Sustaining the Pacific Northwest

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In This Issue

Articles

Survivability of Fecal Coliform in Soil after Winter Application of Dairy Slurry on a Transitional-organic, Grazing Based Dairy.

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Summary. The lifespan of soil bacteria can affect their potential for transport to surface waters and therefore influence policy decisions for land application of manure. The persistence of fecal coliform and Escherichia coli in the top 3.8 cm of soil was evaluated after spreading dairy slurry during winter months on a transitional-organic grazing based dairy in southwestern Washington. Two broadcast applications of dairy slurry were applied, one in December 2003 and the second in January 2004, to pastureland in an area approximately 3 to 4 times greater than routine farm practice. Soil cores were taken from plots in the slurry application area and in a setback zone using a 6 cm diameter soil probe at a depth of 3.8 cm and included surface material. Background soil samples were taken prior to slurry applications to establish baseline levels of fecal coliform and E. coli. Soil samples for determination of fecal bacteria were taken daily for 7 and 4 days, respectively, after the December and January slurry applications and on a weekly basis until bacteria levels were near background concentrations. Bacteria counts increased in the soil with slurry application and a subsequent increase in fecal coliform numbers occurred two to three days after slurry application. Fecal coliform numbers declined over 3 log(10) CFU per 100 g of soil within 52 days after the December slurry application and 42 days after the January slurry application. Fecal coliform bacteria had a relatively short lifespan after application on grassland during the winter months.

Introduction

Application of dairy slurry to pastureland increases the concentration of fecal coliform bacteria present on the soil. The presence of fecal bacteria on soil and/or plant material increases the risk of transport of fecal bacteria to surface water (Nunez-Delgado et al., 2002). In addition, some fecal bacteria can be hazardous to human or animal health if the bacteria are ingested (Jones, 1999).

Developing an understanding of the length of time fecal coliform and Escherichia coli can survive in soil environments is an important factor in evaluating the risks associated with application of dairy slurry. Previous reports on the persistence of fecal coliform and E. coli on soils have been variable. Avery

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Center for Sustaining Agriculture & Natural Resources

Washington State University SMALL FARMS TEAM food&farm CONNECTION

Sustaining the Pacific Northwest
Food, Farm, & Natural Resource Systems

This quarterly newsletter provides a discussion forum for people working towards community-based sustainable food, farm, and natural resource systems using interdisciplinary oriented research and practitioner knowledge.

This is a joint newsletter of the WSU *Center for Sustaining Agriculture & Natural Resources*, the *WSU Small Farms Team*, the *WSU Small Farms Program* and the *Water Quality Management Team*.

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et al. (2004) reported that E. coli survived up to 162 days and Stoddard et al. (1998) found that fecal bacteria declined to non-detectable levels in 60 days after manure application.

The objective of this study was to evaluate the persistence of fecal coliform and E. coli bacteria on soil after application of dairy slurry on a native pasture in a grazing-based dairy operation in southwest Washington.

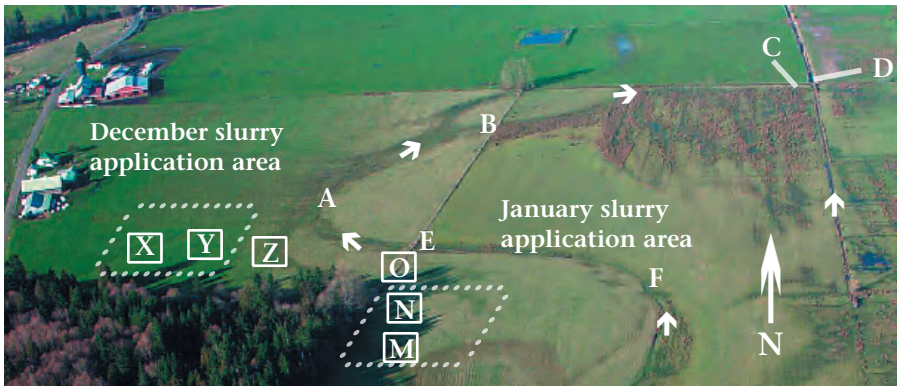
Materials and Method

Dairy slurry was surface applied in December 2003 and January 2004, without incorporation, to a native pasture used for management intensive rotational grazing of dairy cattle. Background soil samples were taken on December 8, 2003. Dairy slurry was surface applied to a 1.16 ha area of pasture on December 12, 2003 using a splash-plate manure applicator. Slurry was applied at a rate of 0.036 kg (m2) -1, covering an area four to five times greater than normal daily slurry applications for this dairy. After the December application, three soil plots (148.6 m2), located 30.5 m from each other, were designated for soil sampling. Two of the soil plots (X and Y) were located in the slurry application area and one plot (Z) was located in a setback zone between the application area and a grassed waterway. Soil samples were taken on a daily basis from December 13 to 19 and on a weekly basis from December 21, 2003 to January 26, 2004.

Dairy slurry was surface applied on January 27, 2004 to a 0.49 ha area at a rate of 0.039 kg (m2) -1, which covered an area two to three times greater than a normal daily slurry application for this dairy. Soil samples were taken on a daily basis from January 28 through 31 and on a weekly basis from February 2 through 9. Samples were collected from three 37.2 m2 plots located 12.2 m apart. Plots M and N were in the slurry application area, whereas Plot O was in a grass setback zone.

Sample Collection

Soil samples were taken using a 6-cm diameter soil probe at a depth of 3.8 cm. Three soil cores, including grass



This photo shows the location of the manure application areas, water sampling sites, and soil plots. Site A was located 10.6 meters from the point of slurry application while Site B was located 216 m further downstream and drained a larger portion of the property. Sites C and D were 287 meters downstream from site B. Site C included a waterway draining the western half of the property and site D included drainage water from the entire property as well as wooded areas to the east of the farm property. Sites E and F were also sampled to monitor runoff from the January application area. Site F was located upstream from the slurry application area and was 152 meters from site E. Site E was located 19.8 meters from the point of slurry application and was 111 meters from site A. Arrows indicate the direction of seasonal water flow. Soil plots for the December application (X, Y, and Z) were l48.6 m2 and were located 30.5 meters apart, and plots for the January application area (M, N, and O) were 12.2 meters apart and 37.2 m2.

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and surface material, were taken from each plot. Each core was divided into 2 parts and placed into separate sterile sample bags. One set of cores was used for microbiological analyses and the other set was frozen. The soil probe was cleaned and sterilized between plots with a 90% isopropyl alcohol solution.

Laboratory Analyses

Soil and slurry samples were analyzed for fecal coliform and Escherichia coli within 6 hours of sample collection. Soil samples were diluted in a 1:1 ratio of milliliters sterile buffer water to grams of wet soil. The soil and buffer solution mixture were placed into a stomacher for one minute at 200 rpm. Samples were allowed to settle for approximately 15 minutes, after which 5 ml of solution was pipetted from the top of the sample. Samples containing soil particulates were pre-filtered using a 2.5 µm filter. After pre-filtering, soil samples were membrane filtered and incubated according to Clesceri et al., 1998.

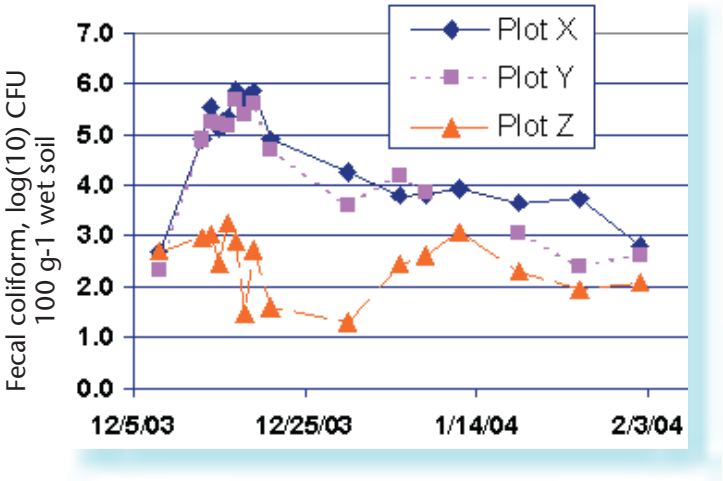
Results and Discussion

Soil fecal coliform concentrations increased after application of dairy slurry in both December and January (Figures 1 and 2). The concentrations of fecal coliform in the dairy slurry were 5.02 log(10) CFU g-1 and 4.51 log(10) CFU g-1 in the December and January slurry applications, respectively. After the slurry applications, there were subsequent increases in the concentrations of fecal coliform bacteria in the soil. However, the multiplication of bacteria was short-lived, with declines in fecal coliform concentrations seen less than one week after the slurry applications. The cause of the increases in fecal bacteria concentrations detected during the first week after application was not known, but may have been due to environmental changes.

After the January slurry application, there was some movement of fecal bacteria into plot O (Figure 2), located in the setback zone, after 5.6 cm of rainfall (in the first 72 hours after application) led to direct runoff of the slurry from the application area. Similarly, Nunez-Delgado et al. (2002) reported that fecal bacteria were transported to buffer strips with rainfall events. Fecal coliform levels in Plot O declined to background levels in less than 17 days after the large rainfall event.

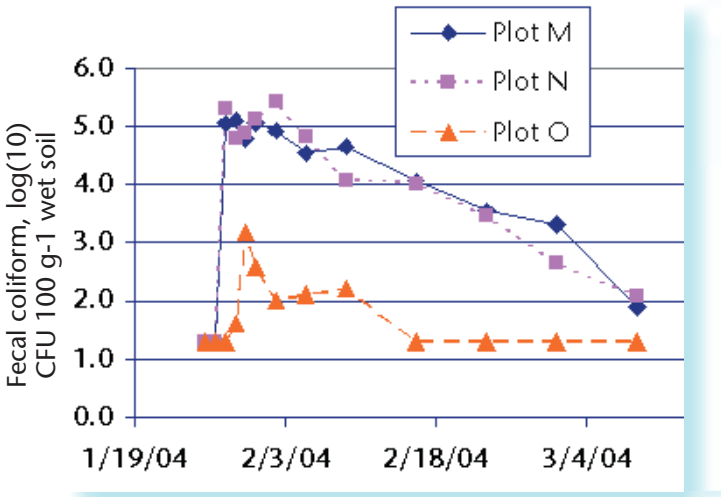
On average, soil fecal coliform concentrations in our study declined 0.043 log(10) cfu 100 g-1 per day after the December application and 0.078 log(10) cfu 100 g-1 per day after the January application. The concentrations of fecal bacteria reached background levels 52 and 42 days after the December and January slurry applications, respectively. In comparison, Stoddard et al. (1998) reported that fecal coliform levels had returned to background concentrations in less then 60 days, whereas Avery et al. (2004) found that E. coli survived for up to 162 days. Lenehan et al. (2004) found that fecal coliform levels in a pasture area used to feed cattle returned to background levels in less then 3 months.

Figure 1: Fecal Coliform Bacteria Concentrations (Plots X,Y,Z)



Fecal coliform bacteria concentrations in soil from plots X, Y, and Z before (1st data point) and after application of dairy slurry on December 12, 2003. Plots X and Y were located in the slurry application area and plot Z was located in a grass setback zone between the area applied with dairy slurry and a grassed waterway.

Figure 2: Fecal Coliform Bacteria Concentrations (Plots M,N,O)



Fecal coliform bacteria concentrations in soil from plots M, N, and O before (1st data point) and after application of dairy slurry on January 27, 2004. Plots M and N were located in the slurry application area and plot O was located in a grass setback zone between the area applied with dairy slurry and a grassed waterway.

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Conclusion

Direct runoff of slurry after field application led to some movement of fecal coliform bacteria into the setback zone. Runoff was due to a rainfall event that occurred 72 hours after application. Soil fecal coliform concentrations returned to background levels in less than 52 days after application of dairy slurry to a native pasture in southwest Washington.

Acknowledgements

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New Crop of Farmers Ready to Go in Washington: Where's the Land?

Mary Embleton, Executive Director, Cascade Harvest Coalition

Do you have farmland that is currently unused or underutilized? Do you want to see your land maintained in agricultural production? Do you want to maintain the current use tax status of your property? Would you like to see the next generation of farmers succeed? If so, please consider enrolling in Washington FarmLink, the state's leading program to link aspiring farmers and landowners and help build sustainable farming operations.

A new crop of farmers is ready! Over 200 farmers enrolled in FarmLinkthat are looking for agricultural land to farm in Washington, but only 40 landowners with farm land available have enrolled. While this ratio of 5:1 surpasses the nationwide average of 10:1, it still means that there are many more folks looking to get into farming than land available.

FarmLink helped Andrew Stout of Full Circle Farm to consolidate his farming operations on one large parcel. This allowed him to further expand his farming operations and become one of the most successful organic farmers in the state. To date, the program has helped keep over 300 acres in agricultural production.

FarmLink workshops provide a wealth of information on innovative marketing techniques and new market opportunities for improved farm income. This farmstead and artisan cheese making workshop drew an enthusiastic crowd.

FarmLink provides resources help farmers and farmland owners identify, consider, and implement options for keeping farmland in healthy, viable, and sustainable agricultural production. FarmLink evolved to help preserve agricultural resource lands and help farmers improve the profitability and viability of their operations and in turn the health of their communities, by:

- Addressing the critical issues of farm transition;
- Identifying strategies to help keep agriculture viable;
- Helping farmers better steward agricultural resources; and
- Bridging the gap between individual services currently being offered to the farming community.

FarmLink helps ensure working farms remain in production and facilitates the transition of farms to the next generation by connecting people with resources and technical expertise. In order to achieve these goals, FarmLink offers: (1) a farmer/landowner matching service; (2) educational

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Other FarmLink workshops have provided information to new and beginning farmers on product diversification. Here Peter Alden discusses his organic potato operation.

workshops; (3) a comprehensive one-stop resource center; and (4) one-on-one assistance.

FarmLink has provided services to nearly 800 individuals, kept over 300 acres in active agricultural proudction, conducted over two dozen educational workshops, and established an informational resource center.

The majority of farmers enrolled in the FarmLink program have training and experience in a variety of farming operations. However, with few land opportunities available, we miss the chance to increase the diversity of farm products available to local consumers and to maintain our agricultural land base throughout the state.

Who Will Farm?

Like most states in the nation, Washington has been losing its local food resources at an alarming rate. The most recent Census of Agriculture documents over 460,000 acres of agricultural land lost between 1997 and 2002. Not only does the agricultural resource base shrink, but age, financial, and other barriers create a dearth of new farm operators. In 2002, farm operators averaged 55.4 years of age in Washington was with those over 55 comprising 50 percent of the state's farmers. Farmers under 35 years old declined to a only 6 percent of farm operators in 2002. These statistics take on greater importance when one considers an estimated 26 to 44 percent of all agricultural land will change hands in the next twenty years.

Many groups, including local land trusts and non-profit grassroots organizations, actively pursue and promote farmland preservation. Some regions adopt land use regulations, such as Washington's Growth Management Act, that require designation of resource lands, such as agricultural lands. Farmland preservation programs, purchase of development rights, conservation easements, and other tools can help preserve the agricultural land base. But these groups and programs only address part of the issue. How is the issue of farm transition to the next generation being addressed? How do we keep agricultural lands as working farms?

The FarmLink Response

In the late 1980's, programs emerged to address the issues facing farmers and farmland in transition, although most developed in the late 1990's, operated by both public and non-profit organizations. These various programs possess one common goal:

Farm tours have proven to be very useful for workshop participants. They've learned a wealth of information on product development, processing, marketing techniques and farming practices. Here, Dr. Dave Muehleisen discusses pest management techniques with an aspiring farmer.

fostering viable and sustainable farm transitions.

Twenty-five "farm link" programs currently exist in 20 states and all provide information on programs and tools to facilitate farm transfers and access to technical and/or financial assistance. Many, like Washington's FarmLink Program, provide a matching service connecting retiring farmers/landowners with beginning farmers who can use the land to establish economically viable farm businesses. Other program elements include workshops, one-on-one technical assistance, and apprenticeship/mentoring programs.

The farm link model offers opportunities to facilitate farm transition. However, while the desire to enter farming remains strong, high program ratios of beginning to retiring farmer inquiries make the barriers to entry formidable. For more information, go to the Cascade Harvest Coalition website or call Mary at 206-632-0606.

Can the Way We Eat Change Metropolitan Agriculture? The Portland Example

Martha Works, Professor, and **Thomas Harvey**, Professor
Portland State University

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Portland, Oregon, is the kind of city where a "greener-than-thou" restaurateur's dilemma over what to do when Monsanto executives make a dinner reservation is a lead story in the local 'newsmakers' column, where local chefs are celebrities and have their own cooking shows (Caprial Pence), and where a neighborhood BBQ joint feels the need to advertise its vegetarian fare (Cannon's Rib Express near NE 33rd and Killingsworth). It's a city where food and eating and increasingly agriculture are taken seriously and form an important part of the cultural scene and landscape. A growing interest in regional food and agriculture has resulted in efforts to enhance rural-urban linkages through creation of farmers markets, community supported agriculture, farmer-chef collaborations, and promotion of local food products, and has resulted in political efforts at scales from the household to the state to foster a regionally-based community food system.

Agriculture and urbanization have traditionally been linked in discussions of loss of agricultural land to urban growth, however, there are regional variations in patterns of urban growth and in the adaptive transformation of farms. The cultural and economic context of agricultural change around Portland suggests that population increase and cultural change can provide opportunities for farming by creating markets for locally grown products. Changing food preferences and local food politics can affect land use and landscape and help shape a regional dynamic where agriculture connects rather than divides urban and rural residents.

Table 1: Changes in Oregon Agriculture (1974-2002)

	1974	2002	Change	% Change
Farms	26,753	40,033	13,280	50%
Land in Farms (acres)	18,241,445	17,080,422	-1,161,023	-6%
Average Size of Farm (acres)	633	427		-33%
Farms by size:				
1-49 acres	10,813	25,005	14,192	131%
50-999 acres	13,179	12,474	-705	-5%
1000 acres or more	2,761	2,554	-207	-7%
Farms by Value of sales:				
Less than $2500	10,196	18,873	8,677	85%
$2500-99,999	16,603 (1978)	16,973	370	2%
$100,000 or more	2,863 (1978)	4,187	1,324	46%

Source: USDA

Changes in Farmland at National, state, and Regional Scales

At the national level there has been a continual decrease in farmland over many decades, with a loss of over 80 million acres and 185,000 farms since 1974. During this same time period however, there has been an increase in the number of farms under 50 acres, reflecting an increase in the number of small and/or hobby farms surrounding urban areas. This is supported by the dramatic increase in the number of farms at the low

Local Farm offers farm stand and u-pick. (Photo by Martha Works)

end of the income spectrum (that is, less than 2500$) by almost 400,000 between 1974 and 2002, and by the number of farms at both the larger sizes and higher incomes, reflecting in this case a significant loss of the "ag in the middle" or the traditional family farm.

In Oregon there is a similar pattern of overall losses (6% decline in number of farms between 1974 and 2002 compared to 8% national decline), but a significantly greater increase in the number of small farms (131% vs. 37%) and a gain, albeit small, rather than a loss in middle income farms (Table 1).

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Changes in Oregon's agricultural picture need to be considered in the context of state land use planning regulations that date from 1973. These regulations have contained urban sprawl through the establishment of urban growth boundaries around all towns and cities in the state and provided specific protections for 'prime agricultural land' and areas zoned for 'exclusive farm use.' Despite rapid population growth in Oregon's "Eden", the Willamette Valley, particularly over the last 15 years, farmland has not been converted as rapidly as it might have been without the land use planning regulations.

In the Portland metropolitan area, this includes five Oregon counties and Clark County, Washington, patterns of farmland change challenge the conventional wisdom about farmland loss, especially considering that the area's population increased from 1.3 to 2 million people between 1980 and 2003. Not only did number of farms increase, so did land in farms, due, in part, to the fact that Christmas tree farms were counted as agricultural land in the 2002 agricultural census, but not in previous censuses. The number of small farms increased, but so did the number of farms larger than 1000 acres and farms in all value categories increased.

This suggests that generalities about farmland loss mask profound regional variation and that to understand agricultural change we need to look more closely at forces affecting land use and landscape change at various scales of analysis.

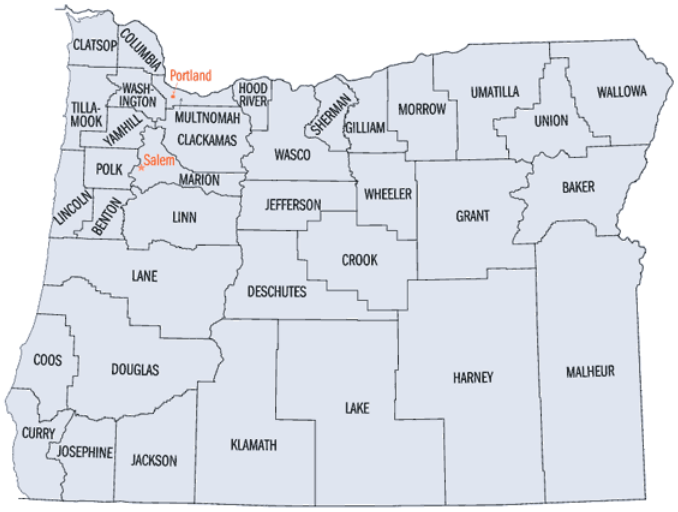
Oregon and Portland Metropolitan Area Agriculture

Oregon agriculture is remarkably diverse and reflects the dramatic regional variation found in the state. Eastern Oregon is high desert country with an economic landscape of wheat, cattle, hay, mining and timber extraction — the classic extractive economy of the intermountain west. The lush Willamette Valley forms the core of western Oregon. It is the 'Eden' that Oregon Trail pioneers sought as they headed out on wagon trains for the six-month journey from Missouri and toward which modern "pioneers", Richard Florida's "creative class", still come in search of "the good life."

The state of Oregon grows over 225 commercial crops, more than any other state except California and Florida, and the greatest diversity of production occurs in the Willamette Valley. Most of the production is exported and 40% leaves the country.

Despite economic changes over the last 50 years, agriculture remains an important part of the state's economy, first in terms of volume and second only to high tech in terms of export value.

Figure 1: Oregon Counties



While it might not be surprising that agriculture is important to the state of Oregon, the concentration and importance of agriculture in Portland's metropolitan counties is contrary to popular notions about the coexistence of agriculture and urbanization. Three of the metropolitan area counties (Clackamas, Yamhill, Washington) are among the top five agricultural counties in the state. Multnomah County, where Portland is located, is Oregon's most urban county, yet still ranks 14th in value of agricultural production. Four of the five counties (Clackamas, Washington, Yamhill, Multnomah) are in the top five counties for greenhouse and nursery products; four, Washington, Clackamas, Multnomah, Yamhill, are among the top five producers of cane berries; and two, Yamhill and Washington, are leading producers of wine grapes. Nine of the most productive agricultural counties in Oregon are in the heavily populated Willamette Valley.

Urban Growth Management in Oregon

Oregon's urban growth management policies date from 1973 when Senate Bill 100 passed with support from both political parties and Republican governor Tom McCall. The law set a number of statewide planning goals that addressed, among other goals, urbanization and the preservation of resource lands. The legislature paid particular attention to farmland protection with Goal 3:

The preservation of a maximum amount of the limited supply of agricultural land is necessary to the conservation of the state's economic resources and the preservation of land in large blocks is necessary in maintaining the agricultural economy of the state and for the assurance of adequate, healthful and nutritious food for the people of this state and the nation.

Factors Affecting Portland Metropolitan Agriculture

This agricultural bounty began attracting chefs, cooks, gardeners, and sophisticated eaters in the early 1990s

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West Union Gardens garlic is offered regionally. (Photo by Thomas Harvey.)

when a number of new restaurants began touting 'regional Northwest cuisine' that drew on locally produced and regionally distinctive food stuff such as salmon, wild mushrooms, game, pears, and berries. This attention to local and regional foods captivated the general public, which in turn began demanding more readily available fresh and local food, driving an increase in direct marketing of agricultural products through many different channels.

In recent years there has been a politicization of the local food system idea with a variety of organizations such as Portland-Multnomah Food Policy Council and Ecotrust working to both promote local agriculture and provide alternatives to the corporate food structure through their support of 'buy local' food procurement strategies.

This combination of demand for a more diverse array of food, fed by globalization and immigration, and the political emphasis on sustainability and 'living in your region' (ironically, a kind of response to the globalization of food) has had an impact across the United States mirroring trends that are well established in parts of Europe. Portland provides a model for investigation of these trends because of the diversity of agricultural production, the physical setting, the concentration of a foodie culture, a tradition of political activism, and the existence of an urban growth boundary which provides some controls over sprawl.

What factors shape this distinctive food culture and what is the impact on agriculture in the region?

The Role of Chefs

In the Portland area, and more generally in the Pacific Northwest, chefs were instrumental in drawing attention to the amazing array of local foodstuffs; they have played an important role in creating a local food culture and in promoting local agriculture. As visible public citizens they actively promoted support for local farmers and seasonal produce. A Portland Chapter of Chefs Collaborative was formed in 1998 and has developed, in partnership with Ecotrust (a local non-profit dedicated to fostering a sustainable regional economy), the Farmer-Chef Connection, a direct marketing model that promotes long-term business relationships between chefs and farmers. This is accomplished by an on-line directory that helps farmers find chefs and chefs find farmers, a set of guidelines for both, and what one participant has called a kind of "speed-dating" conference where farmers and restaurateurs briefly interview each other to establish compatibility.

Farmers Markets

Chefs were early supporters of a Portland farmers market which began in 1992. The official Portland Farmers Market has grown from a handful of vendors in a parking lot in an industrial area to three sprawling markets a week in downtown Portland with over 200 vendors. At its inception market organizers had a hard time finding enough vendors, now there is a waiting list for the downtown markets and 24 additional farmers markets in the Portland area (plus one in Vancouver, Clark County). Two of the Portland area markets have year round operations, extending income opportunities for farmers, and several markets are extending their seasons of operation.

Portland Farmers Market remains the region's largest. (Photo by Martha Works.)

West Union Gardens:

"We Grow Everything We Sell"

Urban-oriented agriculture has found its place in the protected rural landscape of metropolitan Portland. West Union Gardens, located in the urban-rural fringe just ¾ of a mile from the UGB, epitomizes the trend. Jeff and Cheryl Boden started farming on a 50-acre former dairy in 1987. They chose an easily accessed location on NW Cornelius Pass Road, a major rural route close to suburban populations. At that time, the UGB was in place but development had barely pressed against it. Today the boundary is highly visible, the result of housing subdivisions built since 1990.

Farm Stands

Another form of direct marketing that has grown dramatically in the last several years, both in number and in publicity about them, are farm stand operations. 5000 copies of a flyer with the charming title *Sunset Trails to Country Fresh Foods* were distributed in 1977 listing 25 farm stands near Portland. Now 100,000 copies of

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the more prosaic *Tri-county Farm Fresh Produce Guide* are distributed through the local paper and other outlets, listing 80 farm stands in the greater Portland area. While some might consider this merely agri-entertainment for urban dwellers, it also provides a form of direct income for urban area farmers.

Community Supported Agriculture

Increase in community supported agriculture (CSA), whereby subscribers buy shares or invest in a farm at the beginning of the season and in exchange receive weekly supplies of fresh produce, is also a national and local trend. In 1985 there was one CSA in the US; now there are over 2000. Over the last ten years, the number of CSAs in the Portland area has increased from zero to 18. About a third of them offer year-round options for produce.

Growth in the Wine Industry

Another culturally driven change in agriculture is the dramatic growth of Oregon's wine industry. This is due to the character of the physical environment and is part of a broader context of cultural change. It is not driven exclusively by local food preferences, but it has a significant effect on metropolitan agriculture since two of the counties, Yamhill and Washington, are leading producers of wine grapes in the state. This has led to the conversion of what might have otherwise been considered marginal land to grape production, to a significant agri-tourism focus

Oregon's wine industry has seen dramatic growth despite its proximity to Portland. (Photo by Martha Works.)

for the region, and to a visible and vocal lobby for the preservation of agricultural infrastructure and agricultural landscapes.

Demand for Organic Food

Demand for organic produce, also part of a national trend, has helped shape the character of urban area agriculture. Oregon Tilth has certified organic farmers in Oregon and elsewhere since 1974. Because of variation in certification criteria it is difficult to gauge absolute change in organic production in the state of Oregon, although it clearly is increasing. Oregon Tilth records an increase from 180 to 220 organic farms in Oregon between 1998 and 2001 and an increase of over 5000 acres, from 12,000 to over 17,000 over the time period. The 2002 Census of Agriculture, which lists organic farms for the first time under the new USDA criteria, tabulates 515 organic farms in Oregon, 144 (28%) of whichare in the Portland area. If we look more

Smaller farms also find a niche selling organic produce. (Photo by Martha Works.)

broadly at the other urban areas of the Willamette Valley, 266 (over 50%) organic farms are in metropolitan counties.

Political Efforts to Transform Agriculture

More explicitly political efforts are also having an impact on agriculture and land use. Efforts to establish food policy councils at state, county, and city levels are present in over 20 states. Oregon is one of several states to have efforts underway to establish a statewide Food Policy Council and is second only to California in the number of local or county- wide councils (there are five in Oregon, eight in California). Food policy councils are 'joint citizen and government advisory bodies that review and recommend policies that strengthen the local food economy and improve access to healthy and nutritious food' and to combat hunger. "Council members represent the diversity of stakeholders involved in the food system, from farmers and processors to retailers, anti-hunger advocates, nutritionists, planners and community members."

Among the impacts that the Portland-Multnomah Food Policy Council has had on local food production is a commitment from the County Corrections facility to increase purchases from local suppliers. In the 2004 growing season the county bought $57,000 in fresh food from Portland area farmers (including those in SW Washington). Another effort involved a direct marketing workshop for immigrant farmers (Hmong, Cambodian, Latino, and Somali-Bantu) to help with developing marketing opportunities, community gardens, and access to land.

Ecotrust's Food and Farms Program, for example, has the following goals:

- Promote the seasonal products of local farmers
- Reduce the environmental impact of agriculture on healthy watersheds
- Improve public understanding of local agriculture
- Increase the market share of locally grown food.

Food Purveyors and the Role of Entrepreneurs

Burgerville, a locally owned fast food outlet with locations in southwest Washington and Northwest Oregon, has a corporate policy to feature local food and to source as much of their menu as possible from local purveyors. From hazelnut, raspberry, strawberry, huckleberry, or pumpkin milkshakes, to Walla Walla onion rings, sweet

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Burgerville has a coporate policy to feature local food and . (Photo by Martha Works.)

potato fries, Oregon Country Beef, buns made from local wheat, and Tillamook cheese, Burgerville has built a loyal customer base on its support of local agriculture.

New Seasons Market, a chain of locally owned grocery stores, markets itself as "a company [with] a true commitment to its community, to promoting sustainable agriculture and to maintaining a progressive workplace....When you shop at [this] locally owned business your money stays in your neighborhood, creates local jobs, and nourishes the unique character of your community." with a motto of "Think Local, Buy Local, Be Local," New Seasons has prompted other area grocers to feature local and organic produce.

The Food Innovation Center, a branch of Oregon State University's agricultural extension service, is based in Portland. Its mission is to help local producers and entrepreneurs develop food products that support Oregon agriculture. The center provides assistance with packaging, preparation and processing of food items, and marketing and has worked to develop or improve a range of signature Oregon food items that find their way to regional, national, and international markets.

Impacts on Rural Land Use

How do efforts such as farmer-chef cooperatives, farmers markets, community supported agriculture, increases in organic production, a vibrant wine producing region, local companies with emphasis on sourcing local products, and political structures promoting local agriculture affect land use and support for farmland near cities? What are the impacts of these efforts on agricultural production and the agricultural landscape?

Agricultural census data provides a basis for addressing impacts of changes in urban food preferences and food policies on rural land use. Farm acreage decreased in three area counties, Washington, Columbia, and Clark, but increased in Clackamas, where Christmas tree, nursery, and greenhouse production are particularly strong, and in Yamhill County with its booming winery and vineyard industry, and even increased marginally in Multnomah County. Harvested cropland, which some researchers suggest is the best measure of agricultural production, shows increases in Yamhill, Clackamas, and Columbia, decreases in Washington and Clark, and little change in Multnomah County between 1987 and 2002.

To better understand how food preferences and cultural and political factors affect agriculture we can look at agricultural census figures for 'direct marketing' which includes value and acreage of farmers market vendors, farm stands, community supported agriculture, and U-pick or farm stand operations. There are overall increases in value of production in all area counties between 1992 and 2002, with the exception of Clark County, Washington, which has less restrictive land use regulations, rapid population growth, and serves, in part, as a bedroom community for Portland). Local observers of the agricultural scene are unsure why Multnomah County's value of direct marketing products spiked in 1997. There is general agreement, however, that figures for direct marketing in Oregon and elsewhere are undercounted. Direct marketing in the Portland area by number of farms shows an increase in all counties except Clark County, Washington. These figures suggest that cultural preferences, which would be reflected most clearly in the figures for direct marketing, along with land use planning regulations have combined to provide an avenue of opportunity and a measure of protection for urban oriented agriculture.

Agricultural zones at the edge of metropolitan areas are marked. (Photo by Martha Works.)

Regional and National Implications

Does the growth of demand for local food and the increasing number of farms devoted to direct marketing have an impact on metropolitan agriculture in Portland? Can changing attitudes about food consumption have an impact on agriculture overall, particularly agriculture around cities? A preliminary look at two other cities, Kansas City, Kansas and Charlotte, North Carolina, which have very different physical and cultural geographies, and different patterns of urban growth, indicates that those metropolitan areas have also experienced increases in land in farms over the last 15 years.

The cities further suggest these changes are occurring on a national scale in metropolitan areas. Given the national increase in number of farmers markets, community supported agriculture, and support for regional and local food production, these changes are likely having an impact on other urban areas as well. By way of example, the number of farmers markets at the national level more than doubled between 1994

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and 2004, from 1,755 to 3,706. The number of farms or farmers involved in selling products or produce to farmers markets increased from 86,432 in 1987 to 116,733 in 2002.

The "buy local" trend, increasing attention to regional identity, and the role of food and agriculture in shaping places, are apparent in the cultural, economic, and political landscapes of metropolitan regions. These changes in the way people think about and purchase food make a political statement and are a way of supporting the regional agricultural economy; they also are a way of buying 'landscapes,' of supporting viable rural land uses and livelihoods, and in 'voting through your food choices' to create a regional dynamic that links the rural and the urban.

Martha Works' teaching and research interests are in cultural geography and Latin America. Thomas Harvey has research and teaching interests in American regions and landscapes, urban geography, and landscape photography. Information about previous research by Works and Harvey on the urban-rural interface can be found at http://www.rlua.pdx.edu/.

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Small-scale biogas: Can it work in the Pacific Northwest?

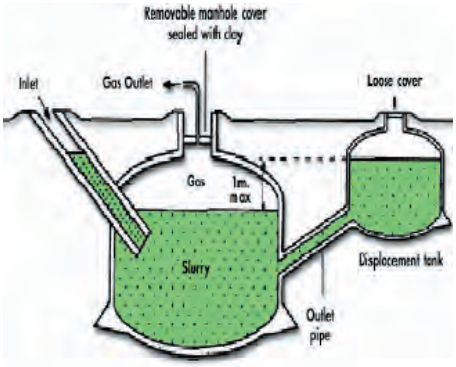
Chad Kruger, WSU CSANR **Craig Frear**, & **Shulin Chen**, WSU Biological Systems Engineering

Rapidly rising costs for energy and agricultural inputs produced from non-renewable sources pose a critical threat to the economic viability of US farms. Small, diversified, and organic farms, while more insulated than chemically-intensive farms, are still vulnerable to the effects of volatile energy markets and could gain considerably from using renewable energy technologies. In particular, energy technologies focused on waste biomass, or bioenergy technologies, hold great promise for efficiently and inexpensively treating organic farm wastes, reducing odor and methane emissions (a powerful greenhouse gas), providing nutrient-rich material for land application, as well as producing renewable energy for on farm use. A natural, biological process, Biogas technology (also called anaerobic digestion), treats wet, organic wastes to produce biogas, a form of renewable energy.

For the past two years, CSANR's Climate Friendly FarmingTM Project, in partnership with the Department of Biological Systems Engineering and Whatcom County Extension, has demonstrated the potential of biogas technology for converting dairy manure from concentrated animal feeding operations into valuable products such as renewable energy, fiber, and liquid fertilizer. This process reduces both greenhouse gas emissions and odor, while improving waste management. The primary obstacle to the widespread adoption of this technology remains economic. In regions with low electrical power rates like the Northwest, it requires at least 750 cows to make the technology viable. The project focused on making this technology commercially viable at smaller scales of 200 to 400 cows. This process also spurred interest in the potential for this technology at much smaller scales, such as for small-farm or household use.

There are three basic designs of small-scale (household size) biogas plants in widespread use in the developing world: the Chinese Fixed Dome Digester (Figure 1), the Indian

Figure 1: Chinese Fixed Dome Digester



Floating Dome Digester (Figure 2), and the Taiwanese Polyethylene Tubular Digester (Figure 3).

Figure 2: Indian Floating Dome Digester

These biogas plants work successfully throughout the tropical and sub-tropical regions of Asia. Simple in their design and relatively inexpensive to construct, each has advantages and disadvantages. Direct transfer of these technologies to the upper latitude, cold climate region of the Pacific Northwest will likely negatively affect the performance of these technologies without some degree of modification. A number of mechanisms can be used to mitigate the cold-climate performance factors and the proposed will address these "engineering" questions.

Figure 3: Taiwanese Polyethylene Tubular Digester

In addition to the engineering questions, we hope to learn how small farmers in the region might utilize small-scale biogas technology. Towards this end, we are attempting to secure funding to demonstrate various uses of small-scale biogas technology on local farms. For more information about this effort, contact Chad Kruger at 509-663-8181 x235.

New Book

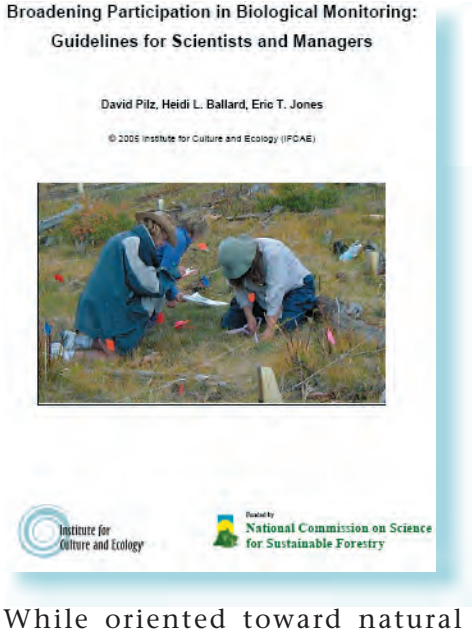
Participatory Biological Monitoring Guidelines

Eric T Jones, Ph.D.,
Environmental Anthropologist,
Institute for Culture and Ecology

A new publication entitled, Broadening Participation in Biological Monitoring: Guidelines for Scientists and Managers, can be downloaded from the IFCAE website.

Biological monitoring, while essential for understanding environmental change, is often expensive. From the hundred plus year-old Audubon Christmas bird count to the EPA's volunteer water quality monitoring to the growing multiparty monitoring movement by community-based forestry organizations, participatory monitoring has proven to be an effective way to increase biological monitoring activities, build support for science, and increase public involvement in understanding environmental change.

This project synthesizes the literature and stakeholder knowledge on participatory monitoring to create a tool to help forest managers and scientists: 1) broaden participation to meet biological monitoring needs while maintaining scientific standards, and 2) build positive long-term relationships with participants and their local communities. The guidelines are designed as a reference handbook on the managerial, scientific, and social considerations of participatory monitoring and complement rather than duplicate existing manuals providing monitoring methods (e.g., Monitoring Plant and Animal Populations, Elzinga et al. 2001). The guidelines can be scaled to work with any type of project whether bottom-up or top-down, large or small, volunteer or small contractor.



While oriented toward natural resource managers and scientists in the U.S., the guidelines apply to anyone interested in participatory biological monitoring. In creating the materials, the interdisciplinary team drew from their professional experiences in participatory research, as well as the invaluable insight of many advisors and reviewers from the University of California Berkeley Cooperative Extension, the Forest Service Inventory and Monitoring Institute, Rural Action, the National Network of Forest Practitioners, and many others (see report). Much guidance was also gained from multi-stakeholder workshops held throughout the United States over the last several years.

The project maintains a network of advisors and consultants to assist with local implementation. Please see the list of organizations provided in the appendices or contact the Institute for Culture and Ecology.

Events

Meat Goat Distance-Learning Course Offered

ATTRA. Penn State Cooperative Bedford County Extension offers a distance education course, "Meat Goat Home Study," to provide a better understanding of the basics of meat goat production. Participants read one lesson per week and then complete and return worksheets. The course can be completed online ($35 fee) or by mail ($50 fee). The lessons are available anytime on the Web, but the registration deadline for the next course is January 25, 2006, with sessions beginning February 1, 2006.

Harvesting Clean Energy Conference

The sixth Harvesting Clean Energy conference will be held February 27-28, 2006, in Spokane, Washington, at the Red Lion Hotel at the Park. This event brings together the agriculture and energy industries to profitably participate in clean energy production and other bio-product markets. Rural landowners and communities from throughout the Pacific Northwest can learn how to make renewable energy, such as wind, biofuels and solar, a profitable new crop. Sessions will look at how landowners can:

- Benefit by hosting or banding together to own wind farms
- Grow new crops to support biodiesel and ethanol production
- Meet community needs and provide jobs through renewable energy
- Assembling public and private financing for project development

- Fueling rural prosperity through state and federal policy leadership

Thanks to generous sponsor support, farmers, ranchers and other private individuals can register by February 6 for just $50, while professionals can register for $100. Go to www.harvestcleanenergy.org/conference or call 360-943-4241 for more information.

Tidbits

Food Service Provider Challenges Chefs to Use Local Food

ATTRA. National food service provider Bon Appétit Management Company challenged its 190 chefs in 26 states to offer diners a 100 percent locally grown meal, made entirely of ingredients from within 150 miles of the kitchen where it is served. The company serves 150,000 diners at corporate, university, and museum restaurants, and has launched the challenge to raise awareness about where the food on our plates comes from. The Eat Local Challenge highlights the issue of "food miles", the distance food travels from the farm to the dining table, which environmentalists have described as the single most damaging factor to food quality and the environment. A brochure from the WSU Small Farms Team provides tips on serving local foods at meetings.

Report Shows Growth in Organic Acreage

ATTRA. USDA Economic Research Service released a report documenting the growth in organic production from 1992-2003. By 2003, farmers in 49 States dedicated 2.2 million acres of cropland and pasture to organic production systems. While adoption of organic farming systems showed strong gains, the overall adoption level remains about 0.4 percent of all U.S. cropland and 0.1 percent of all U.S. pasture in 2003.

WSU Sustainability Initiative

By Executive Policy, WSU commits to sustainability. The policy states, in part, "Washington State University is committed to improve its performance in sustainability in all areas of operations to meet the needs of current generations without impairing the ability to meet the needs of future generations. Washington State University will develop appropriate systems for managing environmental, social, and economic sustainability programs with specific goals, objectives, priorities, and processes. In addition, Washington State University will continue to support the present Environmental Management System and its principles to manage environmental challenges on the Pullman Campus and extend them to other WSU campuses and locations. This policy will help Washington State University meet its responsibility to prepare students, staff, and faculty to proactively deal with the environmental, social, and economic challenges facing humanity."

Resources

Green Power on the Farm

Farming communities can become more sustainable by harvesting renewable energy resources. The National Food & Energy Council has created a web page on green power opportunities, including methane recovery, solar & wind power, and biomass combustion. Check it out at http://www.nfec.org/greenpower.htm.

Motor Efficiency in Agriculture

The National Food & Energy Council offers efficiency and maintenance tips for motors used in agricultural applications. Visit http://www.nfec.org/electricmotors.htm for more information, and to order their Electric Motors Packet.

Winery Energy Efficiencies

The BEST Winery Guidebook: Benchmarking and Energy and Water Savings Tool (1.3 MB) was developed for California wineries to compare their own wineries to one that is the most energy efficient possible. BEST (Benchmarking and Energy and Water

Savings Tool) Winery is a software tool with a handbook that enables users An article in Environmental Energy Technologies Division News http://eetd.lbl.gov/newsletter/nl21/5best.htm includes the contact information of persons who can provide further information to potential users.

New Publication Outlines Growth Potential of Meat Goat Industry

ATTRA. While production of goat meat in the U.S. represents a niche market, it is the most commonly consumed meat in the world and the domestic market has huge potential for growth. The Small Farm Program at the University of California-Davis released a new publication titled *Outlook for a Small Farm Meat Goat Industry in California* (1.8 MB) that concludes California's climate, diverse population, current goat meat import figures, and the size and number of small farms in the state indicate that a successful state goat meat industry could emerge. It also offers several tips for small-scale farmers interested in raising meat goats.

U.S. vs. EU: Two Policy Paths to Organic Agriculture

ATTRA. An August 2005 report by the Economic Research Service of the U.S. Department of Agriculture, *Market-Led Growth vs. Government-Facilitated Growth: Development of the U.S. and EU Organic Agricultural Sectors*, compares the different policy approaches to organic agriculture taken by the U.S. and the European Union (EU), the two largest markets for organic products and farmland in the world. It notes the U.S. focuses primarily on market development while many countries in the EU offer "green payments" to help farmers transition to organic production. The article also notes the EU can supply more organic products, which affects international trade, because it has far more acreage under organic production. In 2001, the EU had 10.97 million acres of certified organic farmland, compared to 2.34 million acres in the U.S.

New Study Shows Organic Diets Lower Children's Exposure to Some Pesticides

ATTRA. The article, *Organic Diets Significantly Lower Children's Dietary Exposure to Organophosphorus Pesticides*, was recently published in the peer-reviewed journal Environmental Health Perspectives. Over a 15-day study period, scientists tested the urine of 23 elementary school-age children for specific metabolites of malathion and chlorpyrifos, two common pesticides used in agricultural production and belonging to a class of insecticides, the organophosphates (OPs), that are known to cause neurological effects in humans and animals. During the first and third phases of the study, the children consumed a primarily conventional diet, and during the second phase (days 4-8) organic food items were substituted for the bulk of the kids' diets. When they enrolled in the study, all 23 of the children's urine samples contained metabolites of the two pesticides studied. Immediately after the introduction of organic food to the children's diets, the metabolites of both dropped to the non-detectable level. Non-detectable levels remained until the conventional diets were re-introduced, when OP pesticide metabolites re-appeared in the samples. Based on the study design and results, the authors "conclude that organic diets provide a protective mechanism against OP pesticide exposure in young children whose diets regularly consist of fresh fruit and vegetables, fruit juices, and wheat-containing items."

Energizing Entrepreneurs: Charting a Course for Rural Communities

Rural Entrepreneurship News. The RUPRI Center for Rural Entrepreneurship and the Heartland Center for Leadership Development have partnered on a new book, Energizing Entrepreneurs: Charting a Course for Rural Communities. This book guides community leaders and economic development practitioners interested in creating entrepreneurship development strategies for their rural communities. The RUPRI Center also developed a companion website www.energizingentrepreneurs.org with additional materials and resources. The book can be purchased ($23) at the *Heartland Center's website*.

Four Reports Document Perceptions of the U.S. Food System

ATTRA. Four reports commissioned from FrameWorks by the W.K. Kellogg Foundation explore how people think about food and the food system. Published collectively as *Perceptions of the U.S. Food System: What and How Americans Think about their Food*, the reports conclude the first phase of a comprehensive strategic frame analysis on the food system to be completed in 2006. The four reports are:

Not While I'm Eating: How and Why Americans Don't Think about Food Systems,

All Trees and No Forest: How Advocacy Paradigms Obscure Public Understanding of the Food System,

Digesting Public Opinion: A Meta-analysis of Attitudes toward Food, Health, and Farms, and

Harmful and Productive Patterns in Newspaper Representations of Food Systems.

Online Resources Help Producers Assess Wine Production

ATTRA. *Interactive spreadsheets and videos* on the wine industry are now online at the Agricultural Marketing

Resource Center (AgMRC) Web site to help producers determine whether a winery or vineyard might be feasible for their operation. The financial feasibility spreadsheets are included in two workbooks, the *Ten-Year Winery Financial Planning Workbook* and the *Cost to Establish a Vineyard Workbook*. A set of three Total Wine Package videos, streamed for online viewing, explore the opportunity of growing grapes and making wine, present a behind-the-scenes look at the science of enology, and cover selling a total wine experience. Funding for this project was provided in part by the Leopold Center for Sustainable Agriculture.

Manure Spreader Available

Clark Conservation District has a small, 62 cubic feet, manure spreader available to loan to Clark County residents. This spreader requires a 14 HP or larger garden tractor or any vehicle weighing 1000 lbs. or more (such as a pickup truck) to pull it. Contact the CCD at 360-883-1987 x110.

Reference Aids Farmers with Income Tax Management

ATTRA. Check out Purdue University's Agricultural Economics department publication on recent changes to tax laws affecting farmers, *Income Tax Management for Farmers in 2005* explains provisions in recent tax bills and other legislation affecting the amount of tax farmers pay or encourage particular management strategies.

Submitting articles: Submit articles electronically to Doug Stienbarger in MS Word or RTF formats. Photos and graphics are encouraged.

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