

CHAPTER 7: SUSTAINABLE AGRICULTURE ACTION PLAN

Context

Agriculture in the U.S. has changed dramatically over the past fifty years as post-war technologies for fertilizer production, chemical use, plant genetics, petroleum extraction, and mechanization were applied to farming. These practices proved to be essential developments in providing a stable food supply for the ever growing world population suffering from the repercussions of global turmoil. In what was heralded as “the Green Revolution” of the 1950s and 1960s, agricultural productivity skyrocketed, allowing impoverished countries to



greatly improve food security and developed nations to reduce farm labor needs and food costs (Griffin 1979). Agriculture became greatly centralized, with the U.S. farm population shrinking from over 12% in 1950 to less than 2% today (Heller and Keoleian 2000). Prices of staple commodities plummeted, allowing Americans to spend a smaller percentage of their annual incomes on sustenance than any population in the world (USDA 2006). While the benefits of a prolific, dependable food supply are inarguable, these efficiencies in agricultural production have come with a price.

Globally, highly mechanized and chemically dependent farming has led to a multitude of environmental problems, including topsoil erosion and depletion, water quality concerns, pesticide contamination, and loss of biodiversity. Centralized production and processing systems have resulted in most food products travelling an average of 1,500 miles to reach consumers, which has had enormous repercussions for air quality, dependency on foreign oil, and climate change from greenhouse gas emissions (Pirog and Van Pelt 2002). From a human health perspective, while mass quantities of lower-value staples such as corn and soybeans have provided needed surpluses for disadvantaged populations, their overproduction has led producers to develop these goods into value-added products of minimal nutritional value, such as corn chips and soft drinks, a trend that has had unquestionable effects on obesity rates and other health indicators in the U.S. and throughout the world (Wallinga 2010). Loss of production diversity of both plants and farm animals has led to widespread use of fertilizers, pesticides, antibiotics, and other chemicals that have entered the food supply and waterways. Centralized agribusiness production has also had social consequences by removing communities from their food production and threatening family farming traditions and incomes, as well as the widely cherished rural lifestyles and landscapes. Many rural areas, once self-sustaining and productive, have been pushed out of the agricultural markets by the artificially low prices of subsidized mass production and have been left with few economic options (Feenstra, undated).

Such consequences have led to a growing interest in more localized and sustainable alternatives over the past two decades as consumers have begun to recognize the role their buying power can play in addressing the environmental, social, and economic concerns related to food. The concept of sustainable agriculture has continually evolved, growing to include multiple environmental, social, and economic considerations, and

becoming integrated into a variety of certification vernacular such as “organic,” “humane-raised,” or “fish-friendly”[®] (Marcus 2009).

Sustainability in agriculture was more officially defined by the U.S. Congress in the 1990 Farm Bill, which characterized it as “an integrated system of plant and animal production practices having a site-specific application that will, over the long term:

- Satisfy human food and fiber needs;
- Enhance environmental quality and the natural resource base upon which the agricultural economy depends;
- Make the most efficient use of nonrenewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls;
- Sustain the economic viability of farm operations; and
- Enhance the quality of life for farmers and society as a whole.”

The definition describes a broad-scale, integrated approach that provides roles and benefits for the producer, consumer, and community and necessitates involvement from policy makers, researchers, landowners, farm workers, retailers, and others.

Components of Sustainable Agriculture

While the word “sustainable” has in recent years become synonymous with ecological concerns, its true definition must equally consider social and economic aspects. Some considerations related to each of these three primary components of sustainability are described below.

Environmental considerations:

Soil quality. Soil health involves both quality of the soil itself as a living medium and structural stability provided by its supported vegetation. It can be degraded through erosion, compaction, loss of soil biota through pesticide use, and depletion of soil organic matter.

Water use. Water remains a primary concern in California’s Mediterranean climate, which is characterized by cool, wet winters and hot, dry summers. While much of the state’s agriculture relies on a complex system of water storage and transfer from reservoirs, aquifers, and the Sierra snowpack, coastal areas enjoy cooler temperatures and relatively higher annual precipitation than inland regions. However, rainfall patterns on the coast continue to pose complications for farmers and ranchers who face water quality concerns from runoff and erosion during the winter months and limited water supplies in the summer. Production systems need to be appropriate to local availability and to practice water conservation and recycling. Always deeply political, water use issues in northern coastal California have been brought to the forefront with the devastating crash of the Pacific Northwest’s already dwindling salmon populations, which serve as the backbone of the region’s fishing industry, valued at over \$130 million per year, and a way of life for coastal Native American communities.

Water quality. Connected to water use issues is water quality, a concept that considers numerous conditions, including temperature, sedimentation levels, nutrient levels, salinity, pH, dissolved oxygen levels, and levels of contaminants, such as pesticide residues or heavy metals. Water quality is essential for maintaining aquatic life and providing safe drinking water for people, livestock, and wildlife. Sustainable farming systems consider on-farm nutrient and sediment retention and protection of riparian areas.

Air quality. Numerous aspects of agricultural production can have implications for air quality, including carbon and nitrous oxide emissions from fuel and fertilizer use, dust, pesticide drift, and burning of crop residues. The role of agriculture in global climate change is considerable, both in its contributions to carbon emissions and its potential for sequestration through plant CO₂ uptake and preservation of vegetated land.

Energy use. Most modern agriculture is heavily dependent on non-renewable fossil fuels for production, transportation, and processing, totaling over 10% of the energy use in the U.S. An estimated 40% of this is used to create and transport chemical inputs, such as pesticides and inorganic fertilizers (Heller and Keoleian 2000), which has enormous implications for climate change and economic stability. Efforts to reduce fossil fuel use could include minimal-till farming, localized production and processing, reduction in energy-heavy chemical inputs, and fuel alternatives.

Habitat and biodiversity. Conversion of natural areas to modern agricultural production has traditionally removed native habitat and displaced wildlife, while threatening neighboring preserved areas through erosion into waterways, pesticide use, and corridor removal. However, in keeping large tracts of land from development, well-managed agricultural systems can actually provide wildlife habitat and maintain migration corridors.

Agrobiodiversity. Modern agriculture has resulted in loss of diversity in farm production with the economies of scale and specialization favoring monoculture crops and removal of on-farm natural or semi-natural areas, such as hedgerows or wetlands. While initially increasing productivity, this trend has made farms more susceptible to market fluctuations, pest problems, and soil nutrient depletion. These problems have, in turn, created heavy reliance on subsidies, pesticides, and nutrient inputs. Sustainable systems mitigate for these concerns by creating diversity both on-farm and across landscapes.

Social considerations:

Human health and well-being. While modern agriculture has greatly increased overall food availability for much of the world's population, it has had other repercussions on human health and overall well-being. Surpluses of corn, soybeans, and other staples have led the marketing of value-added "junk food" products, while pathogens and contaminants from antibiotics, pesticides, fertilizers, and other chemical inputs have appeared in food and water. Farm worker health and quality of life have also emerged as major concerns, particularly in California, where many immigrant farmhands operate outside of legal protections.

Animal welfare. The vast majority of modern meat and dairy production involves confined animal operations or "factory farms," in which large numbers of animals are often restricted to very small areas where they can be subject to immobilization, stress, disease, and inhumane slaughter practices (Pew Commission 2008). Recent efforts have been taken to incorporate animal welfare standards into certification programs, including the American Humane



Beekeeping is fast becoming an important part of pollinator-based agriculture.

Association “Free Farmed” label and the Humane Farm Animal Care’s ISO-certified label “Certified Humane Raised and Handled.”

Preservation of farmland and farming traditions. While farming was once the mainstay of the American economy and identity, fewer and fewer families have maintained these traditions, with less than 2% of the U.S. population now actively producing food. Rising land values have led many farming families to sell productive land for conversion to housing and suburban development, resulting in the loss of over 30 million acres of farmland since 1970.



Community connection to food production. Most Americans are completely removed from food production systems and have retained little understanding of the issues involved, which has had enormous implications for farmers who remain subject to political measures surrounding land use, subsidies, and regulatory efforts. This lack of involvement also keeps consumers from recognizing the influence of their purchasing power in supporting agriculture.

Economic considerations:

Financial viability of farming operations. As food production has become more and more concentrated into large-scale agribusinesses, family farms have become increasingly untenable financially, and many families have been forced to sell generations-old land to conglomerates or developers. While agricultural sustainability by nature begins with the producer, the burden of its implementation cannot rest solely on the small minority of farmers. A key consideration for communities seeking sustainability in agricultural production is to recognize the process involved and to support local producers as they work to attain it. Many transitional steps are time-consuming and expensive to implement, such as organic certification or the infrastructure development to reduce nutrient runoff, and farmers require financial, technical, and regulatory support throughout the process.

An affordable food supply. Americans currently spend a smaller percentage on food than any civilization in recorded history, with estimates ranging from 9-12% (Gallo 2008). As the hidden costs of this production have begun to emerge, such as fossil fuel and chemical input uses, many have started turning to more sustainable alternatives. The organic food market has grown more quickly than any other agricultural sector, at a rate of nearly 20% annually, despite the higher purchase price of organic food. The challenge for sustainable agriculture will be to ensure food remains affordable while addressing ecological or social concerns.

Rural community development. The loss of small farms has led to a disintegration of local production and marketing structures and a general shift in rural community development away from food production. Rural communities throughout California have been faced with economic losses and greater reliance on urban industries.

Sustainable Agriculture in the Salmon Creek Watershed.

Although Sonoma County remains one of the most productive farm counties in California, ranking 16th in the state and 34th in the nation, farmers throughout the County continue to struggle to keep their operations viable. According to the County's General Plan, "except for vineyards, other agricultural commodities generally do not generate sufficient profit to justify agricultural land prices in the County," forcing local farmers to "rely more on specialty niche markets and creative marketing to be competitive." (PRMD 2008a).

Several producers within the Salmon Creek Watershed have capitalized on niche market opportunities, producing high-value products, such as high-quality wine grapes, goat cheese, free-range or grass-fed meats, and organic milk. Two such producers, Kurt Beitler and Patty Karlin, are profiled below, along with the more conventional production system of rancher Walt Ryan. Efforts such as these have allowed the watershed to retain its rural character and its large, undeveloped parcels, which have, in turn, preserved essential ecological functions, such as wildlife habitat and air quality. A discussion of niche marketing, written by Gold Ridge RCD District Manager and Salmon Creek rancher Joe Pozzi, is also included.

A large component of these niche markets is the certified organic sector. California currently serves as the leading producer of organic commodities, a market growing by 15-20% annually over the last ten years (Sierra et al. 2008). A primary contributor to this movement, Sonoma County had nearly 16,000 acres in organic crop production in 2007 (not including land used for organic meat and dairy) and has been the birthplace of several certification programs focusing on sustainability, such as the "Fish-Friendly Farming" label for wineries or Clover-Stornetta's North Coast Excellence seal for milk production (Sonoma County Agricultural Commissioners Office 2008; Marcus 2009). Working in tandem with niche production, localized food processing has proven to be a growing sector of Sonoma County's economy, with employment increasing by 15% between 1997 and 1999 alone. In response to increased local demand, nearly half of these processors were producing certified organic products by 2002 (Sonoma County Economic Development Board 2002).

Residents of Sonoma County have repeatedly shown strong support for preserving local family farming traditions, voting to fund agricultural land preservation and attending over a dozen popular farmers' markets throughout the County. Multiple objectives laid out in the County's General Plan relate directly to agricultural preservation and sustainability, with the stated goal "to ensure the stability and productivity of the County's agricultural lands and industries" (PRMD 2008a). These include assistance with marketing and promotion of agricultural products, protection of farmland from urban encroachment, and the development of agricultural support services. A second section addresses the goal "to preserve the unique rural and natural character" of the County and "protect and enhance the County's natural habitats and diverse plant and animal communities," riparian corridors, soils, and forestry resources.

Goals

- The Salmon Creek Watershed supports a healthy, competitive, and sustainable agricultural industry.
- Large agricultural parcels are left intact to provide open space, support wildlife habitat, and preserve the watershed's rural character.
- The landowners in the watershed have the financial and technical support necessary so that agriculture continues to conserve or enhance the natural resources.

Sustainable Agriculture Recommendation 1: Facilitate opportunities for producers to locally process and market agricultural products.

Scientific Reasoning

Consumers throughout the Bay Area have shown a growing willingness to pay premium prices for local, sustainably produced products. One example of this trend is the expanding market for grass-fed beef. With prices nearly double that of conventionally produced beef, grass-fed beef has appealed to consumer interest in not only enhanced health benefits, but also in its implications for animal welfare and open space preservation.

Recent market studies from U.C. Davis have shown that the most sensitive consideration in operational costs for grass-fed beef production is shipping, primarily the location of both processing plants and target markets (Harper et al. 1996). This finding has considerable implications for the localized beef industry of Sonoma County, which is facing possible closure of the nearby Rancho Veal processing plant in Petaluma, the last cattle processing plant in the North Bay (Petaluma Argus-Courier 2006). While communities have provided support for local produce production in the area through Community Support Agriculture (CSA) programs and farmers' markets, meat marketing has proved more difficult due to lack of processing options.

Sonoma Direct, a local meat company with processing and distribution capacity, is working in partnership with UCCE to launch a locally focused Meat Buying Club that seeks to connect local ranchers more directly with consumers. The program focuses on grass-fed, family-farmed meats produced without hormones or antibiotics and using practices conducive to humane treatment of livestock and environmental stewardship.

Another distributor linking local producers with the community is Field to Family Natural Foods, begun in 2004 by Wayne and Amy Dufond. Field to Family provides poultry, beef, and pork products to area grocery stores, ensuring products from animals raised in humane, free-range conditions with vegetarian diets and without antibiotics or growth hormones. Their products include Beeler's Naturally Pure Pork, Panorama Grass Fed Beef, and Air Chilled poultry products, and lambs grown in the Salmon Creek Watershed. Efforts such as these can be supported and expanded to allow greater participation among local producers.

Action 1a: Promote and sustain agriculture-related industries in or near the watershed and develop forums for linking them with producers.

Implementation Measures

- Seek funding to support establishment of businesses that provide services, such as processing, storage, bottling, canning, and packaging.
- Address regulatory hurdles to on-farm livestock processing or "mobile slaughterhouses."

Action 1b: Develop a watershed "brand" synonymous with locally produced, sustainable, high-quality farm products.

Implementation Measures

- Work with public outreach organizations to promote public appreciation for local agriculture.
- Develop educational opportunities to teach producers about marketing strategies and business management.

- Assist in the development of effective distribution channels for locally produced goods.
- Assist farmers in developing value-added marketing plans for their products while establishing an overall market presence for the watershed as its own appellation.

Sustainable Agriculture Recommendation 2: Preserve open space and rural landscapes by keeping large agricultural parcels intact and their operations viable.

Scientific Reasoning

Large parcels provide valuable wildlife habitat and open space, while contributing to the watershed's rural character. Agricultural landowners need to be supported to sustain viable operations in order to maintain these large parcels. While updated zoning laws prohibit subdivision in some areas, the affected landowners are struggling to maintain financially viable operations to preserve these working landscapes.

Action 2a: Support producers in diversifying income and seeking financial assistance.

Implementation Measures

- Assist producers to participate in programs that provide additional capital to support agricultural land values, such as conservation easements through the Williamson Act.
- Coordinate with NRCS staff to assist producers in developing Farm Bill program contracts.
- Work with agricultural landowners to explore other farm-related income options, such as farm tours.

Sustainable Agriculture Recommendation 3: Ensure sustainable resource use in agricultural production.

Scientific Reasoning

The Salmon Creek Watershed has sustainably supported agricultural operations since its early settlement. It is actually the loss of agricultural land to residential development that poses the most risk of depleting groundwater supplies and transforming the valued pastoral landscape. However, some aspects of agricultural production itself do merit concerns about resource protection.

Vineyard development poses the greatest concern for agricultural water use within the watershed. Currently, many locally owned Salmon Creek vineyards are dry-farmed. Most are also zoned only above the frostline, eliminating the need for frost protection, which uses water when stream flows are low. However, some vineyards in the area are managed by outside companies, who often don't have a good understanding of local water use issues. Vineyard establishment also requires high water use for several years, making rapid expansion of vineyards a concern. Since this area is predominately dry-farmed, the importance of added economic value vineyards bring to a landowner's viability is important.

Water quality serves as the biggest concern for livestock operations, particularly dairies. Concentrated livestock on dairies produces large nutrient and pathogen loads, threatening aquatic life. Confined animal facilities throughout the Bodega Bay

Hydrological Unit have been identified as sources of nutrient and sediment runoff into the Bodega Bay by the Regional Water Quality Control Board.

Vegetated buffers and intact riparian corridors can serve as effective ways to greatly reduce contamination of water sources from sedimentation, nutrients, and pathogens, while simultaneously maintaining riparian corridors for wildlife and stream shading needed for salmon survival. A U.C. Davis study has shown that 99.9% of pathogens are trapped within one yard of their source, indicating that buffers do not have to remove extensive stretches of land from range to reduce water contamination (Tate et al. 2006). Properly constructed wetlands can also be used to filter pasture runoff through anaerobic denitrification of trapped sediment.

One recent legislative change that may greatly affect the operations of Salmon Creek's two remaining dairies is USDA federal regulations passed in October 2008 governing organic dairying. Meant to target large-scale operators running confined animal-feeding operations with no pasture access, the new regulations state that dairy operators must now keep cows in open pastures during the "growing season." In coastal areas, this may coincide with heavy rains, a requirement that may not be appropriate for rainy coastal areas where fields become overly muddy. Pasturing cows through the winter could have severe repercussions for water quality, forage production, and animal health (Digitale 2008).

Action 3a: Work with vineyard operators to reduce water use.

Implementation Measures

- Provide workshops and technical support for vineyard dry-farming.
- Assist vineyard operators in acquiring support through NRCS and RCD programs to develop water conservation measures.
- Work with vineyard operators to understand and remain a step ahead of groundwater regulation measures as they develop.
- Educate the local community on vineyard practices.

Action 3b: Assist rangeland and dairy operators in implementing water quality protection measures.

Implementation Measures

- Provide workshops and technical support for dairy and rangeland operators to assist in compliance with water-quality regulations.
- Assist rangeland and dairy operators in acquiring assistance through NRCS and RCD programs to protect riparian areas.

Action 3c: Assist livestock operators to develop and implement nutrient management plans.

Implementation Measures

- Implement a proactive, on-farm nutrient management program that will include a "user-friendly" nutrient budgeting model, soil, vegetation, and manure sampling protocols, and a land application tracking system. The program will assist watershed dairy and livestock operators with the ability to write nutrient management plans based on facility inventories and nutrient budgeting information.
- Secure funding to effectively develop nutrient management or conservation plans for all livestock operators.

- Provide technical assistance to dairy and livestock operators to conduct on-farm facilities inventories and nutrient budgeting.
- Conduct soil, vegetation, and manure sampling to identify the proper organic fertilizer application rates for farm fields.
- Complete nutrient management plans and land application tracking systems.
- Use buffer strips to trap sediment from confined animal and other high-use areas.
- Work with interested landowners to develop waste-to-profit systems, such as methane digesters and on-site fertigation equipment that spreads manure onto forage fields.

Landowner Profiles

Joe Pozzi – Creating the Salmon Creek Watershed “Brand”

For many years, agricultural producers in the Salmon Creek Watershed had little involvement with marketing: once the product left the farm gate, it was somebody else’s problem. The commodities produced here were quickly consolidated into larger groups of products from all over the country and world. We had no identity as to who we were or what we produced. The small farmers in the watershed were quickly shut out of these large markets, unable to achieve the economies of scale of large agribusinesses in other areas.



However, a significant change has occurred over the past ten years. Many modern consumers, particularly in the Bay Area, want to know where and how their food and fiber are produced and are seeking organic, humanely raised, or other indications these products have been produced sustainably. With rising concerns about global climate change, there is a heightened scrutiny of the carbon footprint of food production. These evolving consumer concerns have caused farmers and ranchers to become more involved with the public interface, a whole new shift in paradigm for many local producers. Not only do we need to be efficient in producing a wholesome, safe product and be good stewards of the land, we now also need to be the marketing arm of our businesses.

While daunting for some producers, this revelation is actually a silver lining for others, because we are now able to represent our products for what they really are. Now, in a trend reminiscent of the watershed’s agricultural history, there is milk going to local organic creameries, and goats producing cheese marketed throughout the Bay Area. The lambs produced in the watershed are marketed as a specialty product in many restaurants and stores; the wool is used in organic bedding products sold both locally and throughout the United States. The dry-farmed vineyards are family owned and keep a large number of local people employed. The cattle are being marketed as grass-fed beef, and many are identified as to where they were raised and how they were taken care of.

The most important aspect of this process is that the producer has an opportunity to add value to his or her product through this interaction with the consumer. We all have an

interesting story as to what we produce and why. The consumers of today want to hear that story, so you now see ranchers carrying business cards and developing websites. You will see their products at farmers' markets or on a brochure at an upscale restaurant or food store. This trend has helped get our products recognized by the surrounding consumers and has put the producer in a position to be a price giver instead of a price taker, to create markets rather than being shut out of them.

I think we will continue to see an expansion into niche and value-added products being produced within the Salmon Creek Watershed. While it can be successful and profitable, niche marketing is not easy. There is a tremendous amount of work getting the product to the farm gate, and there is just as much work in getting it to the consumer. The value of the product has to reflect the time put into it by the farmer for his or her business to succeed and for the farming traditions and landscapes of the Salmon Creek Watershed to be preserved.

Kurt Beitler (Viticulture)

Kurt manages several vineyard properties along Taylor Lane, the top of the Tannery Creek Subwatershed, including a 10-acre area producing high-value pinot noir grapes for prestigious Napa Valley's Belle Glos label, a winery built by Kurt's grandfather. Other properties provide grapes for Caymus Winery cabernets and Kurt's own Bohème label. Since he began managing the property in 2000, Kurt has introduced many innovative practices to the operation. While most vineyards in the area use conventional vertical shoot position (VSP) trellises, with fruiting vines growing vertically at hip height, Kurt's family has converted their vines to an overhead pergola system. This allows the fruiting vines to grow horizontally overhead, which adapts the plants to the region's more limited sunlight by maximizing sun exposure. The system has the added advantage of producing fruit 5 to 6 feet off the ground, allowing Kurt to use sheep for weed control. The system has proven effective in producing high-quality grapes, allowing for early high-sugar levels from the added sun exposure. Productivity ranges from 0.5 tons/acre in a poor year to 2.5 tons/acre, standard levels for the watershed, which produces low-volume, high-quality grapes. Belle Glos wines are generally marketed for \$60-\$70 per bottle.



Kurt Beitler, 2010

A flock of 25 sheep currently graze the vineyard year-round, eliminating the need for strip-spraying, which is normally required to lessen weed competition between vines out of reach of a mower. Grazing also greatly decreases mowing requirements, saving labor and fuel costs and reducing fossil fuel use and greenhouse gas emissions. The sheep themselves require minimal expenses, including some supplemental feed,

veterinary care, and sheering, along with reinforcements to the irrigation system to protect it from grazing damage. Kurt has given the wool to local spinners and has occasionally harvested lambs for personal consumption.

Neighboring landowners have expressed approval of these management techniques, appreciating the multi-use production system and minimal chemical use. Sensitive to neighbors' concerns about water availability, Kurt has also worked to minimize water use, beginning with the use of a local drought-tolerant rootstock. The vineyard is dry-farmed when possible, and any irrigation water comes from an on-site rainwater catchment pond rather than being pulled from overstressed groundwater sources. Most importantly, Kurt emphasizes the importance of on-site management, which allows him to respond appropriately to local conditions and develop a more sustainable production system. (Beitler, K, pers.comm., 2010)

Patty Karlin (Bodega Goat Ranch)

Known throughout western Sonoma County for her goat cheese, Patty owns and manages a diverse operation at the ranch, which sits on over 7 acres up Tannery Creek Road. While the 60 Alpine goats and on site creamery serve as the basis for the operation, Patty promotes a system of cooperative farming in which she works with other producers to keep ducks, guinea hens, turkeys, chickens, and pigs. She plans to soon add beekeeping to the mix to provide hives to area growers requiring pollination services. The livestock diversity holds several advantages, from fertilizer production, whey disposal as pig feed, and weed control as different species can be used to target different weeds. The creamery is also rented to other cheesemakers.



Patty Karlin and her goats, 2010.

To promote biodiversity and forage, Patty has created permaculture swales planted with tree and shrub species as goat browse. Goats are natural browsers, relying on high-protein leguminous shrubs for milk production. While they can and do eat grasses, they can't digest them as effectively, which results in lost productivity, higher methane production, and land needs beyond the ranch's acreage, which would require Patty to purchase supplemental feed. The ranch also has a medicinal garden that supplements the goat feed, which has greatly reduced veterinary costs. Pastures are seeded with selected native grass species, a practice that works both to increase the forage value of the pastures and to enhance the conservation value of the land.

To address the area's low water availability, a complex system of roof water catchments, ponds, and swales were constructed that allow for 90,000 gallons of water storage and supply all of the ranch's water needs. The ranch has also been equipped with commercial-sized solar panels to serve the residences and the creamery, an investment that recouped its own installation costs within 4 years.

The goat cheese is marketed primarily through local farmers' markets, small localized distributors, and area restaurants. Selling a product that can be vacuum-packed or aged also allows Patty to spread her income out throughout the year, selling cheese even during the goats' gestation period in the winter.

While she currently handles all aspects of the operation, Patty is working with FarmLink to have interns take over the fresh cheese production in order for her to assume a more mentoring role. This has proven to be quite a daunting task, with the ranch producing 150 pounds of cheese a week for 8 months each year. In providing internships, hosting agro-tourism tours, and participating in conferences and workshops throughout the world, Patty's vision is to have the Bodega Goat Ranch serve as a model of agricultural sustainability (Carlin, P., pers.comm., 2010).

Walt Ryan (Cattle Ranching)

Walt Ryan's ranch has been in his family for 120 years, since it was purchased by his great-great-grandfather for timber production, and later converted to a grade-B dairy with a small sheep flock. The property was converted to beef cattle rangeland in the 1960s, as small dairies had become financially unviable due to the collapse of the wool market and predation by coyotes. Walt's ranch currently supports cow-calf pairs, and a handful of sheep used to graze around the house for fire protection. While many ranchers in the area calve in the fall, Walt changed the calving regime to the spring so the cows no longer require supplemental feed. While the property's topography make fence installation for rotational grazing challenging, Walt works to ensure grassland health and good use of forage by moving salt supplements, monitoring water sources, and keeping stocking rates at sustainable levels.

With children looking to take over the ranch, Walt has struggled to maintain the viability of his operation, given increasingly strict regulations and zoning constraints. With nearly two-thirds of his ranch covered in valuable hardwoods, redwoods, and Douglas-fir, Walt sees managed timber harvesting as an option for diversification, but has been discouraged from attempting to pursue the option due to the laborious regulatory procedures required. Zoning specifications stemming from the area's limited water supply has restricted subdivision possibilities, and predation continues to limit sheep ranching in the region. Climate and water availability on this coastal property has also limited the possibility of vineyard development. Vertically integrating his cattle operation has also proved infeasible, due to the restrictions placed on on-farm processing. And while grass-fed beef has proved to be a value-added product for some area producers, the steps required to enter that market structure are too often not deemed economical for many ranchers, particularly those with limited marketing experience.

As with all farming families, the Ryans have struggled with the California tax structure, under which it's become more and more difficult for producers to keep their land in agriculture from one generation to the next due to soaring land values and increasing inheritance taxes. Though determined to maintain his families ranching traditions, Walt has even explored other non-agricultural land uses, and has leased the property to hunting clubs and wedding parties, and even looked into establishing conservation easements. However, these uses give rise to obvious privacy and liability concerns, while providing limited income and, of course, no food production.

While continually struggling with regulatory pressures, Walt sees the root issue to be the disintegration of the community's connection to the land. Sonoma County's growing population often supports regulations and political measures that make farming more

and more difficult, without putting into place the necessary support structures to help farmers remain in compliance. With a smaller and smaller percentage directly involved in the industry, many Sonoma County residents fail to recognize the constraints and realities of food production.

Despite the ever-increasing difficulties faced by ranching families in the watershed, Walt has worked tirelessly to push these realities to the forefront. He currently serves as a director on the boards of the Sotoyome Resource Conservation District and the Sonoma County Farm Bureau. He also sits on the advisory board of the Santa Rosa High School Agricultural Department, which works to introduce a new generation to vocational opportunities within agriculture by involving students in the management of an onsite farming operation.