LOCAL FOODS PROJECT FINAL REPORT

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The Local Foods Project was designed to determine the feasibility of small- and large-scale primary processing for food crops such as beans and grains on Willamette Valley farms. Most grass seed operations routinely clean and bag seed on farm, thus we knew the equipment and labor skills were probably available. We hypothesized that cleaning and bagging food crops on farm would allow local farmers to sell food crops directly into local markets, and might have the potential to create new jobs. During the pilot project, we proposed to test the local market for beans and grains grown on local farms, estimate the size of the market, and estimate the cost of operations and profitability of bean and grain crops on small (Sunbow Farm) and large (Stalford Seed Farm) scales. The primary grain of interest for the purpose of this project was soft white winter wheat. We also tracked bean and grain experiments on homestead scale farms. To facilitate the pilot project at Sunbow Farm and the smaller homesteads, we purchased a portable seed cleaner as part of our grant.

Our project goals were to:

- Determine the feasibility of local small-scale bean and grain processing (i.e., primary processing, or seed cleaning and bagging);
- Provide a benchmark for establishing and assessing costs to start up and run seasonal small to medium scale operations;
- Identify problem areas in regard to all aspects of post harvest operations — transport, processing, distribution and storage;
- Make recommendations to address problem areas;
- Identify and assess additional sites for processing operations; and
- Initiate the organization of a local distribution and marketing network.

Feasibility of Local, Small-Scale Bean and Grain Processing

Processing, in the context of this project, refers to on-farm seed cleaning and bagging, or primary processing. We explored the feasibility of on-farm processing and the associated challenges of processing food crops new to the current generation of farmers, by working at three different scales – a large, conventional grass seed operation

(Stalford Seed Farms), small organic truck farm (Sunbow) and small homestead plots. In this report we focus primarily on the first two scales.

The two principal farms involved in this project were Stalford Seed Farm and Sunbow Farm. Five small homestead-scale operations also participated, making use of threshing and seed cleaning equipment available on an hourly fee basis at Sunbow Farm. The following table summarizes the project participants, their experimental acreages, crops, yields and on-farm processing approach. Yields for the two major farm participants are described in the narrative.

Farm or Homestead	**Beans**	**Grains**	**Seeds**
Stalford Seed Farms (Willow Coberly and Harry Stalford)	20 acres each of Anasazi-type, pinto, garbanzo, lentil, black beans. Yields described in narrative.	Soft white wheat (~1,000 acres). Yield described in narrative.	
Sunbow Farm (three acres total; Harry MacCormack)	pinto, black, garbanzo, lentil, and red chile, plus test plots of adzuki, Hei Mu Tou soybeans and edamame soybeans	four varieties of triticale, five varieties of rye, and 13 varieties of wheat (eight winter and five spring)	Quinoa (3 varieties) amaranth (4 varieti buckwheat, sunflow and flax
Earth Station (Mark Stewart; one acre total)	Hei Mu Tou soybeans, froze out in June	Perennial (yr 5) red wheat; perennial (yr 5) rye. No data yet.	Quinoa and amaran froze out in June
Paul Harcombe		Fall hard white wheat, wheat OR 20040 75H (280 sq ft, 53 lb yield); Spring hard white wheat 20040 75H (180 sq ft; 14 lbs); Spring Cayuse oats (180 sq ft; 12 lbs)	
Kiko Denzer (3,000 sq. feet)		Red wheat, perennial Yr 1, Yamhill white wheat, kamut, hull-less oats. Not yet threshed, expects 100 lbs total.	
Steve Rose (200 ft row)	Hei Mu Tou soy; hand-harvested & threshed at Earth Station, 7 lb yield		
William Drabkin & Colleen Llewellyn (~0.2	Black (52.5 lbs), pinto beans (44.5 lbs), threshed in field		

acre)	& cleaned at Sunbow		

All of the soft white wheat and beans at Stalford Seed Farms and Sunbow Farm were harvested by October 10th, 2008. Although crop and cultivation experimentation were not focal to this grant, the farmers learned a good deal about planting and harvest timing and optimal mechanical harvest methods, particularly at Stalford Seed Farms. This was the third year of bean production at Sunbow Farms, thus the cultivation and harvest process was smoother at that farm site. We learned that existing equipment and labor skills on grass seed farms are readily transferable to wheat crops, and the only additional equipment needed for beans is a polisher to remove excess mud.

A brief description of the major crops, yields, and on-farm processing follows for the two major farm participants.

Stalford Seed Farms – Wheat and Beans

SSF's conventional soft white wheat crop was very successful. Yields ranged from 120-150 bushels/acre. The threshing was done by combine and all went off without a hitch. One hundred thousand bushels (Six million pounds) of wheat were cleaned using the warehouse-sized seed cleaner**.** Adjusting the seed cleaner from grass seed to wheat was not difficult or time-consuming. Stalford Seed Farms also harvested and cleaned 50 bushels (3,000 pounds) of organically-grown red wheat, using the mid-sized seed cleaner.

Stalford Seed Farm planted beans at the end of May (three weeks later than Sunbow Farm), due to wet soil conditions. The Willamette Valley experienced the coldest June on record this year (2008), with one near-freeze and many cold nights and overcast days, which shortened the growing season by a further three weeks.

SSF's garbanzo crop produced a 28,000-30,000 lb yield (20 acres), but a little over half of the beans were lost in the attempt to mechanically harvest the crop. Advice from Colorado bean growers suggested the beans be windrowed and then combine-harvested. Unfortunately, this two-step process laid down the beans in our muddy Willamette Valley soils, gumming up the combine with mud and producing muddy, gritty beans. Additionally, due to the short growing season, the plants did not grow tall enough for the combine to lift them easily into the hopper.

About 1,000 lbs (20 acres) of pinto beans were harvested, due to the combination of harvest error and late planting. The black beans and Anasazi-type beans were cut before they had ripened, due to human error, so they have been set aside to see whether they

are salvageable as seed after drying. The lentils were not harvested; they can be considered a biennial, and Stalford Seed Farms left them in the field to see whether they will overwinter and produce next year. Our current understanding is that this lentil variety is cold-hardy to 10 degrees Fahrenheit.

Sunbow Farm – Wheat, Other Grains and Beans

The Sunbow Farm Canadian triticale, hard red wheat, and perennial rye yielded between 40-60 bushels (2,400-3,600 lbs) per acre, which is typical for these grain varieties in our climate. An older variety of soft white wheat yielded an extrapolated 150 bushels (9,000 lbs) per acre. The grains were combine-harvested and cleaned using the portable seed cleaner purchased for the project. The seed cleaner did not represent a time savings over winnowing with a bucket and fan, but was simpler and facilitated triple cleaning.

This was the 3rd year trial for Sunbow's principal bean crops, and the first year for the adzuki and two soy bean varieties in test plots. All of the beans were slowed to varying degrees by the cold June, showing depressed yields relative to previous years (2,000 lbs or 33 bushels per acre; about 10% less than previous years). The soy and adzuki beans ripened late and unevenly, and may not be suitable for our climate. The light green lentils are smaller and lighter, yielding about 1,200 lbs/acre, approximately average for a northern climate. Sunbow Farm's bean crops were irrigated twice during the 2008 growing season, but were otherwise dry-farmed, utilizing heavy leaf mulch. In a normal climate year they could be fully dry-farmed, with yields somewhat lower than what we have demonstrated over the past three years.

Sunbow's beans were hand-harvested, due to difficulties adjusting the John Deere 40 combine so it would not crush the bean seeds. They were threshed using the old-fashioned foot-stomping on a tarp method, which proved faster than the previous year's use of the hammer thresher. Our small homestead participants also used this method. Bean cleaning was very fast with the Ten Rivers portable seed cleaner – the single pass cleaning rate was approximately 90 lbs/hour, much faster than winnowing.

Discussion

In scaling down from an industrial scale of 1,000 acres of wheat (Stalford Seed Farms) to half-acre homestead wheat plots, the project ran into the issue of mechanization versus the use of field labor for harvesting. On an artisanal or homestead scale, *processing* is the problem, not harvesting. At Sunbow and the other smaller participating farms, the wheat was cut either by combine or by hand and then had to be threshed by hand or with the hammer-thresher before it could be cleaned using the portable seed cleaner. We conclude that a small portable threshing machine would be essential to process wheat efficiently on a homestead scale, and Harry MacCormack

(Sunbow Farm) and others are investigating the availability of off-the-shelf and custom-fabricated portable threshers.

In scaling up from half-acre family bean plots in which the harvesting is done by hand, to an industrial scale of 20 acres each of beans, the project ran into the issue of mechanization versus the use of field labor for harvesting. On an industrial scale, *harvesting* is the problem, not processing. Overall, Stalford Seed Farms saw the bean crop as a reasonably successful first attempt. Lessons learned include: 1) plant earlier, 2) don't windrow, 3) direct combine, and 4) wait until the beans are "dead ripe".

Processing Equipment. The portable seed cleaner was very easy to use. Despite its portability, all of the participating homestead-scale farmers chose to bring their grain to the processing shed at Sunbow Farms, rather than to move the seed cleaner to their own farms (20-mile round trip, on average). One of the five homestead scale farmers chose to come to Sunbow because he also wanted to use the Sunbow hammer thresher. Some of the homesteaders commented on the messiness of the seed cleaner, due to blowing chaff. Triple-pass cleaning is standard in the industry, and the portable cleaner accomplished this slowly but effectively at 30 lbs/hour.

All seed cleaner maintenance was done by Sunbow Farm. The cleaning protocol we developed was 1) to dry wipe the cleaner periodically during use and at the end of each day, and 2) to wipe down the cleaner with either hydrogen peroxide or a 1% bleach solution between batches and prior to storage. Labor requirements are minimal.

Cooperative ownership or hourly-fee access to a small thresher and a mid-sized seed cleaner would increase the cost effectiveness of mid-sized and homestead scale farming for beans and grains.

At Stalford Seed Farm, it took the crew very little additional time to clean, lubricate and change screens on the stationary mid-sized and large seed cleaners. There was no need to train new workers as permanent employees familiar with grass seed cleaning operations were used. There were no significant incremental costs to process wheat on farm.

Market standards require clean beans, with minimal mud clods. To market this year's garbanzos, Stalford Seed Farms invested in a second-hand seed polisher. It has not yet been tested, but the expectation is that it will provide a simple additional step in readying beans for market. The smaller farms do not need the additional equipment because 1) hand harvest yields much cleaner beans and 2) beans were either designated for homestead consumption or 3) for farm-direct sales, with buyers content to pay a lower price for a somewhat dirtier product.

Benchmark costs for Sunbow and Stalford Seed Farms

Soft white wheat production costs differ from figures for hard red wheat and other lower yielding grains. Soft white wheat typically yields 135–150 bushels (8,100-9,000 pounds) per acre. Sunbow's Stephens' wheat trials yielded an extrapolated 150 bushels per acre. Two fields at Stalford Farm yielded 150 bushels per acre and one yielded closer to 200 bu/acre. Soil biology appears to be the critical factor in higher yields.

Small Organic Farm Soft White Wheat Production Costs (Sunbow Farm)

	$ Per lb	$ Per bu	135 bu/acre	150 bu/acre
Field production	0.31	18.60	$2,511	$2,790
Harvest, by combine	0.03	1.80	$243	$270
Seed cleaning, portable cleaner	0.40	$24.00	$3,240	$3,600
Bags & bagging	0.02	$1.20	$162	$180
Total	$0.76	$45.60	$6,156	$6,840

Small organic truck farm cost data are based on Harry MacCormack's experience at Sunbow Farm, and include expenses for field production, harvesting, cleaning and bagging. Production costs at Sunbow Farm were estimated on a per pound basis, and calculated up to derive prices per acre. This may exaggerate per acre costs, as there are likely economies of scale even on a small farm. Cost estimates do not include equipment or land – they only include operating costs. Sunbow harvest expenses were $0.03 per lb using a combine. The harvest costs for the smaller homesteads who participated in our project were much higher, due to the cost of hand-harvest labor. Triple cleaning with the Ten Rivers Food Web small-scale clipper seed cleaner, including depreciation estimated at $2/hour and labor (estimated at $10/hour), added an additional $0.40/lb in expenses. Bagging expenses assume expenses of $0.14/50# bag, a labor cost of $10/hour and a bagging rate of 12 bags per hour.

Local soft white wheat could potentially reach a stable price over the next several years between $8 and $10 per bushel (60 lbs). This per bushel price translates into $0.13-0.16 per pound. It is simply not economical to grow organic soft white wheat for the global market at these prices, which are approximately $3-7 above November 2008 conventional white wheat prices. Even at $10 per bushel, a small farm such as Sunbow would lose $4,811 per 135-bushel acre. Given that the single largest expense is seed-cleaning, expenses could likely be reduced by a cooperative purchase of a larger through-put stationary seed cleaner, or by using the services of a large-scale, commercial third party seed cleaner.

Large Conventional Farm Soft White Wheat Production Costs (Stalford Seed Farms)

	$ Per lb	$ Per bu	$ per acre at 100 bu/acre	$ per acre at 133 bu/acre
Field production plus harvest, by combine	0.04	2.50	250.00	275.00
Seed cleaning, large stationary unit plus bags & bagging (50 lb bags)	0.04	2.46	246.00	327.00
TOTAL	0.08	4.96	$496	$602

Our large farm data are based on this year's experience at Stalford Farm. Field production costs per bushel and per pound were estimated from the overall per acre expenses. Economies of scale bring costs down significantly, relative to Sunbow Farm. Field production and harvest costs include the cost of land, labor, amortization of equipment, equipment repair and fertilizer. Cleaning and bagging costs are based on an expense of $2.05 per 50# bag of wheat berries, including labor.

Assuming a 100 bushel/acre yield (6,000 lbs/acre) at a market price of $5.50 per bushel, gross income would be $550 per acre on soft white wheat. If we assume a 133 bushel/acre yield (8,000 lb/acre) and a market price of $10/bushel, the gross income

per acre would be $1,330. Thus the net income per acre could range between, $54 and $728 per acre on the global market, not including freight to the Port of Portland.

Markets and Profitability

Organic food consumers appear to be the "early buyers" for locally grown beans and grains, likely due to their awareness and preference for local foods and potentially higher household food budgets. Thus, in addition to making a transition from ornamental crops (e.g., grass seed) to food crops, there may be incentive to transition from conventional, chemically-based growing techniques to organic agriculture to meet the demand from this current market.

Conventionally grown soft white wheat was abundant in the Southern Willamette Valley this year, with about 150,000 acres sown due to the high prices per bushel on offer during the fall/winter of 2007/08. Due to lack of local secondary processing capacity (flour milling), however, soft white wheat is an export crop. The market for soft white wheat berries may increase if organically grown product is available, and with additional consumer education about the uses of soft white wheat for pasta, tortillas, and other non-yeasted breads. Organic red wheat is less productive in the Southern Willamette Valley (~40 bushels/acre), but there is a consistent and growing local demand by home bakers and cooks. Dried bean markets appear to be sizeable, particularly for organically grown beans.

We estimate the market for soft white wheat berries, hard red wheat berries, and for beans based on a demand-side model, and contrast that initial estimate with our actual experience this year to date.

Demand-side

Current retail sales may reflect the bulk of the consumer market for cleaned, bagged soft white wheat berries, because the typical food buyer does not home produce pasta, tortillas, or other unleavened baked goods. Restaurant and institutional buyers do not currently purchase wheat berries, given that most uses require milling before use and these buyers do not have milling equipment on site.

Our estimate is based on sales data from the First Alternative Cooperative Natural Foods Grocery. The Co-op captures about 60% of all natural health food dollars spent in Benton and Linn counties (Personal Communication, Jim Dobis). The Co-op sells about 340 lbs of soft white wheat berries per year which means that there is a total potential market of about 567 lbs (= 340lbs / 60%) of soft white wheat berries per year in the Benton/Linn counties. The combined population of Benton/Linn is 190,550 for a potential market of about 0.003 lbs/person.

The total population of Benton, Linn, and Lincoln counties (the geographic area served

by the Ten Rivers Food Web) is 236,800 people. At a rate of 0.003 lbs of soft white wheat berries per person the maximum potential market is 710 lbs. Our experience to date indicates that Lane County, particularly the major population center, Eugene, can also be considered an integral part of the alternative local foods market in the Southern Willamette Valley. If we include the population of Lane County, the current potential soft white wheat berry market may top out closer to 1,726 pounds/year.

First Alternative Co-op also sells 1,100 lbs/year of hard wheat berries (red and white, imported) on average, based on previous years' experience. The analogous demand calculations for hard red wheat berries generates a current demand of 0.01 lb/person per year, or an annual demand estimate of 5,534 pounds per year for Linn, Benton, Lincoln and Lane counties.

Dry bean demand, based on estimates by Hummingbird Wholesale, may be much greater. Bean buyers polled include natural foods grocers and restaurants along the I-5 corridor beyond Linn, Benton, Lincoln and Lane counties, but do not include all buyers even within the 4-county area. The potential market for locally-grown clean, high quality, transitional or organic beans could be in the range of 46,000 to 68,000 lbs/year, as estimated by current Hummingbird Wholesale customers. Red lentils and black beans seem to be in greatest demand, followed by garbanzos and pintos. Anasazi-type beans are least in demand.

If past average yearly sales volumes from First Alternative are used to extrapolate demand for the 4-county southern valley area, the annual retail organic bean demand may be 3,500 lbs for garbanzos and 5,500 lbs for pintos. In the case of beans, these estimates represent only a portion of the overall market, because they only include household consumers and do not represent restaurant and institutional buyers, who typically buy through distributors.

Supply-side – This Year's Market Experience

Farm-direct sales for conventional white wheat berries are approaching 1,000 lbs at $0.75 lb, with another potential 1,000 lbs ordered for retail sale, without a fixed delivery date. The current market demand is not likely to exceed 2,000 lbs/year, and matches our demand-side market estimate of approximately 1,700 lbs. Although sales volumes are not high, the direct sale price of $0.75/lb provides current cash in hand to growers such as Stalford, vs. deferred income via the export market of perhaps $0.01-14/lb. If the volume of the local market can be increased, white wheat has the potential to increase overall farm income, until prices per pound are bid downward by producer competition.

The bulk of the Stalford Seed Farms white wheat crop (~99%) is being trucked to Portland for export, as the price per bushel rises through the fall. There was a severe

crunch at harvest time, with insufficient trucks available to carry conventional white wheat to Portland and insufficient elevator space at the Port. Credit problems complicated export further, as many buyers were unable to obtain letters of credit. Fortunately, Stalford's crop was not delayed by financial or transportation problems.

Organic hard red wheat berries were sold farm-direct (~800 lbs) and through First Alternative Co-op (~1,200 lbs). Organic red wheat is moving three times as fast this year as last at the Co-op, and the Stalford Seed Farms supply will not be able to meet the full year's demand. Approximately 1,000 lbs of red wheat were kept by Stalford Seed Farm as seed. Thus we know that the local market will absorb at least 2,000 pounds, and perhaps as much as the 5,500 pounds estimated based on past demand.

Beans have sold very well to date. Sunbow Farm had more orders for beans than it could meet, at $2.00/lb. Stalford Seed Farms sold its pinto beans and approximately 2,000 pounds of garbanzos farm-direct to local buyers at $0.75/lb. Several large orders (>500 lbs) were placed by neighborhood food groups. Once the remaining ~12,000 pounds of garbanzos are polished, they will be sold to a local retailer and potentially to a distributor.

Status of Local Distribution and Marketing Network.

There was no formal advertising for the bean and grain crops grown by Stalford Seed Farms and Sunbow Farm. First Alternative Co-operative was an early partner in the initial hard red wheat trials in 2007, and was aware of the wheat and bean crop planted this year and ready to purchase what it could for local sale. Hummingbird Wholesale was likewise aware of the local bean and grain experiments as a participant in the South Willamette Valley Bean and Grain consortium, and remains eager to purchase crops for resale into the regional natural foods market.

However, all of Sunbow Farms beans and grains were sold farm direct to either individual buyers or buying clubs, based on email announcements of availability. Stalford Seed Farms sold approximately 1,600 lbs of red and white wheat and 3,000 lbs of beans farm direct, also using email announcements of availability. Farm-direct buyers traveled to the farms to make their purchases. The farm-direct approach has several advantages to the producer and buyer – the producer maximizes his revenue per pound of grain or beans, and the buyer gets a better price than through a retailer. Secondly, the average purchase for beans and grains was 50 lbs, which has the effect of distributing bulk storage across the community. Lastly, consumers had the opportunity to visit the farm sites and see at least a portion of their operations, increasing their knowledge and appreciation regarding the work of growing food.

Additional Sites for Processing Operations

There are a few large, conventional seed farms that offer third-party seed cleaning services, and these may provide a lower cost processing option for small farms than the current $0.40/lb. Adding a mid-sized stationary seed cleaner to Sunbow Farm for shared use may also be feasible. At the small scale of local bean and grain cultivation we have experimented with to date, no additional jobs are created by on-farm primary processing, i.e., seed cleaning and bagging.

The greater opportunity may lie in secondary processing for soft and hard wheat. The market for both types of wheat may be expanded by locating grain grinders at point-of-sale in retail outlets such as First Alternative, based on the current fresh coffee grinding model. Alternatively, some of the major soft white wheat users such as regional tortilla factories, fresh pasta makers and pastry bakers could install small-scale milling systems and use locally grown wheat.

One quick example may suffice to demonstrate the potential for milled local soft wheat. Zia's Restaurant (Corvallis) uses 400-600 pounds of soft white flour per month. If local flour were available, the owner would be willing to pay a small premium over her current outlay of $16 per 50-pound bag of flour ($0.32/lb). As we understand it, there may be several buyers at this scale in Eugene and Oregon coastal towns – we are just beginning to characterize the milled wheat market.

Other Challenges and Potential Solutions

Many of the challenges experienced this year were due to inexperience. The lessons we have learned with regard to economies of scale for wheat vs. beans; the importance of bean planting timing; bean harvest methods, and the need for a bean polisher can all be passed along to others who follow.

Given the small scale of our experimental crops this year, we did not have any significant problems with processing, transportation, distribution or storage. However, with larger hard red wheat crops and bean crops expected next year, we may face significant storage obstacles. If regional restaurants, retailers and institutional buyers have on-site storage capacity, this may alleviate some of the storage pressure. However, the current "just-in-time" approach to inventory, intended to minimize capital tied up in product, has eliminated the distributed storage capacity of many businesses. In the short-term, individual buyers or neighborhood buying clubs may have the greatest flexibility to add storage for 50-100 lb quantities of beans and grains.

If the local bean and grain market is to flourish, farmers will have to produce a sufficient volume to at least satisfy the typical clients of a distributor such as Hummingbird Wholesale. In this case, either the distributor or the farmer will have to have dry, rodent-free storage capacity. There are few if any grain silos remaining in the southern

Willamette Valley, and many still standing are in disuse and disrepair or have been converted to other uses as tourist destinations and hotels.

Conclusions

Our initial effort to grow, process and locally market conventionally-grown soft white wheat, organic red wheat and triticale, and both organic and third-year organic transitional dry beans demonstrated that existing seed farms have the capacity to conduct preliminary processing on farm, without acquiring additional equipment or expertise. Small-scale truck farms would likely need to acquire or time-share a small thresher and mid-sized seed cleaner.

Despite modest production this year, we believe this year's preliminary data suggest the existence of a substantial potential market for local beans and grains in the South Willamette Valley, via direct sales to consumers and buying clubs, farmer's markets, a major natural foods retailer and a natural foods distributor. Further study is warranted to assess the full potential of these bean and grain markets, as they vary significantly by crop. Demand appears to be lowest for conventionally grown white wheat berries. Initial marketing attempts were directed primarily to customers who showed an organic preference. With a $0.26 spread between production expenses and Zia Restaurant's retail purchase price for conventional soft white flour, there may be an economic niche for a medium-scale miller-distributor, if there is sufficient regional flour demand.

Beans, hard red wheat and soft white wheat are profitable to the large farmer through direct sales. Beans and soft white wheat may also generate net farm income via sales through local retail outlets or a regional distributor. The latter two distribution networks remain relatively untested, due to the small volume of product available this year. For smaller farms, cleaning and bagging expenses eat up the profit margin for all but the soft white wheat. The portable seed cleaner is most appropriate for homestead-scale farmers, while a small truck farm such as Sunbow would benefit from the higher through-put of a stationary mid-sized seed cleaner and a small thresher.

Only current staff was used in these experiments, but we expect that eventually on-farm jobs are likely to be created at all levels of production, cleaning, bagging and even delivery. As both the Sunbow and Stalford bean and grain-growing, cleaning, bagging, and sales operations were experiments, it will take several more seasons to adequately assess just how many on farm jobs might be created in this process. If nothing else, current staff might have longer seasonal employment as a result of the white wheat, other grains, and beans being grown and marketed locally.

Next Steps

1. This year's study served as proof of concept, but did not generate sufficient bean and hard red wheat volume to truly test distribution channels and market capacity. Future farm trials will require a half dozen additional small- to large-scale farmer participants to better understand distribution and market potential.

2. Lower productivity grains (e.g., triticale, rye, and hard red wheat varieties) may prove to be more cost effective consumer purchases than high productivity grains (e.g., soft white wheat) if the nutritional density per pound of grain is factored into the equation. Comparative studies of grain and bean nutritional density across varieties, growing conditions, and conventional versus organic growing methods would help to provide more information to potential consumers.

3. Edible bean and grain crops may prove to be most profitable to Willamette Valley farmers as rotation crops, interspersed with higher per-acre value row crops. Engaging several additional farmers to more formally study optimal rotation dynamics, using both organic and conventional approaches, might demonstrate means to reduce herbicide and fertilizer usage per acre.

4. We speculate that organic soft white wheat might find a market more quickly than conventionally grown wheat, but that it would likely represent a smaller portion of the eventual overall market. A milled soft white wheat market assessment is essential to move from our examination of on-farm processing and direct marketing potential (niche buyers with household grain mills) toward developing commercial processing and associated storage capacity for the general market. Such a study might include a soft white wheat user survey to determine the quality, quantity and timing needs of local tortilla, sweet goods, cracker and prepared mix makers in Linn, Lane, Benton, and Lincoln counties, or perhaps in the Roseburg, Oregon to Olympia, Washington corridor. Such a market assessment should also include an assessment of the demand for millfeeds – bran and wheat kernel generated either as a component of whole wheat flour or a by-product of milling. Millfeeds are generally used as livestock feed.

5. We do not know whether the crudely estimated $0.26 spread between production costs and distributor sales price is sufficient to attract milling capacity to the area. An economic model calculating small mill start-up, maintenance, operations and storage costs would be useful. Transportation costs for shipping finished product to market have been a major factor in flour mill location since the 1950s. Calculating the sensitivity of profits to the changing dynamic of consumer demand for local versus least-cost global products would be a key component of such a model.