3. For chickens, provide fresh pasture during the day and feed rations in the evening only for best performance. When birds eat feed, their metabolism ramps up, generating a lot of body heat which can stress the birds during the day leading to poor growth and increased mortality.
4. Select the poultry and hog management, processing and marketing strategies that work for you (i.e. day range, Salatin pens, etc.). Keep the focus on animal health, maximizing high quality forage which reduces feed costs and minimizing labor costs.
5. Ask your piglet producer what, if any, worming treatments the feeder hogs have received. When in doubt worm them when you first get them. Appropriate rotational pasturing breaks the internal parasite cycle so continued worming should not be needed for good vigor. However, if the feeders arrive heavily infected you could be facing loss of growth or even death of young piglets.
6. Ask your customers what they want and invite them to field days or special events that you will be attending. This allows you to make better decisions and gives customers a stake in your operation.

OTHER RESOURCES

Alternative Broiler Breeds in Three Pastured Poultry Systems. Kim Cassano. 2009. Sustainable Agriculture Research and Education (SARE) at: www.sare.org.

APPPA grit. Newsletter of the American Pastured Poultry Producers Association at: www.apppa.org

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The Minnesota Institute for Sustainable Agriculture < <http://www.misa.umn.edu> >

IV. PROJECT IMPACTS

Overall, we are very pleased with the pasture rejuvenation results achieved through grazing of chickens using the Salatin pens. Within 3 years we saw substantial increases in the quality and quantity of forage available and improvement in the key soil measures of % organic matter, Phosphorus and K (potassium). Additionally, the habitat quality of our pasture remained high or perhaps improved. Our pasture is used extensively by native grassland breeding bird species and 2012 was a high water mark in that we were able to document breeding by Sedge Wrens, Dickcissels and Bobolinks for the first time. Local birders made our field a regular stopping place to view these rare species that used to be common. We also continued to see high levels of nesting success in 4-5 sparrow species and bluebirds (nest boxes along field edge).

We made good progress on maintaining or increasing the profit we make on our poultry and hogs despite ~30% increases in feed costs. Through a combination of improved grazing which decreases the total amount of feed needed, and buying feed in bulk we managed to keep our production costs about the same for the Cornish Cross and substantially decreased costs of the Red Broiler/Freedom Ranger as the study progressed. As a result, profitability on the Cornish ranged between 6-9% through the study. In the first year of the study we showed a 56% loss on the Red Broilers. However, by the end of the study we decreased that to a 4% loss and anticipate seeing a profit with those birds in 2013. The profitability of our hog production has more than doubled and we are expanding that enterprise as a result. Demand still strongly outstrips our production for both poultry and hogs and as we improve our profitability we anticipate increasing the scale of our operation. We have learned a great deal about how to improve our management system through this grant and expect our results to be widely applicable to small-scale, diversified pastured poultry operations in the western Great Lakes region.

Perhaps the biggest take home lesson...this grant forced us to keep good records and that information was invaluable to us in making informed decisions about changes to our operation. There are always reasons not to collect good data. However, the best reason to collect basic data is that it makes us more profitable. We will continue the data collection process established through this project and encourage others to implement similar record keeping systems!

V. OUTREACH

Our outreach activities included a combination of field days, festivals and presentations to interested groups including:

- 1) Our farm was featured in a 2011-12 case study conducted by the Minnesota Institute of Sustainable Agriculture, you can view the case study and more at our website <http://www.clovervalleyfarms.com>
- 2) Oct 3rd, 2012 – “Homesteaders” Group at Duluth Township, approx. 80-100 people; invited to talk about our farm by their group; presented ~ 20 minute talk with ~ 20 minute Q & A; gave handouts. See attached CVFarms poster/handout developed for field days and outreach.
- 3) May 5th, 2012 - North Shore Good Neighbors group. “Grown by Our Own” event featuring local producers in the NE region of Minnesota. Invited as one of the three lead

- presentations (see attached flyer). We also tabled at the days event. Approx. 200 people.
- 4) September, 2010-12 – “Duluth Harvest Festival” sponsored by the Lake Superior Sustainable Farming Association. We had a market booth and displayed our farm poster featuring the pasture rejuvenation project (see attached). Est. 1,000’s of attendees annually.

Our annual farm field days were hosted in July and October each year. Each event was attended by 30-60 people, both other producers and customers, who toured our farm and the various aspects of our operation. A booth was set up with posters and handouts describing our operation, examples of our products and highlighting our on farm research. The fall field day included a cider pressing event where we pressed up to 1,200lbs of apples yielding 50-70 gallons of fresh cider. We conducted 5 farm tours throughout the day, including:

- the pasture where flagging from the pasture rejuvenation project clearly showed differences in the various treatments, discussions of the broilers we raise, marketing direct to customers and our management operation; and they also got to meet our 5 pastured hogs and see their rotational paddock system in operation;
- our newly purchased and set-up Mobile Poultry Processing Unit which we will use for our operation and also rent to other small producers for on farm processing at their farms;
- our newly planted apple/pear orchard with deer fencing with discussions of the root stocks & varieties and how/why it will be incorporated into the poultry grazing system next year;
- the homestead orchard, with fruit still on the trees, so we could discuss orchard restoration & management and different varieties;
- our hen coop(s) and their rotational pasture/hoop houses for summer & winter foraging and 2 day-old chicks in the brooder, results of our developing breeding program for our laying flock;
- our year-round solar greenhouse with discussions about perennial herb growing and the seasonality/plants for such a greenhouse (no supplemental light or heat).



VI. PROGRAM EVALUATION

This was the twentieth year the North Central Region SARE Program sponsored a farmer rancher grant program. As a participant, do you have any recommendations to the regional Administrative Council about this program? Is there anything you would like to see changed? Please fill out the Evaluation form.

As a professional research scientist, it was relatively easy for me (Cindy Hale) to design the study, write this proposal, conduct the study, analyze the data and write the report. However, for the average farmer I expect this might be daunting. If there were a way to support mentorship among farmers who have done on farm research with those who would like to do it that would be great! I'd be willing to be such a mentor, but realistically, some level of compensation would need to be included for anything more than cursory advice.

I do believe that finding ways to enable farmers, especially small and new farms, to do on-farm research is an incredibly effective way to help teach them the valuable skills of how to form basic questions that they can address with simple data collection methods and how to use the data to improve their operations.

VII. BUDGET SUMMARY

Submit your final report to:

E-mail: BenjaminJ@lincolnu.edu or mail to:
Joan Benjamin
NCR-SARE Associate Regional Coordinator
Lincoln University
900 Leslie Blvd, Room 101
Jefferson City, MO 65101