



National Sustainable Agriculture Coalition

FOOD SAFETY ON THE FARM POLICY BRIEF AND RECOMMENDATIONS

OCTOBER 2009

INTRODUCTION

For over twenty years, the National Sustainable Agriculture Coalition (NSAC) has advocated for federal agricultural policies that foster the long-term economic, social, and environmental sustainability of agriculture, natural resources, and rural and urban food systems and communities. NSAC's vision of agriculture is one where a safe, nutritious, and affordable food supply is produced by a legion of family farmers who make a decent living pursuing their trade, while protecting the environment, and contributing to the strength and stability of their communities. NSAC's work has resulted in federal programs that promote small and mid-sized family farms, increase new farming and ranching opportunities, invest in sustainable and organic research, reward conservation excellence, and expand local and regional food systems.

Over the last several years, the rise in major outbreaks of foodborne illnesses has called into question the sufficiency of the U.S. food safety system. Up until now, food safety regulatory oversight has focused mainly on processing, food handling, and manufacturing sectors—areas shown to be of highest risk for foodborne pathogen contamination.¹ However, several food safety bills have been introduced into the 111th Congress that could directly or indirectly affect farms and ranches by expanding these authorities and making some on-farm safety standards mandatory. In addition, in the spring of 2009, the Obama Administration created an inter-agency Food Safety Working Group through which the Food and Drug Administration and U.S. Department of Agriculture are adopting new food safety standards and oversight, including on-farm measures.

While NSAC applauds Congress and the Administration for taking steps to decrease foodborne illnesses by strengthening federal food safety oversight and enforcement, in respect to farms it urges decision-makers to ensure that:

- Measures are risk-based, focus on risk reduction, and are justified by scientific research;
- FDA coordinates with other state and federal agencies and community-based organizations with food safety expertise or pre-existing standards or training programs for standard development and enforcement;
- Standards do not discriminate against, but rather encourage, diversified farming operations and conservation practices;
- Standards are appropriate to the scale of the enterprise;
- Fees of any kind, if they are imposed, are equitable to reflect different scales of production and ability to pay;
- Traceability rules for farmers should not require more than good, basic recordkeeping (one-up, one-down) of all sales;
- Marketing Agreements and Orders are not used to regulate food safety.

NSAC members and food safety experts agree that the responsibility for ensuring that our food is safe is incumbent on all actors in the food supply chain: from farmers, packers, processors, and distributors, to the final consumer. It is our position, however, that proposals proffering one-size-fits-all solutions to food safety fail to acknowledge the diversity of agriculture and are inappropriate and counterproductive courses of action.

The farmers on whose behalf NSAC works are leaders in the areas of working-lands environmental stewardship, innovative marketing, and value-added processing. To a large extent, these farmers have deliberately chosen alternatives to the industrial agriculture and food chain that privileges uniformity over diversity, centralization over widespread ownership and control, and sterilization over natural habitat. As a coalition, we do not see these trends in industrial-style production as the destiny of agriculture, but rather as a model that is failing to provide a safe food supply, achieve economic security for producers, or ensure a resilient landscape and healthy human society.

To the extent that new federal food safety authority extends to the farm, NSAC urges policymakers to ensure that standards and regulations encourage farmers to seek out innovations and a more sustainable agriculture, and at least not create additional barriers to the widespread adoption of sustainable agriculture practices. Besides contributing to the economic and social viability of family farms and rural communities, many of the alternatives these farmers are exploring can mitigate certain food safety risks by shortening the supply chain, creating transparencies and relationships between producers and consumers, and establishing important living buffers and sustainability-enhancing relationships between livestock, riparian, and crop-growing areas.

The following position paper addresses some of the current legislative food safety proposals that have been introduced in the 111th Congress, as well as administrative developments within the Obama Administration, the FDA, and the USDA. The paper focuses on fresh produce and microbial pathogens because they are at the center of current food safety debates. The background section provides an overview of microbial pathogens and summarizes the existing federal authorities over food safety, as well as some of the current legislative and administrative proposals. The Policy Principles and Recommendations section will continue to be updated as new legislative and administrative authorities over on-farm food safety are considered, and as new research findings emerge.

Putting the Produce Food Safety Debate into Perspective

We are compelled to note at the outset that despite the very narrow focus of the current debate on fresh produce and microbial pathogens, the umbrella of “food safety” involves a much broader range of public health issues related to food production, as well as other federal agencies besides the FDA. It is vital not to lose sight of this broader perspective. Below we draw attention to a few issues that have been largely ignored by current food safety legislation and administrative actions but are nonetheless relevant as potential contributors to the risk of microbial pathogen contamination in fresh produce or as casualties of one-size-fits-all policy approaches to produce safety.

Two widespread practices that influence human health are livestock production in large-scale **concentrated animal feeding operations (CAFOs)** and the use of **antibiotics in animal agriculture**. Beef cattle finished on grain in crowded feedlots have been shown to shed much larger numbers of pathogenic strains of *E. coli* than grass-fed cattle on well-managed pasture.² According to a report from the Union of Concerned Scientists, over 70% of the antibiotics used in the United States are fed to animals that are not sick in order to compensate for crowded and unsanitary conditions. This practice breeds antibiotic-resistant bacteria.³ These virulent and antibiotic-resistant microbes can and do find their way into produce fields through manure, dust, runoff, or contaminated waterways that carry pathogens into irrigation and wash water. Any new food safety regulations should seek to control these concentrated sources of livestock-related bacteria and pathogens first.

Nutrition and food security must also be considered in developing food safety guidelines and standards. Fresh fruits and vegetables are an essential part of the human diet, but many Americans, especially those of limited incomes, do not consume the amounts recommended by USDA. In recent years, increasing consumer demand for fresh, high quality, locally-grown produce, and the growing number and efficacy of community food endeavors—such as Farm to School programs—seeking to provide greater access to fresh local foods, have been hailed as part of the solution to today’s diet-related epidemics of obesity and diabetes.⁴ Thus, any food safety guidelines and standards that inhibit the growth or activities of produce farms or that limit local access to fresh, affordable produce are working against public health. In addition, proposed food sterilization methods such as irradiation or high levels of chlorination may reduce the nutritional quality of fruits and vegetables by destroying phytochemicals and other healthy plant compounds, or creating new, unhealthful compounds.⁵ Produce safety approaches should promote fresh produce production and processing management systems that prevent pathogen levels high enough to warrant sterilization methods. Overall, food safety standards must not decrease the healthfulness, variety, or availability of fresh produce in the food supply.

Lastly, FDA should acknowledge that **healthy ecosystems** contribute to food safety in a number of ways. Healthy, living soil will harbor a greater number and variety of both macroscopic and microscopic organisms, and will thus be less susceptible to colonization by unwanted pathogens.⁶ Vegetative buffers can filter pathogens from streams and runoff, and protect cropland from windborne pathogens. According to a research literature review by Wild Farm Alliance, grasses and

wetlands can greatly attenuate *E. coli* loads in runoff from cattle operations, with grass strips as narrow as six feet removing the majority of *E.coli*.⁷ On an even grander scale, lush, integrated farms can contribute to clean air, clean water, soil tilth, and overall environmental health, thus helping to protect the long-term health of our planet. We must consider these vital services when creating a new food safety system.

Agriculture is a human endeavor based on biological processes, and nature cannot be eliminated from the equation. Food safety will not be achieved simply by monitoring and killing bacteria—it must come from a food system that values human relationships and environmental stewardship. The goal should not be to eliminate all risk of microbial contamination, but to reduce risk to the lowest level possible while optimizing the myriad other ways in which agriculture contributes to human and ecological health.

There are additional food safety issues that do not have a direct bearing on microbial pathogen contamination of fresh produce or other foods, but have a significant impact on the overall safety of the food supply. These issues will ultimately need to be addressed if the long-term goal is for the federal government to implement a truly comprehensive food safety program.

One issue not currently being debated in proposed food safety bills is the use of **agrochemicals**, which are regulated by the Environmental Protection Agency (EPA). Certain pesticides, herbicides, post-harvest treatments, and other agrochemicals have long been known to pose a risk to human health. Many of them have toxic, endocrinological, or carcinogenic effects if handled or consumed by humans. A food that poses cancer risk or interferes with normal hormone function is not a safe food, regardless of the presence or absence of microbial pathogens.

Recent research by health professionals around the world reinforces concerns that consumption of foods manufactured from commercially available **genetically-modified (GM)** crop varieties may have significant adverse effects on human health. A report released earlier this year by the American Academy of Environmental Medicine,⁸ cites several independent studies showing that feeding GM foods to laboratory animals can interfere with normal immunological and inflammatory responses, compromise digestive and other organ function, and contribute to infertility. The article concludes that evidence exists for “probable harm” from consumption of GM foods, and recommends that physicians counsel their patients to avoid them.

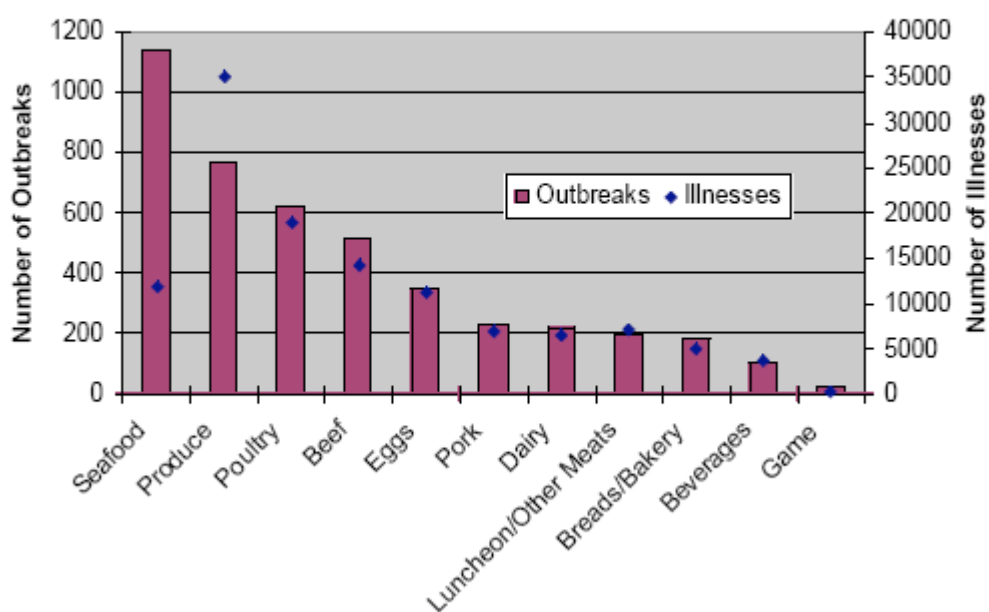
Like GMO crops, **food irradiation** was roundly rejected in public comments on the initial proposed rule for the National Organic Program for food safety reasons. Food irradiation does not make the food itself radioactive, but it can compromise food quality in two ways: by destroying vitamins and other nutrients and healthful natural compounds in food, and by creating “unique radiolytic products.” The latter are novel compounds, foreign to life as it has evolved on Earth, generated by the impact of ionizing radiation on the proteins, nucleic acids and other natural compounds present in food.

Background

Contamination Overview

Since the 1970s, foodborne illness outbreaks associated with fresh produce have increased both in number and as a proportion of all reported outbreaks.⁹ According to analysis of CDC data by the Center for Science in the Public Interest, produce has been responsible for the second largest number of outbreaks and the largest number of illnesses among commodity categories since 1990 [Fig. 4]¹⁰.

**Figure 4. Outbreaks and Illnesses in Food Commodities
1990-2006**



It is important to note, however, that these data only take into account the fact that produce was the carrier for the pathogen, but do not indicate where in the food chain the produce became contaminated at a level that could sicken people. High-risk activities such as processing, centralized distribution, cross-contamination with meat, irrigation water polluted by livestock or dairy operations, and unsanitary food preparation may be the culprits. As a recent paper by Food and Water Watch and the Institute for Agriculture and Trade Policy points out, the role of contamination along the supply chain has not been adequately researched thus far, leaving a major gap in our understanding of food safety risks.¹¹

In addition, the data present foodborne illnesses traced back to produce as a whole sector, not broken down by specific commodity as it is for poultry, beef, and pork, which collectively exceed the number of outbreaks associated with produce.

The U.S. Public Health Service, part of the U.S. Department of Health and Human Services, has identified the following pathogens as the 10 most common causes of foodborne illness.¹² Almost all major foodborne pathogens are of animal origin. *E.coli* and *Salmonella*, two of the most well-known contaminants, live and reproduce in animals, not in plants. Therefore, any vegetable that is contaminated with *E. coli* or *Salmonella* invariably received it from an animal source. Many cases of food contamination stem from infected humans who transmit the pathogen to the food during food processing, handling, or preparation. Unfortunately, the media and policymakers alike have incorrectly implied that vegetables are the “source” of many recent outbreaks of foodborne illness, when in fact they are the carriers.

Pathogen	Description/Source¹³
<i>Campylobacter</i>	<i>Campylobacter jejuni</i> grows best at the body temperature of a bird. They grow only in places with less oxygen than the amount in the atmosphere. Most cases of campylobacteriosis are associated with eating raw or undercooked poultry meat or from cross-contamination of other foods by these items.
<i>Clostridium botulinum</i> (Botulism)	<i>Clostridium botulinum</i> is a group of bacteria commonly found in soil. They grow best in low oxygen conditions. Foodborne botulism has often been from home-canned foods with low acid content, such as green beans, beets and corn.
<i>E. coli</i> O157:H7	<i>E. coli</i> O157:h7 can live in the guts of ruminant animals, including cattle, goats, sheep, pig, deer, and elk. The major source for human illnesses is cattle.
<i>Listeria monocytogenes</i>	<i>Listeria monocytogenes</i> is found in soil and water. Vegetables can become contaminated from the soil or from manure used as fertilizer. Animals can contaminate foods of animal origin such as meats and dairy products.
<i>Norovirus</i>	Noroviruses are a group of viruses that cause gastroenteritis in people. Food can be contaminated by humans infected with the virus.
<i>Salmonella</i>	<i>Salmonella</i> live in the intestinal tracts of humans and other animals, including birds. <i>Salmonella</i> are usually transmitted to humans by eating foods contaminated with animal feces.
<i>Staphylococcus aureus</i>	<i>Staphylococcus aureus</i> bacteria are commonly carried on the skin or in the nose of healthy people.
<i>Shigella</i>	<i>Shigella</i> bacteria pass from one infected person to the next. Food may become contaminated by infected food handlers. Vegetables can become contaminated if they are harvested from a field with sewage in it. Flies can breed in infected feces and then contaminate food. Water may become contaminated

	with <i>Shigella</i> bacteria if sewage runs into it.
<i>Toxoplasmosis</i>	Toxoplasmosis is caused by the protozoan parasite <i>Toxoplasma gondii</i> . People become infected by eating undercooked, contaminated meat (especially pork, lamb, and venison).
<i>Vibrio vulnificus</i>	Persons who are immunocompromised, especially those with chronic liver disease, are at risk for <i>V. vulnificus</i> when they eat raw seafood; esp. oysters.

In addition, the manner in which produce is processed can also increase the risk of foodborne pathogen cross-contamination. For instance, a study by the Community Alliance with Family Farmers of food-borne illness outbreaks in leafy greens since 1993 found that nearly 90% of outbreaks were linked to processed, bagged “ready to eat” salad mixes and not to unprocessed greens.¹⁴

Food safety standards should focus on the actual sources of contamination and potential vectors and practices that increase risk (e.g. packaging methods) in order to reduce the risk of vegetables carrying unacceptable levels of the pathogens.

Federal Food Safety Programs and Authority Overview

According to the Government Accountability Office (GAO), there are 15 federal agencies that collectively administer at least 30 laws related to food safety.¹⁵ The majority of the authority resides within two agencies: the Food Safety and Inspection Service (FSIS) at the U.S. Department of Agriculture (USDA) which regulates meat and poultry and some egg products, and the Food and Drug Administration (FDA) of the Department of Health and Human Services which has the authority to regulate all other foods.¹⁶

The USDA FSIS receives the bulk of federal support even though the number of facilities and types of food products that USDA is responsible for are much fewer than the FDA. According to the Outbreak Alert database maintained by the Center for Science in the Public Interest (CSPI), FDA-regulated foods are linked to two-thirds of illness outbreaks, but FDA receives only approximately one-third of the funding for food safety activities [Fig.1, Fig. 2].¹⁷ Additionally, the GAO has noted that federal spending for food safety oversight has not been commensurate with the volume of foods regulated by the agencies or consumed by the public.

As Congress explores ways to increase the size and scope of FDA oversight, one of the challenges in these tough economic and budgetary times will be identifying additional sources of funding to offset the cost of increasing the Administration’s budget. The major food safety bill passed by the House in the summer of 2009 is HR 2749—the Food Safety Enhancement Act of 2009—and costs \$1.5 billion a year. The major source of funding for the bill is a mandatory registration fee for all food facilities that sell over 50.1% of their product into wholesale markets. The fee results in only \$368 million a year. This funding provision is opposed by most small and mid-sized family farms and sustainable agriculture advocates because it disproportionately burdens smaller entities. In addition, it only covers a fraction of the bill’s total cost, leaving Congress to come up with very substantial

additional appropriations (alternatives to this fee structure are included in the Policy Principles and Recommendations section).

Figure 1. Outbreaks Linked to FDA- and USDA-Regulated Foods 1990-2005

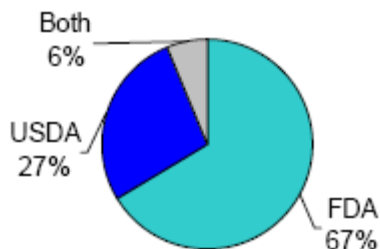
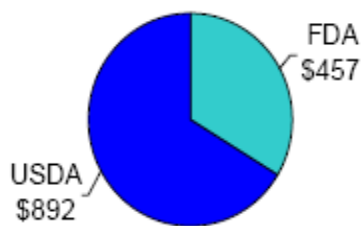


Figure 2. Food Safety Expenditures FY 2007 (\$ Millions)



Food and Drug Administration and On-Farm Regulations

The FDA’s authority over food safety comes from the Federal Food, Drug, and Cosmetic Act (FFDCA) as amended (21 U.S.C. 301 *et seq.*) and the Public Health Service Act (PHSA) as amended (42 U.S.C. 201 *et seq.*). FDA shares responsibility with the USDA for the safety of eggs under the Egg Production Inspection Act as amended (21 U.S.C. 1031 *et seq.*). FDA has broad, general authority to regulate at least some on-farm activities, but it rarely does so.¹⁸

Until now, FDA’s enforcement over food safety has been focused on its “current good manufacturing practice” requirements (21 C.F.R. Part 110) for manufacturing, packing or holding human food. Currently, establishments that are solely engaged in harvesting, storing, or distributing raw agricultural commodities are excluded from these requirements but FDA rules state that the agency can issue special regulations if it deems it necessary to cover excluded operations.

In addition, the FFDCA currently exempts farms and restaurants from requirements to maintain “one-up, one-down” records¹⁹ for up to two years, while record-keeping is required of anyone that manufactures, processes, packs, distributes, receives, holds, or imports. Under current FFDCA law, farms are not required to register, but the Public Health Security and Bioterrorism Preparedness and Response Act of 2002 amended the FFDCA so that now farms that hold or pack food sourced from multiple farms or that process food and sell less than 50% of the farm’s product directly to consumers, are required to register.²⁰

Food Safety Proposals in the 111th Congress to Expand Current Authorities

The major food safety legislation introduced in the 111th Congress—HR 2749 (the Food Safety Enhancement Act of 2009) and S 510 (the Food Safety Modernization Act of 2009)—would amend sections of the underlying FFDCA law, expanding FDA’s oversight of fresh produce production and processing.

HR 2749 “Food Safety Enhancement Act of 2009”

The House of Representatives passed HR 2749 in July 2009. HR 2749 would create a new Section 419A of the FFDCA that would require the establishment of new produce safety standards for on-farm production, extending to manure use, water quality, employee hygiene, sanitation, and temperature and animal control. HR 2749 would also require the Secretary of Health and Human Services to update the 1998 FDA guidance for minimizing hazards to fresh fruits and vegetables (described in greater detail below under *Federal Good Agricultural Practices*). Family farmers and sustainable agriculture advocates are concerned that the new food safety standards and updated GAP guidelines may not be focused on the riskiest activities in food production and processing and ultimately be to the detriment of family farmers and the environment.

The bill would also require a new food tracing system and expand authority for access to records.²¹ A provision of concern to family farmers and sustainable agriculture advocates would require some farms with value-added enterprises to report to the FDA all subsequent sales of the product once it leaves the farm all the way to the final consumer.

Another provision included in HR 2749 that is of great concern to family farmers and sustainable agriculture advocates is a registration requirement under Section 101, that mandates all farms regulated by FDA that process their harvest into value-added products—such as jams, cheese, beverages, and other products—and sell over 50.1% into wholesale markets to register as a “food facility” and pay a flat annual fee of \$500. This provision and others are further elucidated with NSAC positions in our Policy Principles and Recommendations section.

S 510 “Food Safety Modernization Act of 2009”

Like HR 2749, S 510 would also create a new Section 419 to FFDCA for new food safety standards for on-farm production of produce that extend to soil amendments, hygiene, packaging, temperature controls, animals, and water. S 510 does not contain a provision that would require farmers that do on-farm processing to pay a flat registration fee, but farmers who process their product would have to register their facility with FDA. Unlike the House bill, its traceability provision would only apply to fresh produce. It would require a proposed rule within two years of the bill’s enactment with standards relating to traceback mechanisms as well as a pilot project to be conducted before rulemaking to evaluate potential new methods for more effective traceback steps.²²

The Senate bill unlike the House bill does not include specific traceability exemptions for farms selling direct-to-consumer. Neither bill limits traceability requirements for farms to paper recordkeeping to the first purchaser of the farm product. Neither HR 2749 nor S 510 instructs FDA to coordinate with USDA’s National Organic Program, which already requires some food safety measures for certified organic producers.

More information on NSAC’s specific policy recommendations related to HR 2749 and S 510 is included in the Principles and Policy Recommendations at the end of this document.

Food Safety Guidelines and Standards

Federal Good Agricultural Practices (GAPs)

Until now, the FDA and USDA have not imposed mandatory on-farm food safety requirements or inspections. Instead, they have provided “good agricultural practices” (GAPs) as guidance, not regulations, to reduce food safety hazards on the farm. After President Clinton declared safety of fresh produce a priority in 1997 through the creation of the “Food Safety Initiative,” the FDA and USDA issued a Good Agricultural Practices guidance document in 1998²³ that provides voluntary produce safety standards to minimize microbial contamination during growing, harvesting and packing fresh fruits and vegetables. These voluntary guidelines include instructions on farm worker health and hygiene, sanitary facilities, manure management, irrigation and wash water quality, in addition to other activities.

Farmers can self-document their compliance with federal GAPs. The federal guidelines can also serve as the basis of a voluntary audit-based verification program—the Quality Through Verification Program—administered by the USDA’s Agricultural Marketing Service since 1999. Some wholesale buyers now require growers to be audited to ensure they are in compliance with federal GAP standards—turning the voluntary guidelines into *de facto* mandatory requirements. In addition, since 2007, all growers that sell fresh produce to federal food and nutrition programs through the USDA Fruit and Vegetable Program’s Commodity Procurement Branch are required to pass a federal GAP audit with a score of 80% or higher.²⁴

GAP is flexible as a rubric for assessing pathogen risks on the farm, but GAP certification²⁵ has been problematic for some small, mid-scale, and organic producers for whom the costs of physically adopting the GAPs can be prohibitive, whereas the costs and annual audit fees are more easily absorbed by larger growers. A few states have created modest GAP certification cost-share programs to address this issue. Recognizing the burden of actually implementing the practices, a few other states have initiated technical assistance and outreach programs to help farmers implement GAPs.

Others criticize the federal GAPs for being in conflict with conservation goals because they encourage farmers to take measures to reduce domestic and wild animal presence,²⁶ despite the overwhelming evidence that cattle are the number one source for *E. coli* 0157:H7 and that wildlife have not been known to be a significant risk factor.^{27,28}

Both HR 2749 and S 510 instruct FDA to update the Good Agricultural Practices guidance document of 1998. At the same time, the Obama Administration’s Food Safety Working Group has already begun the process of updating the Good Agricultural Practice document by issuing draft guidances in the summer of 2009 to minimize microbial contamination in tomatoes, leafy greens, and melons.²⁹

Private Sector Food Safety Standards

Stepping into what some have deemed to be a regulatory void left by the voluntary federal GAP standards, many private organizations—including grower groups, trade associations, shippers, handlers, and retailers—and states have created their own standards for growing and harvesting fresh produce (fruits and vegetables intended to be consumed raw). The Produce Safety Project, an

initiative of the Pew Charitable Trusts at Georgetown University, has analyzed six of these food safety standards that are publicly available, providing a side-by-side comparison across such issues as water quality, manure use, worker hygiene, and animal control.³⁰

Comparatively more stringent than the federal GAPs,³¹ the guidelines developed by industry—referred to by some as “super metrics”—have raised concerns among some farmers, sustainable agriculture and consumer advocates, and regulators. In general, opponents are deeply concerned about industry self-regulation and lack of public stakeholder input in developing standards. Moreover, there are barriers to transparency since standards promulgated by private industry groups are often deemed proprietary and not made publicly available. Fundamentally, there is also a concern that a proliferation of “super metrics,” each trying to out-do the next, makes food safety a value-added “pre-competitive” issue for the marketplace rather than a universal condition.

Many sustainable agriculture and wildlife groups have also been alarmed by the extent to which new standards required by produce companies directly conflict with on-farm conservation practices to protect soil, water quality, and wildlife habitat. There is increased pressure on growers to address all possible sources of *E. coli* 0157:H7 contamination and some growers are often encouraged to reduce the presence of wildlife, which are listed as possible vectors of disease by some of the private industry “super metrics.”³² The best available evidence suggests that these concerns are overblown, with at most 0.5% of wild animals carrying the dangerous strain of *E. coli*.^{33,34}

Federal Marketing Programs

The USDA’s Agricultural Marketing Service (AMS) administers several programs that are intended to ensure that agricultural products meet specific *quality* standards. The vast majority of these have nothing to do with food safety though recently some include food safety attributes.³⁵ In addition to administering the voluntary audit-based federal GAP verification program described above (Quality Through Verification Program), AMS also has authority under the Agricultural Marketing Agreement Act of 1937 (7 U.S.C. 601 et seq.) to administer voluntary marketing agreements and legally binding marketing orders, either of which can include quality and food safety standards.

Federal marketing orders and agreements are considered a public-private partnership. The marketing orders and agreements are generally led by industry and administered by a board or committee that typically include handlers, growers, and representatives from the public, retail industry, importer industry, and food service industry. The representatives are appointed by USDA (or in the case of state marketing agreements or orders by the state departments of agriculture). Otherwise the role of USDA or the state agriculture department is primarily to ensure that the order follows procedural rules and has the necessary industry support under the law.³⁶

In general, NSAC has opposed the use of marketing orders and agreements as a way to oversee food safety. The House of Representatives included a proposal to authorize the use of federal marketing orders to address food safety concerns in its version of the 2008 Farm Bill. After a concerted campaign by NSAC, Community Alliance with Family Farmers, Wild Farm Alliance, Defenders of Wildlife, and Consumer Federation of America, and with leadership from Senate Chairman Harkin (D-IA), the Farm Bill conference committee removed the House provision from the final version of the Farm Bill.

In return for keeping it out of statute, the House members who were advancing the position of the Specialty Crop Farm Bill Alliance were permitted to include report language that noted that the provision was deemed unnecessary because marketing orders had already been used to address food safety concerns. The report also included language expressing encouragement for the use of marketing orders to address food safety, leaving the door open for future proposals.

California Leafy Greens Handler Marketing Agreement

The California Leafy Green Product Handler Marketing Agreement was created in 2007 after the September 2006 outbreak of *E. coli* 0157:H7 associated with bagged spinach. The California LGMA is an example of a public-partnership where the process and guidelines are initiated and developed by private industry, but the state department of agriculture is responsible for auditing the farms that participate in the marketing agreement.³⁷

Through the California LGMA, fresh produce handler and shipping companies can voluntarily become members and after joining must commit themselves to sell products grown in compliance with the food safety guidelines accepted by the LGMA board (primarily made up of large produce industry representatives).³⁸ Membership in the LGMA program requires verification of compliance with the accepted food safety guidelines through mandatory audits of the farms they buy from by USDA certified inspectors. Currently, LGMA member companies represent 99% of the volume of California leafy greens (which includes lettuce, spinach, kale, chard, and other leafy green vegetables), making it a *de facto* requirement for many growers to follow the LGMA food safety practice standards.

Sustainable agriculture and conservation advocates have noted the negative impacts that the California LGMA standards have had on the environment. Like some of the industry “super metrics,” the California LGMA food safety standards had at one point implied that wildlife are a significant risk factor for microbial pathogens despite studies that show that deer populations, birds, small mammals, amphibians, or reptiles show little to no prevalence of *E. coli* 0157:H7.³⁹ As a result of the standards, in the Central California Coast region a majority of growers managing 140,000 acres have removed conservation practices for water quality and wildlife habitat.⁴⁰ This has included removing common conservation practices that are core to sustainable agriculture systems including filter or buffer strips, grassed waterways, riparian habitat, hedgerows, and windbreaks, which can also reduce risks by filtering out contamination in overland water flows.⁴¹

In addition, critics have noted the disproportionate expense for smaller and mid-sized farmers to comply with the California LGMA standards. A survey by researchers at the University of California, Davis found that larger growers with revenues between \$1 and \$10 million had the highest compliance costs, up to \$18.05 an acre, smaller growers with revenues under \$1 million had costs averaging \$14.82, and the mega farms with revenues exceeding \$10 million had the lowest cost of compliance at \$8.29 an acre, because of their economies of scale.⁴²

New Proposed National LGMA

Recently, the Western Growers Association submitted a proposal to the Agricultural Marketing Service of USDA to create a National Leafy Greens Marketing Agreement that would require participating handlers (packers, processors, shippers) of leafy greens to meet prescribed safety guidelines. USDA is currently reviewing the proposal and will be publishing it as a proposed rule in

the Federal Register and holding several public hearings beginning in late 2009. After the public hearings, USDA will publish a recommended decision for the agreement which will be subject to public comment. Because it is a proposed marketing agreement, not a marketing order, those producers or growers wishing to participate can sign onto the agreement and the final agreement does not have to be put to a vote. The actual metrics and standards will not be created until *after* the agreement is finalized, however. A committee appointed by USDA will develop and recommend a list of metrics to USDA. The metrics will be published in the Federal Register for public comment and the USDA will have final approval authority.⁴³

NSAC's position on this and related talking points are in the Policy Principles and Recommendations section below.

Principles and Policy Recommendations

There is no question that our food system needs to be safer. But if proposed food safety legislation and administrative actions are to have the desired effect of reducing pathogen risks and increasing agricultural innovation, long term sustainability, consumer choice, and availability of fresh, high quality produce, they should reflect the following principles and recommendations.

I. Measures of safety should be risk-based, focused on risk reduction, and be justified by scientific research.

Proposed regulations and updated GAP guidelines should focus on the highest risk activities. Several areas of concern are highlighted here:

Centralized Processing

Attention should be given to the scale of the food production enterprise and its potential to distribute products to millions of people. In most of the recent outbreaks of food borne illness, the main source of the problem was centralized processing, distribution, and retail distribution, not growing and harvesting.

Centralized processing and distribution means that a single lapse can sicken a large, geographically dispersed set of individuals. Most documented cases of contamination of fresh produce can be traced to processing facilities where the products from multiple farms are commingled. Leafy greens provide an example. The vast majority of "ready to eat" bags of salads, spinaches, lettuces, and lettuce hearts have unique risks associated with them. In the last ten years, 98.5% of all *E. coli* illnesses originating in California were traced to processed, bagged salad mixes, not to crops harvested as whole heads, bunched greens, or greens that are cooked.⁴⁴

Manure Use

Properly composted manure is an effective and safe fertilizer. A great volume of research has shown that judicious use of composted or aged manure is essential for maintaining the high soil microbial diversity and biological activity that is vital to soil quality. The buffering or exclusionary role of diverse microbial communities in soils richer in organic matter has been shown to accelerate

die-off of *E. coli* 0157 and plant pathogens in soil.⁴⁵ New safety guidelines, standards, and marketing agreements need not regulate all forms of manure use, but should focus on uncomposted or improperly composted manure, and biosolids, which pose a greater contamination risk. The food safety measures in the National Organic Program include rules for compost, uncomposted manure and biosolids, and may be used as an example.

Animals of Proven Significant Risk

Food safety guidelines, standards, and marketing agreements should use the term “animals of proven significant risk,” instead of referring to all animals or all wildlife when managing risk. Wild animals do not present a significant contamination risk for produce. Preliminary results released in April from a two-year study by the CA wildlife agency, UC Davis, and USDA found that less than one-half of 1 percent of 866 wild animals tested positive for *E. coli* O157:H7 in Central California.⁴⁶ Unnecessary control or elimination of wildlife could have devastating impacts on the ecosystems surrounding farms. Robust studies also document that deer are not a significant risk;^{47,48,49,50} therefore deer should be eliminated from this list of potential vectors by the California LGMA.

Instead, new guidelines, standards, and marketing agreements should recognize the relative risk posed by cattle. Studies show that cattle are the primary source of *E. coli* O157:H7,⁵¹ with up to 50% of some herds being contaminated.⁵² This is particularly true for grain-fed cattle.⁵³ More research is needed to provide scientific evidence for the sources and vectors of *E. Coli* H7:0157 and other microbial pathogens to determine if other animals should be deleted or added to the list. Food safety standards should also encourage conservation measures such as perennial forage, buffer strips, and grasses to filter out contamination in overland water flows from livestock feedlots, loafing yards, pastures, and manure storage areas. Emphasis should be placed on halting avenues of contamination between animals and produce fields, including irrigation water contaminated by runoff from feedlots.

Human Transmission

Experts say that “deficient employee training” is the top food safety problem in the food processing industry.⁵⁴ If employees are not properly trained to implement food safety measures, and if hygiene standards are not enforced, unadulterated products will be at risk for contamination.

Water Quality

Quality of irrigation and rinsing water is intimately linked with produce contamination. Irrigation water can become contaminated by nearby large-scale livestock operations or by overflows from sewage systems. Contamination of produce can also stem from the water used to wash produce in processing facilities. FDA must set standards at the processing level to keep water baths from spreading microorganisms among different batches of produce.

Policy Recommendations:

- **In developing guideline and standards, the FDA and USDA should target critical control points in the food system, including processing and packaging, the nature of the supply chain (e.g. the number of steps between the farmgate and end-consumer), that have been documented to increase risk.**
- **Target FDA and USDA research funding to the most critical points of risk in the food system for fresh produce and other raw agricultural commodities; in processing plants, on water testing of farms; on testing other vectors including animals, people, and dust;**

- on the impact on risk of conservation and biodiversity measures; and on the environmental and social impact on farming of any proposed new food safety measures.
- Additional research should be conducted into the role of resource conservation and soil improvement practices, such as vegetated buffers, and maintaining high soil biological activity and diversity, in reducing on-farm risks of food-borne pathogens in produce fields.
 - Protect wildlife and biodiversity by focusing on animals of significant risk, rather than indiscriminate animal control as the FDA and the USDA develop produce guidelines, standards, and marketing agreements.
 - Focus safety guidelines, standards, and marketing agreements related to manure on biosolids and uncomposted manure, or improperly composted manure.
 - Updated Good Agricultural Practices should include recommendations for how to select and use water sources and guidance for producers on how to test water quality at specified intervals.
 - Standards should encourage conservation practices that promote food safety.



II. FDA should coordinate with other state and federal agencies and community-based organizations with food safety expertise or pre-existing standards and training programs for standard development and enforcement.

New food safety standards should be consistent with the federal organic standard administered by the USDA National Organic Program (NOP) which has long had food safety-related measures in place, such as requiring produce traceability via a documented audit trail as well as stringent manure use and composting regulations.

New food safety standards and updated Good Agricultural Practice guidelines should also consider alternative food safety programs developed by organizations around the country that have been designed specifically for small, diversified, and organic farms. Looking to these alternatives as models can help in the creation of standards and guidelines that recognize the natural variability of farms while maintaining equal levels of product safety.⁵⁵

Organic farms currently have to certify annually. It would streamline the enforcement process and reduce costs if enforcement of food safety standards for certified organic farms were conducted by organic certifiers already serving as agents on behalf of the Department of Agriculture by accrediting them under ISO guidelines through FDA. FDA could similarly determine other third parties to be accredited food safety auditors.

Policy Recommendations:

- Coordinate with existing state and local government programs that help ensure food safety.
- Ensure that guidelines and standards are consistent with organic rules under the National Organic Program at USDA and that enforcement, when required of certified organic farms, is undertaken through organic certification agents accredited by the NOP to reduce duplication and prevent conflicts.

- **The FDA should enlist the services of the USDA and state agencies that work with agriculture to conduct any necessary on-farm inspections, or grant accreditation to other third-party auditors with experience working on farms.**
- **Establish and fund a national on-farm food safety and sustainability training, education, extension, and outreach competitive grants program, targeting small and mid-sized farms and very small processors.**



III. Standards should not discriminate against, but rather encourage, diversified farming operations or conservation practices.

Over the past twenty years, NSAC has advocated for agriculture systems that promote farming and the natural world in a way that enhances the sustainability of both. This is an agriculture system based on diverse crops, resource-conserving crop rotations, increased use of perennial species, and the integration of livestock in pasture-based systems.

A commodity-by-commodity food safety regime works in the interest of an industrial agriculture that upholds monocultures, but works against the interests of diversified family farming and sustainable agriculture systems.

NSAC has also spent significant resources and time in creating and strengthening conservation programs that promote biodiversity, soil health, energy conservation, and clean air and water. As laid out above under Policy Recommendation I, healthy soils teaming with microorganisms increase pathogen breakdown and important conservation measures such as perennial forage, buffer strips, and grasses filter out contamination in overland water flows from livestock feedlots, loafing yards, pastures, and manure storage areas.

Unfortunately, some of the current federal and private industry food safety guidelines are in conflict with existing federal conservation goals and there is evidence that growers in places like California are removing some conservation buffer areas and choosing not to participate in conservation programs because they are afraid that doing so will mean they are unable to comply with food safety protocols.

Policy Recommendations:

- **Standards should encourage and not penalize diversity in cropping systems which have stated benefits for the environment, for risk reduction and resilience, and for income protection.**
- **Ensure that standards do not discourage or create barriers to integrated crop-livestock operations.**
- **Ensure that standards are consistent with conservation practice standards and policies of the USDA Natural Resource Conservation Service and the National Organic Program.**
- **Ensure that food safety standards encourage the adoption of conservation practices beneficial to food safety.**
- **Make all GAP standards and food safety guidelines fully transparent and accessible.**

- **Target FDA and USDA research funding to further expand knowledge of conservation and biodiversity standards and practices that positively address food safety concerns.**



IV. Guidelines and standards should be appropriate to the scale of the enterprise.

Fixed per-enterprise or per-crop costs associated with proposed regulations have a disproportionate impact on producers that grow a diversity of crops or who have limited resources. Subjecting all producers to the same regulations that are especially geared for large-scale cropping production systems will limit market entry of smaller producers or those that produce a more diverse array of food crops.⁵⁶

Policy Recommendations:

- **Ensure that standards are appropriate to the scale of the enterprise and rely on education training, and technical assistance for small and mid-sized farmers.**
- **Create a federal-funded cooperative extension program and competitive grants program to carry out education, training, and technical assistance through state agencies, extension, and NGOs/community-based organizations.**
- **Ensure special outreach for beginning, socially disadvantaged, and limited resource farmers.**



V. Fees of any kind—if they are imposed—should be equitable to reflect different scales of production and ability to pay.

It is inequitable and contrary to the “ability to pay” principle to make small businesses, including family farmers who are processing value-added products on a small scale, to pay the same food facility fee as the large agricultural companies and processing plants. A flat fee would have a disproportionate impact on small businesses and small-scale producers that do on-farm processing, many of whom are working with limited resources. A flat fee would create a new policy-induced barrier to value-added agriculture, which U.S. farm policy has been trying through other programs to promote.

Policy Recommendations:

- **Establish progressive sliding scale fee systems for food facilities, based on adjusted gross income for all sales, starting at zero for the smallest facilities.**



VI. Traceability rules for farmers should not require more than good, basic recordkeeping (one-up/one-down) of all sales.

Products that are direct-marketed or whose identity is preserved from farm-gate to the end consumer are more easily traced back if there is a contamination problem and should therefore be uniquely addressed in food safety standards and regulations.

Identity-preserved marketing ensures that the identity of the farm is clearly indicated on the product. In the case of a farmer who turns his own strawberries into jam, a clear product label listing the ingredients and the farms' names will preserve the product's identity whether it is sold directly to a consumer or to a food store. Farmers that sell their own products and that do not process their products on the farm, and who already keep one-up one-down paper records of their immediate product or input sources and their immediate consumer or recipient, should not be burdened with the time and expense of keeping electronic records of these transactions.

Policy Recommendations:

- **Minimize hindrance on free flow of direct farmer-to-consumer commerce.**
- **Exempt identity-preserved marketing from additional traceability requirements when the identity and location of the farm or fishery is already preserved all the way to the ultimate consumer through appropriate communications to the public.**
- **Do not require more than well-maintained and organized paper records of a farm's immediate sources and recipients.**



VIII. Marketing Agreements and Orders should not be used to regulate food safety.

Food safety should be treated as a pre-competitive area that is not subject to commercial competition. As such, it should not be regulated through the federal office in charge of “facilitating the strategic marketing of agricultural products in domestic and international markets”—the mission of the USDA’s Agricultural Marketing Service. Marketing agreements and orders are industry-driven and do not have in place a democratic or transparent process for the development of standards and metrics that will ultimately impact all producers in the respective sector. The members of boards and committees in charge of developing the auditing metrics that are the basis of food safety inspections are appointed, not elected, so the producers signing onto a marketing agreement have to trust that the rules and metrics developed will not be prejudicial or preferential because individuals not necessarily representing them will be drafting laws that affect them.

Policy Recommendations:

- **Oppose the proposed national Leafy Greens Marketing Agreement.**

Works Cited

- ¹ Sapers, Gerald M., James R. Gorny and Ahmed E. Yousef, ed. "Microbiology of Fruits and Vegetables," (Boca Raton, FL: Taylor and Francis Group, 2006).
- ² Hussein, H. (March, 2007). "Prevalence and pathogenicity of Shiga toxin-producing *Escherichia coli* in beef cattle and their products," *Journal of Animal Science* 85.
- ³ Mellon, M., C. Benbrook and K.L. Benbrook. (2001) "Hogging it: Estimates of Antimicrobial Abuse in Livestock." Union of Concerned Scientists.
http://www.ucusa.org/assets/documents/food_and_agriculture/hog_chaps.pdf
- ⁴ Joshi, Anupama and Andrea Misako Azuma, (2009). "Bearing Fruit: Farm to School Program Evaluation Resources and Recommendations," Center for Food and Justice; Urban and Environmental Policy Institute, Occidental College.
- ⁵ Lacroix, Monique. "Effect of irradiation on the biochemical and organoleptic changes during the ripening of papaya and mango fruits," *Radiat. Phys. Chem.* 35 (1-3) 296-300, 1990. See also: M.S. Ladaniya. et. al. "Response of 'Nagpur' mandarin, 'Mosambi' sweet orange, and 'Kagzi' acid lime to gamma irradiation," *Radiation Physics and Chemistry*, 67: 6665-675, 2003.
- ⁶ Van Bruggen, A.H.C. (1995). "Plant-disease severity in high-input compared to reduced-input and organic farming systems," *Plant Disease* 79:976-984.
- ⁷ Wild Farm Alliance. 2008. "Food Safety Requires a Healthy Environment: Policy Recommendations for *E. coli* 0157," <http://www.wildfarmalliance.org/resources/WFA%20Food%20Safety%20Paper2-.pdf>.
- ⁸ Amy Dean, D.O. and Jennifer Armstrong, M.D. 2009. Genetically Modified Foods Position Paper. American Academy of Environmental Medicine. <http://www.aaemonline.org/gmopost.html>
- ⁹ Sivapalasingam, S. "Fresh Produce: A Growing Cause of Outbreaks of Foodborne Illness in the United States, 1973 through 1997," *Journal of Food Protection*, Volume 67, Issue 10 (Oct 2004).
- ¹⁰ DeWaal, C. and Farida Bhuiya. *Outbreak Alert! Closing the Gaps in Our Federal Food-Safety Net*. Center for Science in the Public Interest, 2007.
- ¹¹ Starmer, Elanor and Marie Kulick (September 2009). "Bridging the Gaps: Strategies to Improve Produce Safety, Preserve Farm Diversity and Strengthen Local Food Systems," Food and Water Watch and the Institute for Agriculture and Trade Policy.
- ¹² *About Foodborne Illness*. Partnership for Food Safety Education.
<http://www.fightbac.org/content/view/14/21/>. Accessed 7/24/2009.
- ¹³ DFBMD Disease Listing. CDC. URL: http://www.cdc.gov/nczved/dfbmd/disease_listing.html. Accessed 7/24/2009.
- ¹⁴ Community Alliance with Family Farmers (2008). "1993-2008 *E. coli* 0157:H7 Outbreaks Associated with Leafy Greens." <http://caff.org/policy/E.colioutbreaksonleafygreens.pdf>
- ¹⁵ Government Accountability Office (2004). *Federal Food Safety and Security Systems: Fundamental Restructuring is Needed to Address Fragmentation and Overlap*, "GAO-04-588T.
- ¹⁶ Becker, Geoffrey and Donna Porter (February 20, 2007). "The Federal Food Safety System: A Primer," CRS Report RS22600
- ¹⁷ DeWaal, C. and Farida Bhuiya, (2007). "Outbreak Alert! Closing the Gaps in Our Federal Food-Safety Net," Center for Science in the Public Interest.
- ¹⁸ Becker, Geoffrey, (December 2008). "Food Safety on the Farm: Federal Programs and Selected Proposals," CRS Report RL34612. Also see: FDA's explanation of its on-farm authority in a proposed rule to regulate egg production to control *Salmonella enteritidis*, 69 Federal Register pp. 56842-45 (September 22, 2004).
- ¹⁹ "One-up-one-down" refers to "immediate previous sources and immediate subsequent recipients of food, including its packaging" which is used in order to permit officials access to these records if a food is suspected of being adulterated and presenting a serious health threat. 21 U.S.C. 250c and 21 U.S.C. 374.
- ²⁰ P.L. 107-188; 21 U.S.C. 350 (d).

-
- ²¹ Becker, Geoffrey (August 13, 2009). "Food Safety on the Farm: Federal Programs and Selected Proposals," CRS Report RL34612.
- ²² Becker (August 13, 2009).
- ²³ "Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables (FDA 1998 Guidance)," Available at: <http://www.cfsan.fda.gov/~dms/prodguid.html>
- ²⁴ Johnson, S.B. (July 2008). "What is GAP (Good Agricultural Practices) all about?" University of Maine Cooperative Extension.
<http://www.umaine.edu/umext/potatoprogram/Fact%20Sheets/RME%20GAP%20informational%20article.pdf>
- ²⁵ Starmer, Elanor and Marie Kulick (September 2009).
- ²⁶ "Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables (FDA 1998 Guidance)," Available at: <http://www.cfsan.fda.gov/~dms/prodguid.html>
- ²⁷ Hancock, D. et al. "Multiple sources of *Escherichia coli* 0157 in feedlots and dairy farms in the Northwestern USA," *Preventative Veterinary Medicine* 35, 1998.
- ²⁸ Resource Conservation District of Monterey County, CA (July, 2009), "Food Safety Considerations for Conservation Planners: A Field Guide for Practitioners." <http://www.rcdmonterey.org>
- ²⁹ "FDA Issues Draft Guidances for Tomatoes, Leafy Greens, and Melons," (July 31, 2009), <http://www.fda.gov/Food/FoodSafety/Product-SpecificInformation/FruitsVegetablesJuices/FDAProduceSafetyActivities/ucm174086.htm>
- ³⁰ Produce Safety Project, "Comparison of GAPs Governing the Growing and Harvesting of Fresh Produce," Pew Charitable Trusts at Georgetown University. Available at: <http://www.producesafetyproject.org/gaps>
- ³¹ Stuart, Diana, "Coastal Ecosystems and Agricultural Land Use: New Challenges on California's Central Coast." Manuscript draft, February 2009.
- ³² Stuart, Diana, (2009) "Constrained Choice and Ethical Dilemmas in Land Management: Environmental Quality and Food Safety in California Agriculture," *Journal of Agriculture Environmental Ethics*, 22:53-71.
- ³³ Stuart (2009) and Beretti, Melanie and Diana Stuart (April-June 2008). "Food Safety and Environmental Quality Impose Conflicting Demands on Central Coast Growers," *California Agriculture*, volume 62, number 2.
- ³⁴ Boxall, Bettina. 2009. "Two years of testing show that wild animals are not 'Typhoid Marys,'" California biologist says. *Los Angeles Times*, April 11, 2009.
- ³⁵ Becker (August 13, 2009).
- ³⁶ Food and Water Watch, memo on Marketing Agreements and Orders, June 2009.
- ³⁷ California Leafy Green Products Handler Marketing Agreement website:
<http://www.caleafygreens.ca.gov/about/lgma.asp>
- ³⁸ California LGMA advisory board: http://www.caleafygreens.ca.gov/about/advisory_board.asp
- ³⁹ California Department of Fish and Game (April 7, 2009). "Preliminary Research Results Find Less Than One Half of One Percent Occurrences of E.Coli 0157:H7 in Wildlife in California Central Coast Counties," <http://www.dfga.ca.gov/news/news09/2009040702.asp>
- ⁴⁰ Resource Conservation District of Monterey County, CA (August, 2007). "A growers' survey: reconciling food safety and environment protection." www.rcdmonterey.org
- ⁴¹ Beretti and Stuart (2008)
- ⁴² Hardesty, Shermain D. and Yoko Kusunose, (September 2009), "Growers' Compliance Costs for the Leafy Greens Marketing Agreement and Other Food Safety Programs," University of California.
<http://ucanr.org/sfp/leafy-greens>
- ⁴³ Food and Water Watch, memo on Marketing Agreements and Orders, June 2009.
- ⁴⁴ Community Alliance with Family Farmers (2002). "California *E. Coli* 0157:H7 Leafy Green Outbreaks." Available online at <http://caff.org/foodsafety/documents/E.coliChartNC.pdf>
- ⁴⁵ Van Bruggen, A.H.C. (1995). See also, Xiuping Jiang, Jennie Morgan, and Michael P. Doyle, (November, 2001) "Fate of *Escherichia coli* 0157:H7 in Manure-Amended Soil," *Applied and Environmental Microbiology*, p. 2605-2609.
- ⁴⁶ California Department of Fish and Game News Release (April 7, 2009) "Preliminary Research Results Find Less Than One Half of One Percent Occurrences of E.coli 0157:H7 in Wildlife in California Central Coast

Counties Available” at:

http://www.wildfarmalliance.org/Press%20Room/press_room_research.htm#cawildlifeingeneral

⁴⁷ Dunn, J., J. Keen, D. Moreland, and T. Alex. (2004). “Prevalence of *Escherichia coli* O157:H7 in white-tailed deer from Louisiana,” *Journal of Wildlife Diseases* 40, no. 2.

⁴⁸ Renter, D., J. Sargeant, S. Hygnstorm, J. Hoffman, and J. Gillespie. (2001). “*Escherichia coli* O157:H7 in free-ranging deer in Nebraska,” *Journal of Wildlife Diseases* 37, no. 4 (October).

⁴⁹ Sargeant, J., D. Hafer, J. Gillespie, R. Oberst, and S. Flood. (September, 1999). “Prevalence of *Escherichia coli* O157:H7 in white-tailed deer sharing rangeland with cattle,” *Journal of the American Veterinary Medical Association* 215, no. 6.

⁵⁰ Fischer, J., T. Zhao, M. Doyle, M. Goldberg, C. Brown, C. Sewell, D. Kavanaugh, and C. Bauman. (March, 2001). “Experimental and field studies of *Escherichia coli* O157:H7 in white-tailed deer,” *Applied Environmental Microbiology* 67, no. 3.

⁵¹ Hancock, D.T., Besser, D. Rice, E. Ebel, D. Herriott, and L. Carpenter (1998). “Multiple sources of *Escherichia coli* 0157 in feedlots and dairy farms in Northwestern USA,” *Preventative Veterinary Medicine* 35.

⁵² Khaita, M. L., M. L. Bauer, G. P. Lardy, D. K. Doetkott, R. B. Kegode, and P. S. Gibbs. (2006) “Fecal shedding of *E. coli* O157: H7 in North Dakota feedlot cattle in the fall and spring,” *J. Food Protection* 69 (5).

⁵³ Diez-Gonzalez, F., T.R. Callaway, M.G. Kizoulis, and J.B. Russell (1998). “Grain feeding and dissemination of acid-resistant *Escherichia coli* from cattle,” *Science* 281:1666-1668.

⁵⁴ Sertkaya, Aylin et. al. “Top Ten Food Safety Problems in the United States Food Processing Industry,” *Food Protection Trends*, Vol 26, No 5, pg 310-315.

⁵⁵ See examples of alternative models from the Maine Organic Farmers and Gardeners Association, California Alliance with Family Farmers, and the Northeast Organic Farming Association.

⁵⁶ Cohen, Daniel (January 2008) “The History, Politics, and Perils of the Current Food Safety Controversy: CAFF Guide to Proposed Food Safety Regulations,” Community Alliance with Family Farmers.