

SMALL FARM DIGEST

Food Safety for Small Farmers

Volume 16: Summer 2013



Source: USDA (<http://www.usda.gov/img/content/photo01-042413.jpg>)

The information shared in this publication does not necessarily express the opinions of the U.S. Department of Agriculture (USDA) or the National Institute of Food and Agriculture (NIFA).



United States
Department of
Agriculture

National Institute
of Food and
Agriculture

In this Edition¹...

Food Safety on the Farm – Richard Molinar and Shermain D. Hardesty	4
The Food Safety Modernization Act: Effects on Our Nation’s Farmers and Our Ability to “Buy Local” and “Know Your Farmer” – Maria Moreira and Rich Bonanno.....	10
Animal Farms: A Step Toward Food Safety – Agnes Kilonzo-Nthenge and Brett Seybert.....	13
Safe Handling of Fresh and Fresh-Cut Fruits and Vegetables – Jan Singleton.....	19
Food Safety Resources – Camielle Compton and Chanel Wilson	21

A Word from Dr. Denis Ebodaghe, national program leader (NPL) for NIFA’s Small Farms Program

In 1998, the National Commission on Small Farms report, *A Time to Act: A Report of the National Commission on Small Farms*, described small farms as “farms with less than \$250,000 gross receipts annually on which day-to-day labor and management are provided by the farmer and/or the farm family that owns the production or owns, or leases, the productive assets.” Today, this description describes approximately 91 percent of all U.S. farms.



This issue of the Small Farm Digest focuses on promoting food safety awareness for small farmers. Contributors include:

- **Richard Molinar** and **Dr. Shermain Hardesty** from the University of California System. Their article discusses food safety on the farm, including concerns with physical, chemical, and biological hazards in produce. There is also an in-depth discussion of good agricultural practices.
- **Maria Moreira** of World Farmers, a non-profit organization, and **Dr. John Bonanno** of the University of Massachusetts focus on the Food Safety Modernization Act, our ability to buy local and the “Know Your Farmer” program.
- **Drs. Agnes Kilonzo Nthenge** and **Brett Seybert** of Tennessee State University discuss food safety in the context of animal farms.
- **Dr. Jan Singleton** of NIFA discusses safe handling of fresh and fresh-cut fruits and vegetables.
- **Camielle Compton** and **Chanel Wilson** from NIFA provide a compilation of food safety resources.

¹ While NIFA has provided technical editing of the included contributions, the accuracy of data cited and the opinions expressed therein are the sole responsibility of the authors.

I hope this edition of the Small Farm Digest serves as a useful tool in food safety awareness. I would like to thank NIFA's Small Farm program team for their assistance with compiling this publication: Brad Rein for administrative support, and Camielle Compton and Chanel Wilson for compiling and editing.

And finally, on a personal note, I would like to wish Dr. Richard Molinar a happy retirement. It has been a pleasure working with you over the past 25 years!

Sincerely,

A handwritten signature in cursive script that reads "Denis Ebodaghe". The signature is written in black ink on a white background.

Denis Ebodaghe is NIFA's NPL for Small Farm Research and Extension Program Development. You can reach him at (202) 401-4385 or debodaghe@nifa.usda.gov.



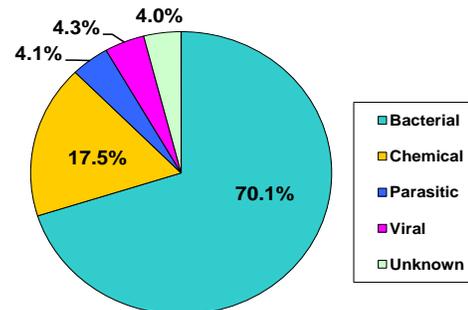
Food Safety on the Farm

*Richard H. Molinar² and
Shermain D. Hardesty³*



INTRODUCTION. Each year one-in-six people get sick from foodborne illnesses, according to the Centers for Disease Control and Prevention. In past decades, public education focused primarily on food safety in the kitchen, at processing plants, at retail stores, and in restaurants. After a large outbreak of the bacteria *E. coli* O157:H7 in spinach sickened 204 people and killed 3 in 26 states in 2006, the focus shifted to growing practices on the farm. Now, food safety on the farm focuses on physical, chemical, and biological hazards in produce. The physical part might be pieces of glass, plastic, organic matter, metal, or jewelry. The chemical part might be pesticide residues, solvents, oil, or other liquids used in the machinery for the growing and harvesting. Biological hazards are predominantly the microorganisms we hear so much about, such as bacteria (including botulism, *Campylobacter*, *E. coli* O157:H7, *Listeria*, *Clostridium*, *Salmonella*, *Shigella*, and *Staphylococcus*), viruses (such as Norwalk and Hepatitis), molds, and parasites (including *Cyclospora*, *Giardia*, and Trichinosis). Figure 1 shows the reported outbreaks linked to FDA-regulated foods, by agent, from 1996 to 2009. Bacteria

Figure 1. Reported outbreaks linked to FDA-regulated foods, by agent, 1996-2009 (N=532 outbreaks)



caused 70 percent of the 532 outbreaks during those years (Food and Drug Administration / Center for Food Safety and Applied Nutrition, 2011). During this same time period, the product responsible for the most outbreaks was eggs (39 percent), followed by seafood (26 percent), and produce (16 percent). Figure 2 shows that leafy greens were associated with more produce outbreaks, and we see why leafy

² Richard H. Molinar is a farm advisor with the University of California Cooperative Extension in Fresno County; he can be reached at rhmolinar@ucanr.edu. For more information, visit his website at http://ucanr.org/sites/Small_Farms_and_Specialty_Crop/.

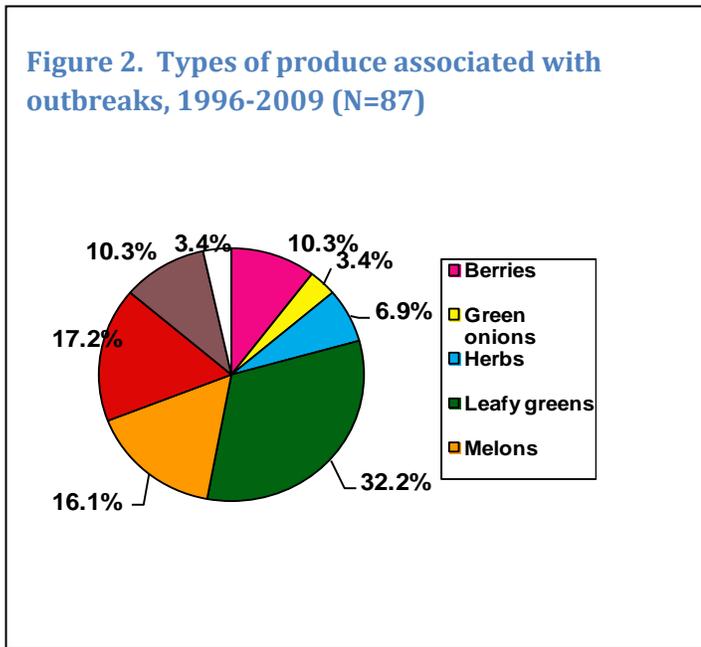
³ Shermain D. Hardesty, Ph.D., is the leader for the Small Farm Program and Extension economist with the University of California–Davis, Department of Agricultural and Resource Economics (http://sfp.ucdavis.edu/food_safety/). She can be reached at shermain@primal.ucdavis.edu.

greens producers and processors were anxious to develop good agricultural practices (GAP) in order to protect their industry and build consumer confidence in their products.

BACKGROUND. Very soon after the 2006 spinach outbreak, parts of the farming community announced they would adopt a set of GAPs for farms growing leafy greens. In 2007, the California Leafy Greens Marketing Agreement (LGMA) was formed through farmer-member participation to help protect the public that consume 14 different leafy greens grown on California farms. They developed a stringent set of metrics (a very specific and detailed set of food safety criteria) for food safety GAPs protocols.

Leafy greens include arugula, butter lettuce, chard, escarole, iceberg lettuce, red leaf lettuce, spinach, baby leaf lettuce, cabbage (green, red, and Savoy), endive, green leaf lettuce, kale, romaine lettuce, and spring mix. More than 100 farmers and processors, representing approximately 99 percent of the volume of California leafy greens, are LGMA members. These farms/companies are committed to sell products grown in compliance with the LGMA board-accepted GAPs.

In recent years, other commodity organizations in California have also adopted GAP practices for their growers, including those representing the following crops: strawberry, tomato, mushroom, melon, citrus, stone fruit, culinary herbs, almond, watermelon, blueberries, asparagus, and sprouts. Most provide a food safety manual template to help their growers develop a program for their farms. In addition to the manual, these organizations assist growers with training and, in some cases, make arrangements for a third party independent auditor to come to their farms.



EXAMPLES OF OUTBREAKS:

***E. coli* o157:H7 on Spinach (Salinas, CA, 2006)**

- Dole bagged baby spinach packaged by Natural Selection Foods (Earthbound)
- 204 illnesses and 3 deaths in 26 states (originating in Salinas, CA)
- Possible source from nearby cattle fields or wild boars on the property

***E. coli* o157:H7 on Strawberries (Oregon, 2011)**

- Locally grown berries on 35 acres, Jaquith Strawberry Farm in Oregon (fourth generation family farm)

- 14 illnesses and 1 death in Oregon
- Sold at you-pick farms, farm stands, farmers markets
- Source: wild deer eating leaves in strawberry fields

***Listeria monocytogenes* on cantaloupes (Rocky Ford brand, Colorado, 2011)**

- 146 illnesses and 30 deaths in 28 states, making it the worst food-borne illness outbreak since the early 1900s.
- Recalls from Jensen Farms and Carol's Cuts LLC, a Kansas food processor
- Source: used potato-washing equipment to wash cantaloupes and left out an important chlorination stage to kill bacteria

SO WHAT ABOUT THE SMALL FAMILY FARMER? Most small family farmers raise a variety of specialty, high-cash-value crops so that they can make a decent living with fewer acres than the large commodity farms. Most also have a more specialized marketing strategy, such as growing organic; selling at farmers markets, roadside stands, pick-your-own operations; or having a community supported agriculture (CSA) enterprise. While it is possible for a small farm to experience a food safety outbreak, the scope and ramifications tend to be smaller, as seen in the strawberry outbreak in Oregon. Nonetheless, food safety is still an important issue for small farmers.

THE FARMER AND THE FOOD SAFETY MODERNIZATION ACT. The last major update to our food safety laws was in 1938. The Food Safety Modernization Act (FSMA) of 2011 aimed to modernize these laws. The U.S. Food and Drug Administration (FDA) is the lead agency charged with the regulations and enforcement pertaining to food safety. One of the tenets of the FSMA calls on farmers who grow fruits and vegetables to prevent such hazards as animals entering the field, workers with poor hygiene, and introducing manure or water that contain pathogens. Currently, small family farms that sell less than \$500,000 annually and sell more than 50 percent of their product direct (to CSAs, farmers markets, farm stands, restaurants, retail stores, etc.) within 275 miles will be partially exempt (except for the traceability requirements).

Many small and medium-sized farmers are confused and feel overwhelmed with the requirements. According to Don Kramer, acting deputy director of the

FDA’s Center for Food Safety and Applied Nutrition, “What I think is going to be very important is another piece that is being developed and that’s this self-assessment tool. We think it is going to be very reassuring for a farmer who hasn’t experienced this kind of oversight before.” Two years after FSMA was enacted, in January 2013, the FDA published its proposed rule for farms. The proposed regulations exempt farms with income less than \$25,000 annually, and those farms that only grow products that are rarely consumed raw—arrowhead, arrowroot, artichokes, asparagus, beets, black-



Tchieng Fong (right) and a Cooperative Extension assistant walking a field of Chinese eggplants

eyed peas, bok choy, Brussels sprouts, chick-peas, collard greens, crab apples, cranberries, eggplant, figs, ginger root, kale, kidney beans, lentils, lima beans, okra, parsnips, peanuts, pinto beans, plantains, potatoes, pumpkin, rhubarb, rutabaga, sugar beet, sweet corn, sweet potatoes, taro, turnips, water chestnuts, winter squash (acorn and butternut squash), and yams. The proposed regulation states, "Because these listed fruits and vegetables are almost always consumed only after being cooked, which is a kill-step that adequately reduces the presence of microorganisms of public health significance, we propose that these listed produce be excluded from the requirements of this rule." The exemptions mentioned above also apply to the \$500,000 exemption.

SO WILL FSMA APPLY TO ME? According to the FDA, 79 percent (roughly 40,211 out of 190,111) of U.S. produce growers will be exempt from the FSMA requirements. However, state and local regulations may still apply, as well as industry standards. Just as the various commodity groups implemented certain GAPs for their crop(s), other groups may also require the implementation of GAPs. For example, to sell to Walmart a farmer must have an approved certifier such as Intertek, which offers Global Food Safety Initiative Safe Quality Foods (GFSI SQF) certification. According to Wegmans stores, 40 percent of its 540 produce suppliers qualify for the FSMA exemption. But David Corsi, Wegmans' vice president for produce and floral operations stated, "To us, it doesn't matter what size you are. We don't allow these exemptions." Wegmans requires GAP certification for its "high priority items," such as lettuce and leafy greens, tomatoes, netted melons, herbs, and green onions. Whole Foods will still accept a Food Safety GAP self-certification manual with a bacteriological irrigation water test. Food safety requirements and policies are changing rapidly. Many stores, packing houses, and wholesalers may require that a farm:

- Have a written food safety GAP manual in place;
- Have a self-certified GAP manual, usually with an irrigation water analysis; or,
- Have a GAP manual and be 3rd party certified.

Various universities, Cooperative Extension, non-profits, and private companies offer sample manuals and templates, as well as information to help farmers develop their own food safety GAP manuals. Check the websites of the following organizations for examples: Rutgers Cooperative Extension, University of Massachusetts, University of Minnesota, Oklahoma State University, University of California Small Farm Program and Cooperative Extension, University of Vermont, Oregon Department of Agriculture, On-Farm Food Safety Project, and Primus Labs.

FOOD SAFETY GAP MANUALS. GAP manuals should include information pertaining to animals entering the field, worker safety and hygiene, manure, and water tests for pathogens. The aforementioned templates and samples cover these areas. By closely following the USDA Agricultural Marketing Service's (AMS) GAP audit checklist a farm will probably satisfy most audits for smaller grocery chains and independent markets in the United States. Decide whether a simple farm review audit will satisfy your buyer or if they also want a field harvesting and packing audit.

KINDS OF AUDITS. The type of audit or certification you choose will depend on your retailer or buyer preferences. Many larger retailers require full-certification that is recognized by GFSI. For the small farmer, generally the least expensive option would be with a USDA GAP audit (access online at <http://www.ams.usda.gov/AMSV1.0/getfile?dDocName=STELPRDC5091326>).

USDA currently charges \$92 an hour to perform audits. A farm can be audited in one or several categories, including a farm review audit and a harvesting and packing audit. A simple farm review audit conducted by the California Department of Food and Agriculture (CDFA) for USDA at a small farm usually takes around 2 hours (if the farmer is well organized). If the auditor does not have to travel very far, it can be completed for roughly \$200 plus \$50 for the USDA certificate. The certificate is good for 1 year. Adding the harvesting and packing audit specific to certain crops might add another hour. While the USDA GAP farm review and harvesting audit might run \$350, a private company might cost the grower \$800 or considerably more.

Kinds of Audits

- **GAP – GHP Audit** (is not necessarily global)
- **Harmonized Audit** (is not necessarily global)
- **GFSI – Global Food Safety Initiative**
 - BRC (British Retail Consortium)
 - SQF (Safe Quality Foods)
 - CanadaGAP
 - GlobalG.A.P. (formerly Euro Gap)

100 different certification bodies= NSF, Primus, SAI, SCS

Logos for SQF, GLOBALG.A.P., and CANADAGAP are also present.

SO WHAT IS THE REAL COST?

Eric Hanagan farms 1,500 acres of melons and vegetables in the Rocky Ford area of Colorado, the same area near Jensen farms blamed for a 2011 *listeria* outbreak that killed 30 people. His vegetables now have traceability codes that allow them to be tracked. Hanagan estimates that the regulations cost medium-sized farms about \$5,000 to \$7,500 a year, which includes the cost of time for training workers and attending classes. But, he said, it’s worth every penny. “We need to have safe food, because if you get a consumer sick, you’re done,” he said. The FDA estimates that the proposed rule would cost the average farm \$11,430, but the costs are estimated to be quite different based on size. The FDA estimates that the initial average cost for complying with the proposed rule for small farms would be \$20,470; for large farms it would be \$38,133. The agency estimates the average recurring costs to industry would be \$10,507 for small farms and \$24,401 for large.

According to a study conducted by Dr. Shermain Hardesty and others in California in 2009, costs for food safety modifications and implementation were considerably higher for leafy green growers in 2007 after implementation of the LGMA. Costs for large farms were lower per acre probably because of economies of scale and a greater ability to absorb these additional costs. Leafy green growers in the mid-size category with revenues of \$1-10 million actually had the highest one-time and annual per acre costs. The complete report can be downloaded at <http://sfp.ucdavis.edu/files/143911.pdf>. The study found:

- **One-time costs for modifications** – Growers of leafy greens had to spend an average of \$13.60 per acre in 2007 to comply with LGMA protocols. The larger farms (grossing over \$10 million) spent \$8.29 per acre, while smaller farms (grossing under \$1 million) spent \$14.82 per acre.

- **Grower annual food safety costs** – These costs doubled after the implementation of the LGMA in 2007, as compared to the previous year. Annual per acre costs for growers with revenues under \$1 million averaged \$38.57, compared to \$33.22 for growers with revenues over \$10 million.

Leafy green grower costs per acre after LGMA implementation, 2007		
Grower Revenues (\$)	One-Time Costs (\$)	Annual Costs (\$)
<1 million	14.82	38.57
> 1 million and <10 million	18.05	85.89
>10 million	8.29	33.22

In our experience working with small 10- to 20-acre Hmong farmers in Fresno, CA, using our simple seven-page ABC Farm Food Safety manual template, adding a \$31 water pathogen test, a couple of log sheets for training and pest observations, and requesting a USDA Farm Review audit, several farmers have been certified for just under \$300. It doesn't have to be rocket science, but they will clearly have to spend more time doing recordkeeping to comply with their food safety program.

The Food Safety Modernization Act: Effects on Our Nation's Farmers and Our Ability to "Buy Local" and "Know Your Farmer"



Maria Moreira⁴ and Rich Bonanno, Ph.D.⁵



Food safety, as it relates to the production, distribution, and marketing of safe, nutritious, and affordable food, is the main goal of all of us who eat. The issue of food safety and developing regulation to address it has been discussed for decades. Every time there is an outbreak of a foodborne illness, it serves as a reminder of the need to address the issue of making our food system safe. The Centers for Disease Control and Prevention (CDC) released a study in early 2013 suggesting that the number of deaths from foodborne illness in this country over the past decade was a little less than 1,500 per year. Even one death is more than anyone wants.

The Food and Drug Administration (FDA) enacted the Food Safety Modernization Act (FSMA) in 2011 to strengthen our food safety system and better protect public health. This is the most extensive reform of FDA's food safety authority in more than 70 years. FSMA gives the FDA new and enhanced mandates and authorities to protect consumers and promote public health.

There are a few points that have been discussed when talking about food safety: 1) It is impossible to remove any and all risk from our food; and 2) Risk is reduced by staying as close as possible to the point of production.

FSMA will affect the marketing strategy of all farmers, from mid-size to small, beginning, and limited resource farmers who market their produce directly to stores and other direct to consumer outlets. Even though they are exempt from FSMA, they are under extreme pressure from buyers and grocery chains to produce certification that their food is safe, such as by complying with the FSMA. According to the FDA, the costs to fruit and vegetable growers for complying with the newly proposed produce safety regulations have been estimated to be roughly \$30,000 for large farms grossing \$500,000, about

⁴ Maria Moreira is executive director of World Farmers (<http://worldfarmers.org/>), a non-profit organization that represents the interest of farms in the market place to ensure that the farmers receive a fair price for their products.

⁵ Richard Bonanno, Ph.D is an Extension educator with University of Massachusetts Extension's Food Safety Education Program (<http://extension.umass.edu/nutrition/programs/food-safety>).

\$13,000 for small farms grossing \$250,000 to \$500,000, and \$5,000 for smaller farms grossing \$25,000 to \$250,000. This will make it extremely difficult for small and mid-sized farmers to find a way to meet the safety regulations imposed on them by their markets.

According to the most recent Agricultural Census, 75 percent of all fruit and vegetable farmers in this country gross \$50,000 or less per year. Most growers would be exempt from FSMA unless they fail to meet the 50 percent retail requirement or ship produce more than 275 miles from the farm.

Unfortunately, many retailers require a food safety audit from farmers, such as Good Agricultural Practices (GAP) or Harmonized GAP, regardless of their size or whether they might be exempt under FSMA. This creates a major problem for many smaller farms in the United States. There is no small to mid-sized food safety program to allow these smaller farmers the opportunity to participate. Asking a grower who grosses \$50,000 or less to add \$5,000 in cost is unreasonable and impractical, especially since there is no increase in price from buyers. These markets then have no other option but to stop buying from smaller, local growers. The markets will make their purchases from a large farm many miles away or import from another country when an “audited” local product is no longer available. Doing this increases risk.

There is a need to develop an affordable food safety program by which small farmers (\$500,000 and less) can be food safety compliant. This could entail most of the same food safety requirements (worker hygiene, agricultural water quality, biological soil amendments, livestock and wildlife controls, general sanitation, and traceability) without the huge cost of an audit and all of the paperwork required under the present system. Massachusetts has developed such a standard, called Commonwealth Quality. A state-approved program such as this could be used as a way educate farmers and encourage or require compliance in an affordable way. In the absence of such a program that would address food safety concerns, large retailers who require an audit have no choice but to stop buying local produce.

On Worker Hygiene:

- Overall, an educational program on the farm is reasonable.

On Water Quality:

- The decision to test for generic *E. coli* as the indicator is acceptable.
- Irrigation water testing for surface water sources is unreasonable.
- Testing surface water three times per season is more than sufficient. Weekly and monthly testing, as well as the requirement to test rivers, is both expensive and unwarranted. Upstream concerns are important only after a significant rainfall event. Irrigation is unlikely following such an event.
- When irrigation is again necessary, pathogen levels usually return to acceptable levels.
- There is no quick system for testing water used in washing and packing operations. Postharvest water should be potable but requiring that testing be done to determine that the water remains potable at all times is not feasible. Any requirement to this effect would require that any dunk

tanks/cooling tubs/etc. use water that is constantly being treated with a sanitizer. Even with the addition of a sanitizer, it is not possible to constantly test for a pathogen.

- Growers should use portable water after harvest, use packing lines that do not recirculate water when possible, and use discretion as to when to change water in tubs when it becomes dirty.
- Use of a sanitizer should not be required, either by regulation or default.
- Educating growers and encouraging them to make risk assessments is valuable, but requiring them to conduct impossible tests and to make impossible determinations is not good regulatory policy.
- There is an inherent risk to eating any raw produce.

On Manure:

- A 9-month delay between a manure application and crop harvest is not practical. Based on the availability of nitrogen as a result of this delay, this 9-month rule would negate any crop benefit and likely increase the possibility of groundwater contamination. There are current options based on GAP that work well now (e.g. no application within 2 weeks of planting or within 120 days of harvest). While not ideal, this is a reasonable compromise between food safety and the benefit of a manure application. Encouraging research to modify application times is helpful, but the starting point should not be a blanket 9 months.

On Livestock and Wildlife:

- Overall, the risk needs to be placed on the grower to determine the presence of fecal material that is more important than the presence of animals. Also, runoff or potential runoff from storage areas or freshly treated fields to production fields needs to be determined and mitigated by the grower.
- These proposed regulations should be harmonized with the National Organic Standards in this area to avoid conflict.
- Animals should be excluded from enclosed or partially enclosed washing, packing, and holding areas.

On Record Keeping:

- No clear direction on what is needed other than "everything." A more workable plan would be to ask growers to write a brief farm plan that outlines the perceived risks on their farms and what they plan to do to address those risks.
- Daily clipboards are time consuming and don't add anything to a good understanding of food safety risks. Some well-placed lists for employees as to what is expected are more useful. Templates could be provided to growers to assist in writing a farm plan.

Animal Farms: A Step Toward Food Safety

Agnes Kilonzo-Nthenge, Ph.D, and Brett Seybert⁶



Introduction: Food safety is a major public health concern that directly affects people in all walks of life. Foodborne illnesses associated with pathogens found in meat have resulted in an increased amount of attention being placed on food safety issues at all points in the food supply chain, “from field to plate.” Microorganisms existing in live animals may contaminate food products including milk, meat, fish, and eggs; they include many foodborne pathogens. Among those of greatest concern to consumers and governments alike are *Salmonella* spp., *E. coli* O157:H7, *Campylobacter* spp., *Yersinia enterocolitica*, *Vibrio* spp., Hepatitis E virus, Rotaviruses, *Cryptosporidium parvum*, *Giardia lablia*, *Mycobacterium* (tuberculosis), *Toxoplasma*, *Vibrio cholera*, and *Shigella* spp. In addition to those microorganisms that may live in animals, certain chemicals such as drug residues (antibiotics), growth promoters (some unauthorized hormones), and some pesticides and disinfectants used on the farm for other purposes may also gain entry to foods generated from animals and animal products.

Antibiotic Resistance and Food Safety: Increasingly, foodborne infections are resistant to one or more antibiotics. Making the problem worse is the fact that microbial resistance to antibiotics is on the rise, making it increasingly difficult to treat animals once an infection is discovered. With this growing resistance to antibiotics, due partly to the overuse of antibiotic growth promoters (used in the production of pigs, broiler chickens, turkey, fish, and beef cattle), this widely used method of preventing bacterial infections is losing its effectiveness, causing the development of even more drug-resistant bacteria strains. This problem in the food system is directly affecting the treatment of various life-threatening diseases in humans.

Small Farms: While consumer attention to proper washing, storage, and bacteria removal is certainly a step in the direction of achieving safer food, it is merely the beginning. To ensure our food system is as safe as possible, we must place a higher value on human interaction and environmental stewardship. Animal producers, as providers of food, are an integral part of this safer food system. The vast majority of all farms, and, thereby, animal producers, in the United States today are small and of limited resource. As such, these small farms hold a special significance in the continuation and sustainability of all facets of agricultural production, including best practices for a healthy and safe food system.

Best practices for safe and healthy farms: Realizing both that the goal of safer food is a systemic issue and those small farms and farmers are an important part of that system, researchers around the country have been making efforts to reach out and educate animal producers—particularly those who are part of a relatively small operation—on establishing and maintaining best practices for safe and healthy animals. In Alabama, researchers Derek Wheeler, Duncan M. Chembezi, E’Licia L.

⁶ Agnes Kilonzo Nthenge, Ph.D. (pictured) and Brett Seybert, Department of Family & Consumer Sciences, College of Agriculture, Human & Natural Sciences, Tennessee State University (http://www.tnstate.edu/agriculture/resumes/agnes_nthenge.aspx)

Chaverest, and Joseph Befecadu of Alabama A&M University studied the environmental impact of waste management practices at small farms. This study examined the collective influence and impact of waste management at small farms that, individually, are not seen as a significant pollutant and therefore fall outside of certain rules and regulations.



North Carolina A&T State University livestock integrated parasite management program

Efforts in North Carolina by a team consisting of Niki Whitley, Ralph Noble, Keesla Moulton, and Roberto Franco of North Carolina A&T State University; Rene Jackson of the Orange County Extension Center; and Tiffanee Conrad-Acuna of the Richmond County Extension Center resulted in the development of a livestock integrated parasite management program that can help small farmers maintain profits while limiting the amount of chemical dewormers introduced into the food system.

This program, which provides valuable resources and education such as fecal egg counting kits and training, encourages the use of multiple methods of parasite control to combat a growing immunity to dewormers while decreasing dependence on potentially harmful chemicals

In Washington, DC, Bryn Bird of the Rural Coalition examined the continued development of animal traceability standards and their effect on socially disadvantaged farmers and ranchers. Through a partnership with the USDA Animal Plant Health Inspection Services, Bird and the Rural Coalition reached out to these limited resource producers to gauge their opinions and understanding of the constantly changing technologies and standards of animal and disease traceability with the intention of educating and improving overall food system safety.

These efforts have not been in vain, as many small farms have either adopted new practices suggested by the research, or made tweaks to existing practices in order to achieve safer and more productive operations. By realizing the overall benefits of careful and safe management practices, these farms have improved efficiency, ensured the highest level of safety on their farms, and contributed to the safety of the entire food system while providing examples for other small farmers or producers to emulate. One such example is Bonnie Blue Farm in Waynesboro, TN. Recipients of the Tennessee Small Farmer of the Year Award in 2007 and 2008 and numerous other awards, Jim and Gayle Tanner produce fine cheeses from herds of Nubian and Saanen dairy goats and a Jersey cow on the Bonnie Blue Farm. Their careful attention to detail, combined with their prized stock, makes them some of the most successful examples safe and effective management practices. According to the Bonnie Blue Farm's website, "Everything matters—from the water the animals drink, to the hay and pasture they consume, to the strict routine of milking and cooling the milk (culminates) in the utmost attention and care in (the) cheesemaking and aging process" (<http://www.bonniebluefarm.com>). By taking this care and paying attention to every seemingly minor detail, the Bonnie Blue Farm not only creates award-winning cheese, but also an extremely safe step in the food system.

From ensuring that all equipment is cleaned regularly, to making sure cooling and refrigeration devices are in working order, the facilities are kept in optimal working condition to maximize both safety and efficiency. The Tanners use a 52-gallon pasteurizer to significantly reduce pathogens, and transportation and storage methods also follow best practices to make sure the threat of contamination is kept to a minimum. But the process of making this cheese so delicious and safe begins long before the does are ever milked, by providing them with clean drinking water, healthy food, and plenty of space to graze by maintaining a manageable population.



Milk goats graze at Bonnie Blue Farm (left). Cold milk enters the cheese studio where it is pasteurized in the 52-gallon pasteurizer at Bonnie Blue Farm (right).

Best Management Practices: Another small farmer, Steve James, was the recipient of the Best Management Practices Award at the 2007 Tennessee Small Farm Expo, sponsored by the College of Agriculture, Human & Natural Sciences at Tennessee State University. James also represents a combination of productivity, efficiency, and safety in his beef calf and cattle farm to maximize results while contributing to the improvement of the overall food system.



Photo: Steve James' beef and cattle farm in Tennessee

James has implemented a number of systems that have benefitted the health of his farm, including a rotational grazing system that allows him to get the most from his pastures, even in times of extreme drought, while also affording the cattle with room to graze freely and stay fed. Additionally, an intricate water system that uses underground pipelines to carry water to the multiple fields used allows James to keep the cattle out of small streams and creeks while still maintaining an adequate water supply. This not only keeps the stock hydrated, but also works to limit the spread of infection through the water supply.

So, after reading about the ongoing work to improve overall food safety, particularly the food produced on small farms and the successes of the Bonnie Blue Farm, you may wonder what you can do to help ensure that your small farm is as safe as possible and doing its part to improve the food system. While achieving a level of safety like the one described here is no doubt a large undertaking and an ongoing process that will evolve to fit your own situation and the needs of your animals and customers. Here are some helpful tips to help you get started.

Record Keeping: Thorough and diligent record keeping is an essential step toward building and maintaining food safety for animal producers. In the event that contamination or another problem occurs, having detailed records is the only efficient way to find its source. To get started, keep records of each of the following:

- Origin of all feeds, drugs, and chemicals;
- Infected animals and their treatments, including time period, dosage, date the treatment was administered, and mortalities;
- Identification marks or devices;
- Entrance date of animals into the farm (this ensures that movements of incoming animals are traceable to their source);
- Feeds and dates of acquisition;
- Usage of any feed additives;
- Carcass disposal; and,
- Animals/Products leaving the farm, including date of dispatch and destination.

Hygiene and Disease Prevention: One of the first and most important ways to keep food from animals safe is keeping the animals themselves healthy and free of disease. While it is inevitable that animals will sometimes get sick, following these steps can help avoid widespread illnesses that can contaminate the food system and potentially cripple a small farm:

- Isolate sick animals.
- Ensure the overall health of livestock by keeping careful watch of nutrient intake.
- Manage lighting schedules to minimize stress.
- Maintain appropriate animal population density. Crowding animals into facilities leads to unsanitary conditions and increases vulnerability to disease.
- Keep contact between livestock and visitors to a minimum, and be sure to take hygienic measures to limit possible introduction of pathogens and contaminants.
- Regularly clean facilities, and inspect them for overall safety.
- Keep newly arrived animals separate from resident stock for an appropriate period to monitor behavior and health.
- Always clean and disinfect husbandry equipment between each use.

Feed and Water: In addition to avoiding the spread of disease from other animals, food and water play an important role in the overall health of your farm. Maintaining healthy food and water for your stock keeps them in better condition and less susceptible to disease; a watchful eye over possible contamination can prevent potential infections. Keep the following in mind:

- Use feed from suppliers who follow recognized good manufacturing practices.
- Purchase only feed that is free of chemical residues and complies with regulatory requirements
- Ensure that the only water used for watering stock is known to be of acceptable biological and mineralogical quality.
- Prevent animal access to places where feeds or hazardous chemicals are stored.
- Maintain and regularly clean water distribution systems, including feeding and watering facilities such as drinkers and troughs.
- Carefully manage effluents so as not to contaminate sources of drinking water.
- Apply short-duration feeding systems aimed at decreasing the shed of harmful bacteria by animals intended for slaughter.

Animal Handling: Animals should be kept happy, healthy, and disease-free during their lives on the farm. It's also important to maintain a keen attention to detail and a vigilant desire to produce safe and healthy food as you prepare the animals for the next step in the process. Follow these steps:

- According to Rostagno (2009), stress from overcrowding, handling, severe temperatures, and transportation can have detrimental effects on their overall quality. Combat this by ensuring that animals are kept comfortable with enough space to graze in areas with good ventilation that are well-lit and provide shelter from bad weather.
- Make certain that all animals destined for slaughter are clean, healthy, fit to travel, and have not had recent contact with any diseased stock or infectious animal.
- Minimize contamination of animal products from animal and environmental sources during the primary production and storage phase.
- Maintain storage conditions that best preserve the quality of product.

Waste Management: Another unavoidable aspect of running a small farm is dealing with animal manure, which, although helpful in fertilizing produce, also contains pathogens that can cause illness in humans. These pathogens in animal manure have the potential to contaminate water or land if not adequately treated and contained. Improper or incomplete treatment can potentially contaminate crops and cause foodborne illness in consumers. Take these steps to better manage manure:

- Wait at least 9 months (270 days) between the application of raw animal manure and harvesting the field if there is a possibility that the manure may contact the produce.
- If there is no risk of contact with the crop, composted animal manures may be applied anywhere from 0-45 days before harvest.

The problem of keeping our food safe is indeed a daunting one. With microbial antibiotic resistance on the rise and a seemingly endless list of harmful pathogens that continues to expand, and a food system that includes many different parts and spanning the globe, a top-down approach to implementing better safety practices and standards would be difficult, if not impossible, to implement. But, by following these steps, seeking guidance from research, and making a continuous effort to keep safety at the

forefront of every small farm, small farmers and animal producers can have an enormous impact on the safety of our food system, for this generation and the next.

References

Food and Agriculture Organization of the United Nations (FAO) and World Organization for Animal Health (OIE), 2009. "Guide to Good Farming Practices for Animal Production Food Safety." Available at: http://www.oie.int/fileadmin/Home/eng/Current_Scientific_Issues/docs/pdf/eng_guide.pdf.

Pennsylvania State University Extension. "Farm Food Safety." Available at: <http://extension.psu.edu/food-safety/farm>.

Rostagno, M.H. "Stress and Food Safety Fact Sheet: Can stress in farm animals increase food safety risk?" *Foodborne Pathogens and Disease* 6: 767-776.

The Bonnie Blue Farm Website. Available at: <http://www.bonniebluefarm.com>.



Safe Handling of Fresh and Fresh-Cut Fruits and Vegetables

Jan Singleton, Ph.D., RDN⁷

When you were growing up, it's very likely that you were warned against the dangers of eating undercooked eggs, meat, poultry, or seafood. You were told that those foods could cause illness if they weren't prepared, stored, or cooked properly.

You got some good advice. But we now know that the advice you got wasn't as complete as it could have been. Why? Because foodborne illness can be just as easily associated with raw fruits and vegetables. Yes, that's right! Those same healthy, wholesome fruits and vegetables that your parents, school lunch workers, government agencies, and health organizations have urged you to eat for years are increasingly being linked to foodborne illness outbreaks in the United States.

Over the past decade, one in every 25 restaurant-associated outbreaks has been linked to produce, including lettuce, onions, peppers, tomatoes, cilantro, and sprouts. That comes as a surprise to many people, but it really shouldn't. Any raw or uncooked food can pose a food safety risk, whether that food comes from animals (meat, poultry, and seafood, as well as unpasteurized milk and eggs) or from plants (fruits, vegetables, nuts, seeds, or sprouts). In a study of more than 100,000 illnesses linked to food between 1990 and 2006, fruits and vegetables were linked to more problems than poultry and beef combined. This is partly because the message to eat more fruits and vegetables is taking hold. People are heeding that advice, and while that is good news from a health standpoint, it's important that people know about food risks associated with raw fruits and vegetables.

Adequate, nutritious, and safe food is vital to human health – but food can threaten human health as well. Each year roughly one in six Americans gets sick from something they ate. That's more than 48 million people! Of those who get sick, 128,000 are hospitalized, and 3,000 die from foodborne illness. In the United States, we have one of the safest food supplies in the world, but that doesn't mean there is absolutely no risk for foodborne illness. There's no such thing as zero risk, but there are a number of things people can do to bring their risk as close to zero as possible.

Tips on Buying Safe Produce

- Check for bruises, soft spots, and damage to the skin or peel. If you see damage, leave those fruits or vegetables in the bin!
- When buying cut, sliced, or diced fruits and vegetables, make sure they're packed on ice. It's even better if they're surrounded by ice.

⁷ Jan Singleton, Ph.D., RDN is Director of NIFA's Food Safety Division (<http://www.nifa.usda.gov/>).

- When buying packaged salad vegetables, make sure the package is sealed – check for holes or tears in the packaging. When buying whole fruits and vegetables, bag them immediately before placing them in your cart. This will prevent cross contamination from meat, poultry, and other foods.

Tips for Storing Produce

- For cut, sliced, or diced fruits and vegetables, refrigerate them immediately once you get them home.
- For whole fruits and vegetables that are stored in the refrigerator, make sure they are held at a temperature of 40 degrees Fahrenheit or below.
- If needed, pat dry fruits and veggies before refrigeration to prevent spoilage.

Tips for Preparing and Eating Produce

- Wash fruits and vegetables thoroughly under running water before eating. Do this even if there is a peel you plan to remove. The knife you use for peeling can introduce bacteria into the produce. And by the way, make sure you use a clean knife!
- For fruits and vegetables that have a firm surface or peel, scrub gently under running water with a produce brush.
- After washing, cut away and remove any bruised or damaged areas that have occurred during storage or you can simply remove the peel.
- For packaged, pre-washed fruits and vegetables, it's not necessary to wash again, but feel free to do just that if you feel safer... it won't hurt the produce!

Fruits and vegetables are an important part of a healthy diet, and we should all be eating more of them. But to protect against foodborne illness, it's important to keep safety in mind when buying, storing, preparing, and eating fresh and fresh-cut produce. Why? Because harmful bacteria in soil and water, where fruits and vegetables are grown, may come in contact with them and remain on the surface after they are harvested. But even after they're harvested, bacteria can contaminate surfaces during transportation and shipping to the grocer, while they're on display in the store produce bin, or in your own home. Follow the important safety tips for fresh and fresh-cut produce, and enjoy the nutritious variety they have to offer!

Food Safety Resources

Training, Food Safety Plans, and Good Agricultural Practices (GAP)

- GAP: A Self-Audit for Growers and Handlers (On-Farm Food Safety Project)
<http://onfarmfoodsafety.org/wp-content/uploads/ucdavis-food-safety-audit.pdf>
- GAP Food Safety Manual (University of Massachusetts Extension)
<http://extension.umass.edu/nutrition/programs/food-safety/programs/good-agricultural-practices/gap-manual>
- National GAP Educational Materials (Cornell University)
<http://www.gaps.cornell.edu/farmassessmentws.html>
- On-Farm Food Safety Project
<http://onfarmfoodsafety.org/>
- USDA GAP Audit Verification Checklist
<http://onfarmfoodsafety.org/wp-content/uploads/USDA-Audit-Checklist.pdf>

Federal Food Safety Resources

- FoodSafety.gov
<http://www.foodsafety.gov/>
- Food and Drug Administration – Food Safety
<http://www.fda.gov/food/foodsafety/>
- USDA National Institute of Food and Agriculture – Food Safety and Biosecurity
<http://www.csrees.usda.gov/foodsafetybiosecurity.cfm>
- Agricultural Marketing Service
<http://www.ams.usda.gov/AMSV1.0/getfile?dDocName=STELPRDC5097957>
- USDA Food Safety and Inspection Service
<http://www.fsis.usda.gov/>
- Know Your Farmer Know Your Food
www.usda.gov/kyfcompass

Food Safety News

- Food Safety News: Breaking news for everyone's consumption
<http://www.foodsafetynews.com/>

Food Safety Associations and Advocacy Organizations

- DFA of California
<http://www.agfoodsafety.org/about/>
- International Association for Food Protection
<http://www.foodprotection.org/>
- Make Our Food Safe
http://www.makeourfoodsafety.org/about_us?id=0001
- Produce Marketing Association Food Safety Resource Center
<http://www.pma.com/resources/food-safety-resource-center>
- United Fresh Produce Association
<http://www.unitedfresh.org/>