Final Report

SECTION 1
General Information

Project #: FW01-081

Project Title: Sustainable Small-Scale Grain Raising

Location of Project: Lopez Island, WA

Funding Period: 2000-2001

Grant Award: $2040

Producer's Name: (Project Leader) Henning Sehmsdorf, Ph.D.

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SECTION 2

Objectives:

The goal of the project was to demonstrate the technical and economic feasibility of growing organic grain (barley) on small acreages using appropriately scaled equipment. Until the completion of this project, there had been no growers of organic grain in San Juan County. The number of small farms on Lopez Island has increased significantly over the past few years according to the 1997 USDA Census of Agriculture and personal observation. Many of these farms need organic grain and straw for livestock production. The geographic isolation of the San Juan Islands (one hour from the mainland by ferry) makes importation of feed grain and straw from mainland sources prohibitively expensive.

Over the long run, S&S Homestead Farm aims at producing two tons of organic barley annually in rotation with soil-building crops to supply the farm with animal feed for up to two years. In doing so, the farm intends to demonstrate the feasibility of producing organic grain on a small scale to meet the needs of local farmers, to increase local food security, and to further the S&S Homestead's goals of farm-level self-sufficiency and educational outreach to the larger community.

Summary Results:

During summer 2002, a two-acre paddock of leased pasture was planted with barley, yielding nearly two tons of organic grain, plus eighty fifty-pound bales of straw. Since the loan of equipment pledged by a collaborating island farm did not materialize, the field was not plowed in the fall of 2001 and left to fallow as intended. Instead a small herd of beef cattle was wintered on the paddock to break the sod and fertilize the soil. In May 2002, the field was rotovated with equipment rented from a neighbor. Planting was accomplished using a hand-held organ seeder. About a month after germination, residual thistles were removed by hand. No other cultivation was required since the rapidly growing barley out-performed all weeds. No herbicides or synthetic fertilizer were applied. The experimental threshing equipment available through WSU actually turned out to be larger (and expensive to transport) than a vintage 8-foot combine available on the island. Despite the relatively high cost of hiring harvesting equipment, the net out-of-pocket expenses for producing organic barley and straw remained well below market value of these products, thus demonstrating the economic feasibility of raising grain on a small scale to meet the farm goals of feed self-sufficiency, biodiversity and soil health. Soil tests taken in spring 2002 showed that levels of available potassium and phosphorus were in the high range in the barley field, compared to low to medium in neighboring pastures (total nitrogen was 10-20% higher), demonstrating the effectiveness of replenishing soil fertility through winter-feeding cattle in a confined target area. At the same time, growing a grain crop in that area recycled the accumulated soil nutrients in the form of animal feed and thereby forestalled potential groundwater pollution in the winter sacrifice area.

Specific Results:

The need to accomplish soil preparation of the intended barley field through animal impacts rather than by plowing and disking, has provided an unexpected opportunity to re-focus the practice of wintering the cattle on a designated sacrifice site. Previously, animals were held in the smallest possible area for the duration of the rainy season, up to four months (usually one bull, six cows, six yearlings and six calves on two acres). After a while the animals would be mired in mud and considerable quantities of hay wasted. The overriding concern was to sacrifice as little land as possible and save the remaining pasture and hayfields on the farm from soil compaction. With the focus shifted to fertilizer application and breaking sod, we found that both could be accomplished more efficiently by subdividing the target area with temporary (electric) cross-fencing to concentrate animal impacts in smaller paddocks for shorter intervals. The animals were fed daily by distributing a narrow strip of fresh hay (50-pound square bales) across the entire paddock. As the animals moved, they left behind several inches of hay covered with a generous layer of excrement. Underneath, the sod was broken, but no deep mud. Within days, large flocks of birds (robins, juncos, sparrows, crows and ravens) moved in to distribute the manure and work it into the ground. “Night crawling” earthworms (Lumbricus terrestris) proceeded to incorporate the hay residues into the soil, so that after about four weeks the ground was left open and we moved the cattle in again. Altogether an estimated 50 tons of manure was incorporated into the two-acre field, leaving behind an estimated of 300# N, 100# P, and 250# K/acre, considerably more than is needed to produce a yield of 2 tons of barley. Therefore, this winter we have embarked on a rotational cycle of three two-acre sites instead of one. In November and December 2002, the cattle were fed hay on a two-acre portion of summer pasture for four weeks. The animals grazed whatever grass was left to the ground but did not break the sod, and left behind a solid layer of hay and manure. Four weeks later the pasture is re-growing and new grass is sprouting from the residual seeds in the hay. After Christmas 2002, the cattle were moved to a new two-acre field where they will winter for two months, long enough to break the sod. This field will be the site for this year’s barley production. At the end of February, the cattle will move to last year’s barley field, and there spend the rest of the winter, after which the field will be seeded to alfalfa and a nurse crop of oats. Next year’s rotation will involve new sites, eventually to replenish soil fertility on the entire farm on an ongoing basis. The alfalfa-oat hay will be fed to our milk cow as a winter supplement. With the production of both barley and alfalfa-oat hay, in addition to summer forage, S&S Homestead Farm will have accomplished its larger goal of self-sufficiency in producing organic, additive-free feed for all its animals sustainably.

Benefits or Impacts on Agriculture:

Since the inception of S&S Homestead more than 30 years ago, the farm has been managed on the holistic principle of quality of life. We started with less than an acre of vegetable and fruit production and a few chickens to supply quality food for the family; now we also produce beef, pork, lamb, chickens, eggs, and dairy on fifty acres, supplying approximately fifty island families with a significant portion of the food they need. Over time we have learned to minimize purchased in-puts, producing animal feeds and natural

fertilizer on the farm as needed to support a farm organism in which human, plant, and animal life support each other in a symbiotic whole that derives progressively more of its energy from the sun and less from fossil fuels. We believe that national food security begins at the local level, in rural communities, and that society as a whole benefits from the ability of families and communities to support and feed themselves. Therefore the ability to produce our own grain (and replenish soil fertility in the process) is an important benefit not only to this farm, but as a model of an alternative farming system that is economically viable, environmentally sound and socially responsible.

Producer Adoption:

During 2002-3, three other small producers on Lopez Island, Brent Charnley, Peter Ludwig, and Kenny Giacomo, experimented with growing a variety of grains, from winter wheat to oats and barley, using similar methods as demonstrated in this project. It remains to be seen what long term effect their experiments will have on their future production. Their motivation was mostly to see whether they could supply their own needs, rather than for market.

Reaction from Producers:

In the past, a number of farms in San Juan County grew hundreds of acres of grain for export to the mainland, but competitive pressure from large-scale mainland producers have driven island growers from the commodities market, and currently only one farm, the Buffum Brothers, grow grain on Lopez Island, but they do not produce organically, nor do they plant every year. According to the most recent USDA census of Agriculture (as well as personal observation), the number of small farms on the island has increased significantly over the past few years, and many of these farms need organic grain and straw for livestock production. Organic chicken feed, for example, is now typically imported from Canada at prohibitively high prices. None of these small farmers has the capital to invest in machinery and infrastructure required to grow grain for sale, but they are quite interested in low-input on-farm production to meet their own needs.

Recommendations:

As this report demonstrates, the success of a project such as the present one requires flexibility. When one of the collaborating farmers unilaterally decided that he was no longer in a position (“did not have time”) to contribute machinery and labor as pledged, an alternative method of field cultivation (through animal impacts) was found, a method that actually proved to be more beneficial and sustainable than mechanized cultivation. It is recommended that others conducting projects similar to ours build that type of goal-oriented flexibility into their project from the start, and that the SARE program support it.

Educational outreach:

During various phases of the project its findings have been communicated to a variety of audiences, emphasizing the following topics:

- The technical and economic feasibility of growing organic grain on small acreages while minimizing off-farm inputs;
- The feasibility of small-scale grain production to support local food systems and food security;
- The potential of rotating collaborative small-scale grain production on several island farms;
- The sustainability of small-scale grain production at S&S Homestead Farm.

From the perspective of S&S Homestead Farm, the most important audience consists of our farm interns, usually graduate students working on degrees in agriculture-related fields. In 2002, there were four interns (from Washington State, Texas, Sweden and India). One of them, Andrew Haden, M.S., was recruited specifically for a six-month farm stay to undertake a formal assessment of the ecological sustainability of production, including grain, at S&S Homestead Farm. The completed study, "Emergy Analysis of Food Production at S&S Homestead Farm", is appended to this report. The interns were involved in all phases of the grain project: planning, soil preparation, seeding, cultivation, grain and straw harvest, storage construction, and post-harvest feed production. The topics listed above were discussed at weekly farm seminars for which interns prepared extended reports.

On-farm workshops, demonstrations and discussions (both formal and informal) relating to the grain project involved the following groups and individuals:

25 students in sustainable agriculture from The Evergreen State College in Olympia, Washington (spring, 2002);

16 livestock advisors from San Juan, Skagit and Snohomish counties participating in the training program offered annually by WSU Cooperative Extension (spring, 2002);

15 high school students in Agricultural Science (a course taught by me), who came to the farm every week to study animal husbandry, including on-farm feed production (summer-autumn, 2002, winter, 2003);

A group of middle school students from a Waldorf school based in Seattle (spring, 2002);

A group from Earth Ministry, a faith-based organization from Seattle committed to simplified living, environmental stewardship, and social justice (autumn, 2002);

Numerous island neighbors, many of them our customers, other gardeners and farmers (spring, 2002-winter, 2003);

"Seed Savers", a group of some 40 gardeners and homesteaders on Lopez, to whom I reported on the project (summer, 2002);

Michael Karp, President, A World Institute for Sustainable Humanity, Bellingham (spring, 2002);

Gus Hughbanks, NRCS State Conservationist; Steve Meyer, Executive Director, Conservation Commission; Lynn Brown, Chairman, Conservation Commission;

Bill Hamilton, Manager, San Juan County Conservation District; and Heather Hankins, Resource Technician, SJCCD (spring, 2002);

"Sustainable Systems": a farm tour for island residents thematizing local food production and community food security (summer, 2002);

Dr. David Muehleisen, Research and Outreach Coordinator for WSU's Small Farms Program, who worked with two of our interns throughout the summer on an on-farm nutrient recycling project relating to the production of grain and other crops (summer, 2002);

Andy Bary, Scientist at WSU's Puyallup Research and Extension Center, who helped the interns develop soil test protocols related to the project (summer, 2002);

Dr. Dick Carkner, WSU agricultural economist, who guided the interns to develop a model for economic analysis of farm production, including grain (summer, 2002);

Tim Seifert, Executive Director, San Juan County Preservation Trust, who came to discuss local food security and the role of the Trust in preserving local farm land (winter, 2003);

Dr. Lennart Salomonsson, Director of Studies, Center for Sustainable Agriculture, Uppsala, Sweden; Rebecka Milestad, doctoral candidate, Department of Rural Development Studies, Swedish U. of Agricultural Sciences; Dr. Pia Johansen, Department of Economics, Politics, and Public Administration, Aalborg University, Denmark: this group attended the IFOAM conference in Victoria in August, 2002, and came to Lopez at my invitation to view the grain project; both Drs. Salomonsson and Johansen expressed an interest in sending their students to study sustainable production systems at the farm (summer, 2002);

In June 2002, I gave a presentation to about 250 cattle growers at the American Highland National Convention in Mount Vernon, WA, concerning the grain project in the context of alternative production systems;

In December 2002, I spoke to about 40 researchers from WSU, OSU and other regional universities, as well as approximately 300 growers attending the annual conference of Tilth Producers. I discussed the grain project in relation to overall farm sustainability and how the latter can be measured; at the same research symposium, Andrew Haden displayed a set of posters that compared the grain project to other production systems on S&S Homestead Farm in terms of energy transformity and yield (thermodynamic efficiency), environmental loading ratios, and ecological (emergy) footprints.

SECTION 3

Budget:

	Receipts:	Expenses:
Educational outreach:		
Supplies		$ 200
Digital camera		$ 350
Travel		$ 650
Soil preparation:		
Additional cattle fencing		$ 140
Rotovator rental		$ 120
Tractor charge		$ 100
Fuel		$ 25
Seeding:		$ 250
Cultivation labor:		$ 60
Harvest:		
Labor		$ 900
Threshing equipment rental		$ 243
Straw baling, hire		$ 75
Storage bins and chute construction		$ 250
Post-harvest grain processing:		$ 200
		$3,563
SARE grant, 50%		$1,020
Balance		$2,543

SECTION 4

Attachment: "Emergy Analysis of Food Production at S&S Homestead Farm"