



## **Food Safety Requires a Healthy Environment: Policy Recommendations for *E. coli* O157**

### **Summary**

Concerns about the safety of vegetable crops captured a great deal of attention in 2006 when illness and deaths were linked to spinach contaminated by a virulent strain of *E. coli* (O157). Since that episode, regulators, farmers, food handlers, and retailers have begun instituting options for ensuring the safety of food crops, with particular attention paid to leafy green vegetables. Unfortunately, many well-intentioned efforts to make the growing environment “clean” for California vegetables have created misguided farm policies, harmful to both food safety and land stewardship practices. We run the risk of reaching for an unattainable and indeed risky “sterile” growing environment for the nation’s food crops, at great cost to farmers, consumers, and wildlife. We could instead build upon conservation practices, already underway on many farms, to enhance the effective ecosystem services provided by a healthy growing environment while ensuring the safe growing of food.

Conservation practices for water quality and wildlife habitat supported by the USDA and other agencies have been actively eliminated by 89% of growers surveyed on the Central Coast of California, who manage 140,000 acres, in order to keep their markets. Removing the protective mantle of vegetation buffering farms, as required by food safety auditors, is intended to reduce the risk of *E. coli* O157 that might be associated with large and small wildlife, which have not been proven to be significant vectors. Eradicating habitat that buffers and filters pathogens does, however, unnecessarily increase the likelihood of *E. coli* O157 distribution by wind and water. The FDA has not been able to determine how *E. coli* O157 ended up in the spinach field. Since no *E. coli* O157 was found in animal feces, irrigation water, or production inputs in the field with the outbreak, the most likely culprit was dust or soil contaminated with *E. coli* O157 drifting in on the summer wind or flowing in with the spring rainy season’s runoff.

Cattle are the multipliers of *E. coli* O157 on the landscape since the vast majority of this pathogen starts out in the animals’ digestive systems. Grazing cattle can be found with *E. coli* O157, but more often, confined animal feeding operations increase its prevalence. Processed bagged fresh-cut leafy greens are the primary source of leafy green *E. coli* O157 outbreaks, not head lettuce and bunched greens. Bagged greens are more susceptible because the package itself creates an inviting microenvironment for pathogen growth and because greens harvested from multiple large fields are mixed in the same wash water. The fresh-cut salad mix processors insist on practices that lead to the killing of small wildlife, which have not been associated with the pathogen, because of the potential for their being chopped up into the mix. This is really a problem with the harvest procedures, not a life and death situation for people.

California’s Leafy Green Marketing Agreement (LGMA) addressing food safety for bagged and non-bagged products was created without all stakeholders, such as conservationists and small farmers. Super metrics that go beyond the LGMA were shaped using debatable science by shippers and buyers in order to capture more market share and avoid supposed litigation. Food safety auditors using the LGMA and super metrics do not understand the trade-offs of eliminating non-crop vegetation due to their unfounded concern about small and large wildlife, and hence are on a mission to make cropland as sterile as possible. Farmers are left between a rock and a hard place, forced to comply with onerous food safety practices and to ignore environmental laws, when many think this state of affairs could also increase the risk of contamination.

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## Grower Survey Records Destruction of Vegetation and Wildlife

Six months after the spinach *E. coli* O157 outbreak, growers managing 140,000 acres on California's Central Coast responded to a survey conducted by the Resource Conservation District (RCD) of Monterey County. They indicated that they have adopted environmentally destructive measures in order to comply with food safety audit requirements and keep their markets (RCD, 2007). Eighty-nine percent of respondents reported that they had actively removed conservation practices for water quality or wildlife habitat. Survey respondents that now use: bare ground buffers own/rent a total of almost 92,000 acres (65%); trapping own/rent a total of about 87,000 acres (62%); poisoned bait stations own/rent a total of approximately 108,000 acres (77%); and fencing own/rent a total of about 66,000 acres (47%). The excerpts below show that growers have serious concerns about the conflict:

“Our experience has been that the food safety auditors have been very strict about any vegetation that might provide habitat. We are very concerned about upsetting the natural balance, but we have to comply with our shipper's requests.”

“There is too much fear about food safety and not enough good science. Providing habitat for wildlife is very important to me.”

“My concern is that they want us to kill all wildlife. This is not the threat. We all need wildlife.”



*The Salinas River flows through the heart of our nation's salad bowl. In an effort to eliminate wildlife, vegetation along its banks is being removed and extensive fencing is being installed, which could leave wildlife without an escape route during flood events.*

## Vegetation: A Natural Filter

Windbreaks, hedgerows, and natural habitat have long been known to reduce dust movement. Since *E. coli* O157-laden dust can travel viably for relatively long distances (Benbrook, 2007), leafy green crops, especially those near cattle ranches and dairies, would benefit from a ring of trees and shrubs to serve as a buffer to dust. A credible theory in the spinach outbreak is that, since no animal feces were found in the field and no surface irrigation source was nearby, wind picked up dust carrying the pathogen from an un-vegetated cattle loafing area on a nearby ranch and blew it onto the freshly irrigated crop, unprotected by non-crop vegetation (Benbrook, 2007; Richardson, 2008). To reduce pathogenic dust at its source, use of rotational grazing on ranches and the distribution of solar-powered water troughs, salt blocks, and supplemental feeding areas can help to spread cattle more evenly over the land.



*Healthy grasslands and riparian areas safeguard water quality by filtering harmful pollutants.*

Habitat along drainages, creeks and streams, wetland vegetation, hedgerows bordering the farm, and healthy grasslands on ranches serve as filtering systems for sediments and pollutants. Without adequate vegetation, rainwater flow can swiftly distribute any *E. coli* O157 present (Meadows, 2007). In general, *E. coli* O157 cannot survive very long without fecal matter as a host. Its viability in the soil ranges from a few days when tilled in, to years—which is uncommon (Unc et al., 2006). More typical is three or more months (Benbrook, 2007). Grasses and wetlands provide a filtering capacity for runoff with *E. coli* and other pathogens (Stuart et al., 2006; Tate et al., 2006). Between 70 and 99% of microbial pollution can be removed from water flowing over *E. coli* laced cattle feces (Knox et al., 2007; Tate et al., 2005). Grassed buffers of just three to six feet provide this protection, as do functional wetlands that spread out and slow the water (Johnson, 2007). Wildlife habitat serves as the critical lungs and kidneys of the landscape, filtering the pollutants from air and water before they reach food crops.



*The farmer managing this eroding land had planned a restoration project until his food safety auditor told him no vegetation would be allowed.*

## Cattle As Multipliers of *E. coli* O157

Cattle are the primary source of *E. coli* O157 on the landscape, since the vast majority of this pathogen starts out in their digestive systems and is shed from their ruminant gut without causing the animals to contract the illness (Hussein, 2007). Prevalence varies from 2.3 to 53% depending on location and season (Stuart et al., 2006). Grazing cattle can be found with *E. coli* O157, especially calves and stressed adults in warm weather. But more often it is found in the confined dairy and beef feeding operations, where cattle are fed an unnatural diet of grain instead of grazing on pasture. Grain makes the animals' rumen more acidic and increases their output of *E. coli* O157 (Diez-Gonzalez et al., 1998). New research indicates that distillers grain, an increasingly available byproduct of ethanol production, intensifies the output of the *E. coli* O157 when used as a large part of the diet (Brasher, 2007).

## Antibiotic Resistance: A Troubling Trend

Confinement of a large number of animals from many areas of the country makes for unhealthy conditions that can require high use of antibiotics. While comparatively little antimicrobial use occurs in cow-calf and stocker operations, the typical beef animal receives antibiotics much more often after being shipped to a feedlot, some of which are very large. In 2000, about 35% of cattle went into large confinement operations, averaging 32,000 head (McEwen and Fedorka-Cray, 2002).

About 70% of the antibiotics currently being sold in the United States are used as feed additives for chickens, hogs, and beef cattle (Union of Concerned Scientists, 2008). Most cattle are routinely fed low doses of antibiotics

primarily for growth promotion as well as for disease prevention, and these practices are ideal conditions for the development of antibiotic resistance (Armstrong et al., 1996; McEwen and Fedorka-Cray, 2002). Feeding sublethal concentrations of drugs over long periods selects for resistant bacteria. Of the 225 *E. coli* strains known, most are beneficial to healthy digestive systems. Pathogenic *E. coli* strains have been found to be 10 to 39% resistant to one or more antimicrobials (Benbrook, 2006). Other factors can also contribute to the selection and spread of antibiotic resistance, such as interactions with farm animals, water, dust, wildlife, pets, and humans. The Preservation of Antibiotics and Medical Treatment Act proposed in Congress (S. 549/H.R. 962) would restrict the non-therapeutic use of antibiotics in animal feed, if passed.



*The FDA was not able to determine the source of the 2006 spinach contamination, but using a process of deduction leads many to theorize it was dust. Conservation plantings like this hedgerow adjacent to another spinach field serve as buffers to capture dust-borne pathogens.*

## Reduced Slaughterhouse Food Safety Audits Are Tying Ranchers' Hands

In less than 20 years, the lack of government food safety auditing for thousands of small to mid-sized slaughterhouses has resulted in a sharp reduction in their numbers, leading the way for the creation of large slaughterhouses supplied by large confined operations. Mounting scientific evidence shows that the selection and proliferation of antibiotic resistant *E. coli* strains and other pathogens in industrial-size livestock operations are largely responsible for our country's food safety crises (Aaerstrup, 1999; DuPont and Steele, 1987; Mathew, 1998; Shea, 2003). Large meat slaughter and processing plants are linked to 41% of reported *E. coli* O157 ground beef outbreaks between 1982 and 2002. Most ranchers have little choice but to send their cattle to these large operations since the majority of small units have shut down. During that same period, lettuce and salad had about 10% of the outbreaks (Benbrook, 2006)<sup>1</sup>.



*The selection and proliferation of antibiotic resistant pathogens in concentrated animal operations are largely responsible for our country's food safety crises.*

It is ironic that a dearth of food safety audits in animal agriculture has caused the proliferation of food safety audits in leafy greens agriculture.

## Wildlife Pose Low to Zero Risk

Distribution of *E. coli* O157 comes from cattle on rangeland, the use of manure on crops, dust, water, other farm animals and—to a much lesser extent—wildlife. Wild animals have been found to carry pathogenic *E. coli*, but research shows them having little to no role as vectors. Individuals can be carriers, such as a few feral pigs or a raccoon or chipmunk (Maldonado et al., 2005), but formal



*Studies have repeatedly demonstrated that deer present little to no danger as carriers of *E. coli* O157, yet they are listed as animals of significant risk under California's Leafy Green Marketing Agreement. As a result, habitat that would otherwise provide for food safety is destroyed.*

population studies are most telling. Traces of *E. coli* O157 in feral pig feces sampled near the spinach incident have prompted ongoing studies with a large number of animals to determine the prevalence in the population.

Native animal species on range and wildlands are sporadically found with pathogenic *E. coli*. Research of deer sharing the range with cattle in Texas yielded 0 % of *E. coli* O157 (Branham et al., 2005), in Kansas 2.4% (Sargeant et al., 1999), in Louisiana 0.3 to 1.8% (Dunn et al., 2004), in the Southeastern United States 0 to 0.6% (Fischer et al., 2001), and in Nebraska 0.3% (Renter et al., 2001). Investigations found 0% pathogenic *E. coli* in the following wild birds: geese in New Jersey and Virginia (Converse et al., 1999), pigeons and gulls in Finland (Kobayashi et al., 2002), and gulls and passerines in Sweden (Palmgren et al., 1997). Gulls in English natural areas had 2.9% *E. coli* O157, while those associated with landfills had 0.9% (Wallace et al., 1997). Passerines and woodpeckers in Wisconsin were found with 1% *E. coli* O157 (Brittingham et al., 1988), wild birds living close to cattle and pig farms in Denmark had 1.6 % pathogenic *E. coli* (Nielsen et al., 2004), and wild birds on cattle ranches in the Pacific Northwest had 0.5% of *E. coli* O157 (Hancock et al., 1998). In the same Pacific Northwest study none of the 300 rodents examined were found to harbor the pathogen. Invertebrates are known to be carriers but the incidence is also low. Slugs near an English sheep farm were found to have 0.2% (Sproston et al., 2006), and houseflies associated with cattle in Kansas had 1.4 to 2.9% (Alum and Zurek, 2004). Wildlife will never be proven completely risk-free on the farm, but given the drawbacks in denuding their habitat, the greater risk for food safety is not having them.

## Not All Leafy Greens Are Equal

Crops have existed beside cattle and wildlife for a long time, but some are more prone to food safety issues than others. Processed bagged “fresh-cut” leafy greens, as opposed to head lettuce and bunched greens, are the primary source of *E. coli* O157 outbreaks and illnesses linked to leafy greens. According to the Community Alliance with Family Farmers’ (CAFF) compilation of Food and Drug Administration data, 80% of the outbreaks and 98.5% of the illnesses were attributed to fresh-cut leafy greens in California between 1999 and 2006 (CAFF, 2007).

A multitude of reasons exist for why fresh-cut leafy greens are more susceptible. Whether grown on a small or large farm, bagged produce creates a microenvironment that encourages growth of *E. coli* O157, since it can exist with

or without oxygen. When bagged leafy greens are not kept continuously cold en route to the farmers' market, a big box store across the country, or a consumer's home after purchase, chances of *E. coli* O157 proliferation greatly increase. Having so much cut surface area in fresh-cut bagged greens increases the exposure route of the pathogen. For industrially produced fresh-cut leafy greens, the contamination risks expand further. Harvests from several large fields are mixed together in wash water, amplifying chances of sickening more people. In recent years, processors have also extended the shelf life, possibly pushing the product near its unsafe range, without the knowledge of the consumer. One-third of the illnesses were associated with "sell by dates" that were at their limit (Richardson, 2008). The fresh-cut industry should reduce the shelf life to what it was just a few years ago—from 15 to 17 days to 12 days.



*Regulations for leafy greens destined for processing should not apply to whole heads or bunched greens; instead separate metrics are needed.*

## Exploiting the *E. coli* O157 Scare

Before 2006, concern began to brew about leafy greens and wildlife habitat in the fresh-cut leafy greens industry. Processors worried that foreign objects, such as frog and rodent parts, might appear in mowed and bagged leafy greens, and farms near existing habitat were required to put up short plastic-sheet fences to deter wildlife. While small wildlife have not been found to be *E. coli* O157 vectors, the *E. coli* crisis is now used to justify requiring farmers to do much more, from trapping and poisoning these species, to removing habitat that might harbor them. The Resource Conservation District of Monterey County survey reported that crops were rejected due to potential frog habitat and that farmers are required to trap and poison rodents (RCD, 2007). Animal parts in bagged greens are not a matter of life and death for humans; rather they are a foreign object issue with minimal food safety risk. Instead of denuding

farms of habitat and encouraging the destruction of wildlife, the processing industry should either go back to hand harvesting or redesign harvesting equipment for better detection of foreign objects.

## Getting Markets Back at Any Price

When the FDA advised consumers against eating any fresh spinach in the fall of 2006, the spinach growers, processors, and shippers lost an estimated \$100 million (Nagin, 2007). Immediately, the industry began strategizing on how to get its markets back. Everyone who had anything to do with food safety became involved, from the big supermarket chains to the shippers, processors, and large growing concerns. A major theme was to impose farm requirements that eliminated wildlife habitat regardless of the environmental damage.



*The processed leafy greens industry is concerned with foreign objects (small animals) being chopped up by mechanical harvesters. Small wildlife such as this Pacific tree frog have not been found to be *E. coli* O157 vectors, yet the processors are mandating farmers destroy habitat in the name of public health, instead of redesigning the equipment.*

## Stakeholders and Vital Factors Left Out of California's Marketing Agreement

In a top-down approach, California's Leafy Green Marketing Agreement (LGMA) and its associated Good Agricultural Practices (GAP) metrics were developed, guided by a set of large growers, shippers, and processors. High on their list was appeasing the attorneys of large retailers that wanted zero risk but had little understanding that agriculture benefits from and exists in nature. Initial farm requirements were environmentally destructive, but to the LGMA board's credit, it has incorporated many comments



*California's current food safety regulations in the Leafy Green Marketing Agreement were designed with large monocultures in mind and are impractical for diverse farms that often cultivate more than 30 different crops, as shown above. Typical large farms have the capacity to hire dedicated staff to conform to the requirements, while for small farms this is not a realistic option.*

submitted by agencies and advocates for the environment and small farmers. Originally, the LGMA required a non-vegetated buffer of 30 feet between crops and rivers or wildlife habitat, and now none is obligatory; it required a bare buffer of 100 feet between crops and grazing lands, and now a reduced 30-foot buffer is mandatory; it included geese in the “animals of significant risk” list, and now they are removed; and throughout the document it alluded that all wildlife were a significant problem, and now only “animals of significant risk” are mentioned.

Still, many conservation and small farmer issues are left unaddressed. All leafy greens are included when only fresh-cut should be covered. Small and medium-sized farms typically harvest smaller areas of multiple crops more often, but the required *E. coli* water testing schedules do not accommodate this difference. Deer are included as animals of significant risk when studies have shown they present zero to little risk. Reducing the number of deer on the landscape in many areas would not be a conservation concern because of their overpopulation, but blocking migratory paths for other wildlife with fencing and removing wildlife habitat that supports many species are problematic.

## Competitive One-Upmanship of Super Metrics

At the same time California's LGMA was being developed, more onerous food safety requirements were created by shippers and buyers in order to capture more

market share. Often, large leafy green growers sell a crop to many entities and are made to have multiple, duplicative food safety inspections that go beyond the LGMA metrics. Fresh Express, for example, a company with almost half (47%) of the U.S. fresh-cut salad market in 2007 (some of which is organic), requires both California's LGMA audit and their own “safer” super metrics audit (Cohen, 2008). These excessive metrics contain environmentally destructive measures, such as the requirements for more than 450-foot buffers between crops and rivers or wildlife habitat, and for more than several hundred feet between crops and grazing lands (Schmit, 2006). In reality, the Fresh Express auditors ensure that these are bare ground buffers, the result of which is undoubtedly reflected in the RCD Monterey County grower survey.

The Food Safety Leadership Council (FSLC), which McDonald's and Walmart support, have put forth a set of standards that require the “reduction of the presence of reptiles, insects, birds, rodents,” a “minimum of a quarter mile barrier between grazing lands and adjacent growing fields,” and that “surface water used for irrigation shall be free from weeds, trash and foreign materials” (FSLC, 2007).

There are many super metrics influencing growers that do not take into account the increased *E. coli* O157 risk promoted by elimination of habitat, do not comply with state and national laws, nor do they take a well-rounded approach to existing science. A ceiling backed by legislation should be placed on the LGMA and any future government-sanctioned food safety metrics so that farm products using their labels cannot also be certified by super metrics, similar to how the National Organic Program works. Before legislation is written for the LGMA metrics, environmental and small farmer concerns should be addressed.

## Retraining Food Safety Auditors

Although most farm requirements that could impact the environment are stated cautiously in California's LGMA and some of the other protocols, they are often interpreted by food safety auditors to mean removal of all wildlife and its habitat near the crop. These auditors have not been made aware of the trade-offs when eliminating non-crop vegetation. Many are on a mission to make cropland as sterile as possible, which only adds to the dissemination of *E. coli* O157. In an effort to standardize food safety audits, auditors should be certified in a program covering agricultural natural resource protections that reduce the incidence of *E. coli* O157.



*Fresh-cut bagged leafy greens have been tied to 98.5% of the *E. coli* O157-related illnesses that occurred in California between 1999 and 2006.*

## **Compromised Protections, Ignored Laws**

In an effort to clean up farm runoff, the California State Water Resources Control Board has put millions of dollars into a non-point source water pollution control program with a carrot/stick approach. In the Monterey Bay region where the contaminated spinach outbreak occurred, a large number of farmers had installed grass waterways, hedgerows, riparian plantings, and tailwater ponds after taking classes supported by state programs. Most were excited at the prospect of taking better care of their land, while others were complying with the regulatory side of the program (RCD, 2007). Now, urgent need for this stewardship is unraveling in the name of food safety.

The National Organic Program (NOP) rule requires organic farmers to conserve biodiversity and to maintain or improve the natural resources of the farm operation, including soil, water, wetlands, woodland, and wildlife. Many organic as well as conventional farmers want to conserve biodiversity by providing wildlife habitat, not only to filter pollutants, but also to support pollinators, and insect- and rodent-eating predators, which reduce the need for any type of pesticide. The Endangered Species Act is another public trust that may be exacerbated by food safety protocols. While many factors have reduced the populations of protected steelhead (*Oncorhynchus mykiss*) and California red-legged frogs (*Rana aurora draytonii*) in the Monterey Bay region, certainly the increase in bare ground buffers and the reduction of riparian vegetation increases turbidity and agricultural chemical runoff harmful to both species. In addition, since the presence of frog habitat has stopped harvests and has cost farmers thousands of dollars (RCD, 2007), it is surely possible that farmers are compelled to remove all frog habitat, whether protected or not.

## **Farmers Caught in the Crossfire**

Farmers are between a rock and a hard place; should they listen to their food safety auditors, or comply with other critical rules, regulations, and government-promoted conservation practices? In 2006, four companies controlled 86% of the fresh-cut salad market; Fresh Express had 41%, Dole 31%, Ready Pac 8%, and Earthbound Farms (Natural Selection Foods) 6% (Cohen, 2008). Farmers are under tremendous pressure from these few corporate buyers to remove important vegetation. Not only does it cost farmers thousands of dollars to remove vegetation and put up fences, but many believe it could also increase the risk of contamination (Richardson, 2008).

## **Further Regulations: Re-evaluate Stakeholders, Metrics and Audits**

Arizona now has a LGMA similar to California's, and other marketing agreements and laws are proposed for leafy greens, additional crops or sets of crops in other states and by the federal government. The creation of food safety regulations for individual crops or groups of crops is impractical for many diverse farms, which often grow 30 or more crops. However, if more regulations are written, four major problems need to be dealt with first. These are: (1) the unfounded targeting of wildlife is stopped; (2) all buffers next to crops are vegetated; (3) a ceiling is placed on the super metrics before the environmental destruction seen in the Monterey Bay region spreads nationwide; and (4) interpretations of the metrics made by food safety auditors are corrected with natural resource trainings and an auditor accreditation program.

## **Conclusion**

There is a lot we do not know about *E. coli* O157. New research should examine existing farming systems that are free from the *E. coli* O157 pathogen. Research results should be used to implement practices that are in line with conservation and do not discriminate against small farmer concerns. But there has been a lot of research that is not being applied, research that shows the benefits from vegetation and does not justify the unreasonable attacks on wildlife. Common sense along with research should guide us into the future. A healthy growing environment will enhance both food safety and the ecological role of farms in our landscape.

***The Wild Farm Alliance is working with universities, government agencies, farmers, and other nonprofits to help make our farms healthy, productive, and safe.***

# Facts and Policy Recommendations for the Coexistence of a Robust *E. coli* O157 Food Safety Program and a Healthy Environment

## Good Agricultural Practice Metrics Changes

1. Food safety is enhanced with wildlife habitat that filters pathogens present in wind and water.
  - Food safety protocols should clearly state that vegetation, not bare ground buffers, exist between crops and grazing lands, and that no buffer is needed between crops and habitat. The USDA Natural Resources Conservation Service should be consulted on metrics written that affect wildlife habitat.
2. Wildlife have zero to little risk of being carriers of *E. coli* O157.
  - The listing or implication that small and large native animals are a risk should be removed from all food safety protocols, including deer as “animals of significant risk.”
3. Farmers are caught between a rock and hard place with conflicting food safety and environmental regulations.
  - Food safety metrics and audits should clearly state that compliance is required of the Clean Water Act, a state’s farm water quality regulations, the National Organic Program rule, and the Endangered Species Act.

## Food Safety Programs’ Scope Changes

4. Unscientifically based super metrics that go beyond the California and Arizona Leafy Green Marketing Agreement (LGMA) metrics do not take into account the increased *E. coli* O157 risk they promote by their aversion to habitat.
  - A ceiling should be placed on the LGMA and any future government-sanctioned food safety farm programs so produce using these labels cannot also be certified by super metrics that cause environmental destruction.
5. Most food safety auditors are on a mission to sterilize farms and do not understand the risks involved with the removal of wildlife habitat.
  - Food safety programs should require all farm auditors to be certified in a program teaching agricultural natural resource protections that reduce the incidence of *E. coli* O157.
6. Processed fresh-cut leafy greens, as opposed to lettuce heads and bunched greens, cause 80% of the pathogenic *E. coli* O157 outbreaks and 98.5% of the illnesses in California.
  - The current California and Arizona LGMAs, and any future marketing agreements or orders based on these, should only cover processed fresh-cut leafy greens.
7. Conservationists, small distributors, and small farmers have no representation in California and Arizona’s LGMAs.
  - Current and future government-approved food safety farm programs need to have governing boards composed of all stakeholders.
8. Multiple state and federal food safety regulations are proposed for specific crops or groups of crops, and it is impractical for diverse farms to comply.
  - Diverse farms should not be subject to many separate crop programs when they often grow dozens of crops.

## Changes Addressing the Heart of the Problem

9. Cattle are the major source of *E. coli* O157 on the landscape.
  - Part of any food safety program should include funding for farmers and ranchers to work together, and for government and the private sector to conduct education and outreach to ranchers about lessening the risk of *E. coli* O157. Risk can be reduced when grasses and soils are conserved by using ecologically managed grazing practices, wetlands are restored, and animals are distributed evenly on the land.
10. The practice of feeding antibiotics for growth promotion, especially in confined animal operations, is increasing antibiotic resistance of pathogens like *E. coli* O157 and thus leading to its proliferation in the environment.
  - The Preservation of Antibiotics and Medical Treatment Act proposed in Congress (S. 549/H.R. 962) should be passed to reduce the risk of more pathogenic strains being developed.
11. The demise of the small slaughterhouse and the increase in the industrial-size livestock operations where antibiotic resistance develops and proliferates are responsible in a large part for our country’s food safety crises.
  - Funds should be made available for low-interest loans for the building of small slaughterhouses in the United States, and to support the reinstatement of food safety inspections in small slaughterhouses.
12. The unfounded targeting of wildlife initially began with a mandate from fresh-cut leafy greens processors to eliminate (trap and kill) foreign objects such as small wildlife.
  - Harvest techniques and equipment should be redesigned to better detect foreign objects, so that fresh cut leafy greens can coexist with wildlife.

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