



Food-borne Illness Crisis Procedures

Food Safety Guidelines



Updated January 1999

Table Of Contents

Introduction	4
Water Component	6
Agricultural Water Quality	6
Identifying Sources of Contamination	7
Quality Testing	9
Irrigation Water Quality	10
Non-Irrigation Uses	11
Processing Water	11
Wash Water	12
Sanitizers	13
Efficacy of Wash Treatments	14
Cooling Operations	15
Manure and Biosolids Component	17
Microbial Hazard	18
Control of Potential Hazards	19
Reducing Pathogens	19
Composting	20
Treatments to Reduce Microbial Hazards in Manure	23
Animal Feces	24
Resources	26
Sanitation and Hygiene Component	28
Worker	28
Microbial Hazard	29
Control of Potential Hazards	30
Toilet Facilities	36
Sewage Disposal	37
Grove	38
Storage Facilities/Bins	38
Equipment Maintenance	39
Packing Facility	40
Pest Control	42
Roadside Stands	44

Table Of Contents - Continued

Transportation	45
Potential Grower Liability	49

Introduction

These draft food-safety guidelines, developed for California's avocado industry, constitute one part of the California Avocado Commission's Food-Borne Illness Crisis Management Plan. They were developed at the request of California Avocado Commission senior management as a response to increasing numbers of food-borne illness incidents in the United States, and growing political and public concerns.

The guidelines are intended to provide information based upon which various industry sectors, including growers, farm managers, handlers and processors, can assess present growing, harvesting, handling and other practices against practices intended to minimize or eliminate the potential for avocados to be implicated in a food-borne illness crisis.

The guidelines are based upon conferences and surveys involving California avocado industry leadership, as well as field and packinghouse tours. They take into account the experience of others in generating similar guidelines, as well as the content of the guidelines themselves.

In particular, reference was made to work being done by Ocean Mist Farms, Western Growers Association, the California Tree Fruit Agreement, the United Fresh Fruit and Vegetable Association, the California Citrus Quality Council,

Introduction – Continued

Apple Hill Juice and Cider Processors, and the U.S. Food and Drug Administration’s *Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables*.

Draft California avocado industry guidelines presented here rely in particular upon FDA work. They do so for two reasons. First, because that work has been influenced by substantial sectors of the nation’s agricultural community, largely through a series of nationwide “town hall” meeting held over the past year. The resulting FDA product reflects direction provided by agriculture. It also reflects in some cases safe-food guidelines developed by agricultural entities over roughly the same time period. Conversely, those guidelines often reflect FDA work. The second reason for substantial reliance on FDA guidelines in preparing California avocado industry guidelines is that conformance with FDA work, where possible, reduces the likelihood of industry-government conflicts that could have significant marketplace impacts on avocado sales and prices.

Water Component

WATER

Water use in avocado production involves numerous field operations including irrigation, applications of pesticides and fertilizers, and produce cooling, washing and transport. Water has the potential to be a direct source of contamination and a vehicle for spreading localized contamination in the field, facility or transportation environments. Wherever water comes in contact with fresh produce, its source and quality dictate the potential for pathogen contamination. If pathogens survive on the produce, they may cause food-borne illness.

Agricultural Water Quality

Agricultural water quality will vary, particularly from surface waters that may be subject to intermittent, temporary contamination, such as polluted runoff from upstream livestock operations. Ground water that is influenced by surface water, such as older wells with cracked casings, may also be vulnerable to contamination. Practices to ensure that the water quality is adequate for its intended use may

Water Component - Continued

include ensuring that wells are properly constructed and protected and treating water to reduce microbial load. The vast majority of avocado producers use for irrigation potable water bought from water districts. While water-to-produce contact can contaminate fruit, current, prevailing avocado irrigation practices reduce or avoid such contact in groves. Water coming into contact with wind-fall fruit or other fruit not harvested directly from the tree increases the possibility of contamination.

Considerations

- **Identify the source and distribution of water used and be aware of its relative potential for being a source of pathogens.**

Typical sources of agriculture water for avocado production include groundwater from wells, municipal supplies, and, in some cases, private reservoirs. It's generally assumed that groundwater is less likely to be exposed to high levels of pathogens than surface water. Under certain conditions, shallow wells and improperly constructed or older wells may be under the influence of surface water and thus more likely to be susceptible to contamination. Growers with older wells (e.g.,

Water Component - Continued

wells constructed 30-40 years ago, and especially wells constructed before 1925), or who have other reasons for concern about possible contamination, may want to have their well examined by a water quality expert.

- **Identifying potential sources of contamination.**

Agriculture water can become contaminated, directly or indirectly, by improperly managed human or animal waste. These and other potential sources of water contamination, including handling and storage of agricultural chemicals, should be assessed and controlled to the extent feasible to minimize microbial food safety hazards.

- **Know the land - past and present uses**

Because agricultural water is frequently a shared resource, operators should consider factors that impact their portion of the watershed. For example, the topography of the field and current and historical use of adjacent lands all affect the potential for irrigation water to serve as a mechanism for spreading contaminants. Growers should evaluate their crop fields in terms of their proximity to surrounding land uses that pose a potential for polluted runoff from heavy rainfall. While growers may not have control over all factors that impact the watershed, awareness

Water Component – Continued

of potential problems will help determine which control options are most feasible.

Soil and water conservation practices such as grass/sod waterways, diversion berms, runoff control structures and vegetative buffer areas may help prevent polluted runoff water from contaminating produce crops.

- **Water quality testing**

There are a number of significant gaps in the science upon which to base a microbial testing program for agricultural water. Thus, microbial testing of agricultural water may not be useful for all growers. Growers concerned about water quality should first focus their attention on good agricultural practices (such as manure management and runoff controls) to maintain and protect the quality of their water sources. Growers interested in testing private water sources for microbial or other contamination may want to consult local water quality experts (such as State or local Environmental Protection or Public Health agencies, extension agents or land grant universities), local water districts or private, qualified testing laboratories for advice. Acceptable water quality should be defined in terms of currently prevailing standards.

Water Component – Continued

Irrigation Water

To the extent feasible, growers should follow good agricultural practices that minimize the potential for contaminated water contact with produce. Some experts have suggested the avocado skin does not guarantee protection of the edible interior. Moreover, contaminants on the avocado skin may be transported to the edible interior when the fruit is cut in the process of preparation for consumption. This becomes increasingly important the closer irrigation applications are made in relation to harvest.

- **Protect irrigation water quality.**

Growers should consider practices, where feasible, to protect the quality of water used for irrigation, such as protecting wells and pump areas from uncontrolled livestock or wildlife access to limit the extent of fecal contamination.

Water Component - Continued

Non-Irrigation Water Uses

Water for non-irrigation agricultural uses, such as for cooling crops, frost protection or pesticide applications may also be a potential source of microbial contamination and should be considered in the same manner as irrigation water.

- **Be aware of risk factors.**

The potential for non-irrigation water to contaminate avocados depends on factors such as the amount of water contacting produce, frequency of water use and when it is applied. The presence of surfactants, powders or debris in crop protection sprays and the biological characteristics of microorganisms may also influence the potential for microbial contaminants in non-irrigation water to contaminate avocados.

Processing Water

Good Manufacturing Practices (GMPs) for water used for food and food contact surfaces in processing facilities are set out in Title 21 CFR 110.37(a) and 110.8(a)(1).

Water Component – Continued

General Considerations

Water quality needs may vary depending on where a particular operation falls within the series of processes that are applied to fresh avocados.

Wash Water

Washing fresh produce (also known as surface treatment) can reduce the overall potential for microbial food safety hazards. This is an important step since most microbial contamination is on the surface of fruits and vegetables. If pathogens are not removed, inactivated or otherwise controlled, they can spread to surrounding produce, potentially contaminating a significant proportion of the produce.

- **Use appropriate wash methods.**

Growers who still use water to rinse fruit should consider:

- Washing produce in hot water or water containing a surfactant or wetting agent, then washing again or rinsing with clean water.
- The implications of vigorous washing, which may increase the likelihood of pathogen contamination for some crops.

Water Component - Continued

Spray wash treatments may be less likely to directly spread microbial contaminants, if they are present, from one produce item to another compared to submersion wash treatments. However, spray wash treatments may spread pathogens by splashing or by aerosol, or on food contact surfaces such as brushes. Further, if water is contaminated during washing and then reused, it can still be a vehicle for spreading contamination. Therefore, regardless of wash method used, operators are encouraged to follow good management practices that ensure and maintain adequate water quality.

- **Consider the use of sanitizers or antimicrobials in wash water.**

Sanitizers or antimicrobials in wash water and other processing water may be useful in reducing pathogens on the surface of produce and/or reducing pathogen build-up in water. The effectiveness of a sanitizer depends on its chemical and physical nature, treatment conditions (such as water temperature, pH and contact time), resistance of pathogens, and the nature of the fruit or vegetable surface. Chlorine is a commonly used antimicrobial. Chlorine dioxide, trisodium phosphate, organic acids and ozone have also been studied for use as antimicrobials in produce wash

Water Component - Continued

water. All chemical substances that contact food must be used in accordance with FDA and EPA regulations.

- Follow manufacturer's directions for correct mixing of sanitizers or antimicrobials for food processing uses to obtain effective chlorine concentrations.

- Surface treatments with antimicrobials (such as washes, dips or spray treatments) should be followed by a clean water rinse to remove any residues.

- Monitor chlorine levels during washing and other operations to ensure that they are maintained at an effective level. For some operations, a swimming pool test kit may be a simple but adequate method for monitoring chlorine levels. Levels should be routinely monitored and recorded.

- **Maintain the efficacy of wash treatments.**

Wash water, even with antimicrobial chemicals, will likely reduce but not necessarily eliminate pathogens on the surface of produce. Antimicrobial washes generally reduce microbial populations by 10- to 100-fold. As organic materials and microbial load increases in wash water, the efficacy of antimicrobials decreases. Operators should adopt practices to maintain the efficacy of wash

Water Component - Continued

treatments. Such practices may include an initial wash treatment to remove the bulk of field soil from produce followed by a sanitizing dip and a rinse, and adding additional sanitizer to processing water as the sanitizer is depleted.

Cooling Operations

Air cooling equipment and cooling areas should be periodically cleaned and inspected. Further, potential sources of contamination should not be located near air intakes.

- **Maintain temperatures that promote optimum produce quality.**

There is general agreement that good quality intact produce is most-resistant to microbial contamination and growth. Thus, an overriding concern should be with maintaining temperatures that maintain optimum product quality. Operators should follow good management practices to ensure that chilling does not introduce food safety hazards.

Water Component - Continued

- **Equipment should be clean and sanitary.**

Chilling equipment, including containers holding produce during chilling operations should be clean and sanitary. To the extent practical, field soil should be removed from produce and containers prior to chilling.

Manure & Municipal Biosolids Component

MANURE AND MUNICIPAL BIOSOLIDS

Properly treated manure or biosolids can be an effective and safe fertilizer.

Untreated or improperly treated manure or biosolids used as a fertilizer, used to improve soil structure or that enters surface or ground waters through runoff, may contain pathogens of human health significance that can contaminate produce.

Growers need to follow good agricultural practices for handling manure or biosolids to minimize microbial hazards. One way of minimizing risk is to use properly composted manure. As with water use, windfall avocados or other fruit that has had ground contact poses the greatest potential problem. There are two basic ways of reducing or eliminating the problem: minimize or eliminate the process of laying fruit on the ground before transporting it to bins, or provide tarps on which fruit is to be laid prior to transport to bins. If tarps are used, it is important that they be either sterilized or replaced with appropriate frequency.

Growers also need to critically examine their specific growing environment to identify obvious sources of fecal matter that could be a source of contamination.

Manure & Municipal Biosolids Component - Continued

Microbial Hazard

Animal manure and human fecal matter represent a significant source of human pathogens. A particularly dangerous pathogen, *Escherichia coli* O157:H7, is known to originate primarily from ruminants such as cattle, sheep and deer which shed it through their feces. In addition, animal and human fecal matter are known to harbor *Salmonella*, *Cryptosporidium* and other pathogens. Therefore, the use of manure or biosolids in the production of avocados must be closely managed to limit the potential for pathogen contamination.

Growers must also be alert to the presence of human or animal fecal matter that may be unwittingly introduced into the produce growing and handling environments.

Potential sources of contamination include use of untreated or improperly treated manure; nearby composting or manure storage areas, livestock or poultry operations; nearby municipal wastewater or biosolids storage, treatment or disposal areas; and high concentrations of wildlife in the growing and harvesting environment. A significant potential threat occurs in avocado harvesting operations

Manure & Municipal Biosolids Component - Continued

when fruit is placed on the ground prior to being transported to bins. A similar danger exists when windfall fruit is marketed.

Control of Potential Hazards

Growers should follow good agricultural practices for handling manure to reduce the potential for introducing microbial hazards to avocados. Such practices may include processes, such as composting, that are designed to reduce possible levels of pathogens in manure. Good agricultural practices may also include minimizing, to the extent feasible, direct or indirect manure-to-produce contact, especially close to harvest.

Treatments to Reduce Pathogen Levels

A variety of treatments may be used to reduce pathogens in manure and other organic materials. Treatment may be performed by the grower using organic materials generated on the farm or by a third party (e.g., supplier). Choice of treatment will depend on the needs and resources of an individual grower or supplier. Treatments may be divided into two groups, passive and active.

Manure & Municipal Biosolids Component – Continued

- **Passive treatments.**

Passive treatments rely primarily on the passage of time, in conjunction with environmental factors, such as natural temperature and moisture fluctuations and UV irradiation, to reduce pathogens. To minimize microbial hazards, growers relying on passive treatments should ensure manure is well aged and decomposed before applying to fields. Holding time for passive treatments will vary depending on regional and seasonal climatic factors and on the type and source of manure.

- **Active treatments.**

Active treatments include pasteurization, heat drying, anaerobic digestion, alkali stabilization, aerobic digestion or combinations of these. Composting is a controlled and monitored process, commonly used to reduce the microbial hazards of raw manure.

Composting

The high temperature generated during composting can kill most pathogens in a number of days. Thus, the risk of microbial contamination from composted manure

Manure & Municipal Biosolids Component - Continued

is reduced compared to untreated manure. Some pathogens, such as the hepatitis A virus, have a higher thermal threshold than others. In addition, the time and temperature required to eliminate or reduce microbial hazards in manure or other organic materials may vary depending on climate and specific management practices on an individual operation.

While there is insufficient data to make specific time and temperature recommendations that would apply to all composting or other manure treatment operations, good agricultural practices, as discussed below, may reduce the risk of microbial contamination.

Handling and Application

- Minimize contamination of avocados from manure in open fields, compost piles or storage areas onto nearby maturing crops. Manure storage or treatment sites close to fresh produce fields or packinghouses increase the risk of microbial contamination.

Manure & Municipal Biosolids Component - Continued

- Consider barriers or physical containment to secure manure storage or treatment areas where cross-contamination from runoff, leaching or wind spread is a concern.
- Rainfall onto a manure pile can result in leachate, potentially containing pathogens. Growers may want to consider covering manure piles, such as storing manure under a roof or covering piles with an appropriate covering. Alternatively, growers may consider collecting water that leaches through manure that is being store or treated. Collecting leachate allows the grower to control its disposal.
- Equipment, such as tractors, that come into contact with untreated or partially treated manure and are then used in groves can be a source of contamination. Equipment used to turn compost, and other multiple use equipment that contacts manure, should be cleaned (such as with high pressure water or steam sprays) before it contacts fresh produce. Growers should also be aware of other factors, such as farm layout and traffic flow, that may allow a tractor to drive through manure before entering a grove. Use of untreated (raw) manure carries a greater

Manure & Municipal Biosolids Component - Continued

risk of contamination compared to the use of manure that has been treated to reduce pathogens.

Treatments to Reduce Microbial Hazards in Manure

Natural fertilizers, such as composted manure, and fertilizers containing natural components, need to be processed in a manner to reduce the likelihood of introducing pathogens. Care should be taken to avoid contamination of fresh produce from manure that is in the process of being composed or otherwise treated.

Growers using treated manure should consider the following good agricultural practices:

- Composting and other treatments may reduce but might not eliminate pathogens in manure. Furthermore, it is unknown to what extent pathogens that survive treatment may regrow in composted manure that is stored before use. Therefore, to the extent feasible, growers using treated manure may want to consider some of the recommendations made for untreated manure, such as maximizing time between application and harvest.

Manure & Municipal Biosolids Component - Continued

- The specific requirements of any treatment to reduce pathogens will depend on many factors, including types of organic materials being treated, pH, moisture content, process management, the carbon/nitrogen balance of the organic materials, and even climatic factors such as rainfall and temperature.
- Whatever parameters are selected, growers and manure suppliers should apply good agricultural practices that ensure that all materials receive an adequate treatment, such as turning outside edges into the center of a compost pile or containment.

Animal Feces

Growers should review existing practices and conditions to assess the prevalence and likelihood of significant amounts of uncontrolled deposits of animal feces coming into contact with crops. Good agricultural practices for minimizing hazards include:

Manure & Municipal Biosolids Component - Continued

- Domestic animals, such as cows or sheep, should be excluded from groves during the growing season. Depending on the operation, good management practices may include keeping livestock confined (e.g., in pens or yards) or preventing their entry into fields by using physical barriers such as fences.
- Growers should determine whether surrounding fields and farms are used for animal production. Growers may need to consider measures to ensure that animal waste from adjacent fields or waste storage facilities will not cross-contaminate the crop during heavy rains, especially if produce is grown in low-lying fields. Measures might include physical barriers, such as ditches, mounds, grass/sod waterways, diversion berms and vegetative buffer areas.
- Control of wild animal populations in the grove may be difficult, especially where crop production areas are adjacent to wooded areas, open meadows and waterways. In addition, Federal, State or local animal protection requirements must be considered. However, high concentrations of wildlife (such as deer or waterfowl in a field) may increase the potential for microbial contamination. Where high concentrations of wildlife are a concern, growers should consider

Manure & Municipal Biosolids Component - Continued

establishing good agricultural practices to deter or redirect wildlife to other areas. Options may include visual, auditory or physical deterrents or buffer areas.

Helpful Resources:

The NRCS Conservation Practice Standard 317, "Composting Facility" sets out standards for on-site composting (USDA, SCS, December 1990).

NRCS AWMFH 651.1004(F), Rynk et al., "On Farm Composting Handbook," NRAES-54 North Regional Agricultural Engineering Svc, Cooperative Extension, and R. T. Haug, 1993, "The Practical Handbook of Compost Engineering," Tachnomics Publishing Co., Inc., Lancaster, PA.

"Domestic Septage Regulatory Guidance - A Guide to the EPA 503 Rule, "EPA 832-B-92-005, September, 1993.

US EPA, "A Plain English Guide to the EPA Part 503 Biosolids Rule, "EPA 1832-R-93-003, Washington DC, 1994.

Manure & Municipal Biosolids Component - Continued

Environmental Regulation and Technology Control of Pathogens and Vector
Attraction Reduction, EPA 1625/1-92/013, December, 1992.

Sanitation And Hygiene Component

SANITATION AND HYGIENE

This section of the guide focuses on how operators can use proven sanitation and hygiene principles to reduce the risk of fresh produce becoming contaminated with disease-causing microorganisms. Because different levels of sanitary controls are achievable at each level of production (such as a grove compared to the packinghouse), the discussion is organized by production segment: field environments, packing facilities and transport operations. A general discussion of the role of the agricultural worker in maintaining good sanitation programs is also included. At every phase of the food chain, from the field to the table, good sanitation and hygiene practices are essential for reducing microbial principles to reduce the risk of fresh produce contamination.

Worker

The U.S. Code of Federal Regulations Title 21, Section 110.10 (21 CFR 110.10) prescribes worker health and hygienic practices within the context of GMPs in the manufacturing, packing or holding of human food. The standards in this section should be considered when establishing hygienic practices in the agricultural

Sanitation And Hygiene Component - Continued

environment (grove and packinghouse). In addition, operators should be aware of and follow applicable standards for protecting worker health established under the Occupational Safety and Health Act.

Microbial Hazard

Past outbreaks of food-borne illness associated with fresh fruits and vegetables are usually the result of produce becoming contaminated with fecal material.

Therefore, operators should place a high priority on ensuring the use of agricultural practices that minimize the potential for direct or indirect contact between fecal material and avocados. Infectious diseases, ill health accompanied by diarrhea, open lesions (including boils, sores and infected wounds), or other ailments are a source of disease-causing microorganisms. Workers can unintentionally contaminate fresh produce, water supplies and other workers, and transmit food-borne illness if they do not know and follow hygienic principles.

Sanitation And Hygiene Component - Continued

Control of Potential Hazards

It is important to ensure that all personnel, including those indirectly involved in avocado production (such as pest control operators), comply with established hygienic practices. Operators should consider the following practices:

- **Establish a training program.**

All employees, including supervisors, full time, part time and seasonal personnel, should have a good working knowledge of basic sanitation and hygiene principles.

The level of understanding needed varies among operations and between workers.

Growers or handlers will need to determine the most effective way of communicating these principles. A formalized training program, coupled with periodic evaluation by supervisors of sanitary conditions, has proven to be effective in other segments of the food industry. Depending on the workers' job requirements, periodic refresher or follow-up training sessions may be needed.

Sanitation And Hygiene Component - Continued

- **Become familiar with typical signs and symptoms of infectious diseases.**

Because of the high infectivity (ability to invade and multiply in the body) and virulence (ability to produce severe disease) of *Salmonella typhi*, *Shigella* species, *E. Coli* O157:H7, or hepatitis A virus, any other worker diagnosed with an active case of illness caused by any of these pathogens should be excused from work assignments that involve contact with produce or produce processing equipment. Workers with diarrheal disease and symptoms of other infectious diseases should not work with fresh produce or produce equipment. To become more familiar with symptoms of infectious diseases that can contaminate food, operators should consult FDA's Food Code.

- **Provide protection for a worker who has a lesion.**

A lesion that contains pus, such as a boil or infected wound that is open or draining and that is located on parts of the body that might have contact with avocados or avocado harvesting equipment, increases the risk of contamination. If a lesion cannot be covered in such a way that it will not have contact with produce or harvesting equipment, the employee should not be working.

Sanitation And Hygiene Component - Continued

- **Consider alternative good hygienic practices.**

Gloves can be an important hygienic practice in combination with handwashing in some circumstances. If gloves are considered, be sure they are used properly and do not become another vehicle for spreading pathogens.

- **Assure that visitors to the grove, processing or transport facilities follow good hygienic practices.**

Operators should require that product inspectors, buyers and other visitors comply with established hygienic practices when inspecting avocados.

Training

When providing training for employees, the requirements under the Occupational Safety and Health Act (29 CFR 1910.141, subpart J and 29 CFR 1928.110) that are applicable to worker health and training should be considered. Other areas of training to consider include, but are not limited to:

Sanitation And Hygiene Component - Continued

- **The importance of good hygiene.**

All personnel should understand the impact of poor personal cleanliness and unsanitary practices on food safety. Good hygiene not only protects the worker from illness, but it reduces the potential for contaminating avocados which, when consumed by the public, could cause a large number of illnesses.

- **The importance of handwashing.**

Thorough handwashing before commencing work with produce and after using the toilet is very important. Many of the diseases that are transmissible through food may be harbored in the employee's intestinal tract and shed in the feces.

Contaminated hands can also transmit infectious diseases.

- **The importance of proper handwashing techniques.**

Don't assume that workers know how to wash their hands properly. Teach proper handwashing techniques:

- Handwashing with water. Warm water is more effective than cold water for washing hands;

Sanitation And Hygiene Component - Continued

- Use of soap; and
- Thorough scrubbing (including cleaning under fingernails and between fingers), rinsing and drying of the hands.

California avocado industry leadership recommends producing and posting at appropriate sites reminders that those handling fruit in any capacity have a responsibility to properly wash hands.

- **The importance of using toilet facilities.**

All employees should be encouraged to use toilet facilities connected to a sewage disposal system, or properly constructed on-site sanitary pit, privies or latrines to reduce the potential for cross-contaminating groves, produce, other workers and water supplies.

Sanitary Facilities

Operations with poor management of human and other wastes in the field or packinghouse can significantly increase the risk of contaminating produce.

Sanitation And Hygiene Component - Continued

Control of Potential Hazards

Operators should become familiar with laws and regulations that describe appropriate field and facility sanitation practices. Sanitation laws, such as those under the Occupational Safety and Health Act 29 CFR 1928.110, outline the appropriate number of toilet facilities to the number of workers, describe proper handwashing facilities, the maximum worker-to-restroom distance, and how often such facilities should be cleaned. Good grove sanitation not only helps reduce the potential for contamination, but also ensures that employees and consumers are protected from food-borne diseases.

The U.S. Code of Federal Regulations prescribes current good manufacturing practices for buildings and facilities, equipment and production and process controls (21 CFT 110.20 to 110.93), and is a good resource to guide the development of mitigation programs. OSHA standards under 29 CFR 1910.141, subpart J, provide regulations relative to toilet facilities and other sanitation issues. Enclosed packinghouse facilities come under these regulations. Handlers should also consider application of food service type standards, such as found in FDA's Food Code (Ref. 4), in the packinghouse and processing environments.

Sanitation And Hygiene Component - Continued

Toilet Facilities and Handwashing Stations

The more accessible the facilities, the greater the likelihood that they will be used.

Workers should always have the opportunity to use the facilities when they need to, not only when they are on break. This will help reduce the incidence of workers in the field or outside handling areas relieving themselves elsewhere (such as in groves).

- **Toilet facilities should be properly located.**
- **Toilet facilities should be well supplied.**

Provide an adequate supply of toilet paper. Handwashing stations should be equipped with a basin, water, liquid soap, sanitary hand drying devices (such as disposable paper towels), and a waste container.

- **All facilities should be kept clean and sanitary.**

Toilets and handwashing stations, whether attached to the toilet facility or located near it, should be cleaned on a regular schedule. Containers used to store water for handwashing should, on a routine basis, be emptied and thoroughly cleaned, sanitized and refilled with potable water.

Sanitation And Hygiene Component - Continued

Sewage Disposal

Improper disposal of human waste from toilets could lead to water, soil, animal, crop or worker contamination. Systems and practices should be in place to ensure safe management and disposal of waste from permanently installed and portable toilets to prevent drainage into the field. Operators should follow EPA regulations for the use or disposal of sewage sludge, 40 CFR Part 503, or refer to EPA's "Domestic Septage Regulatory Guidance: A Guide to the EPA Part 503 Rule."

Examples of good practices to consider are as follows:

- **Use caution when servicing portable toilets.**

Waste water from portable toilet facilities that drains into a field can contaminate produce. Dispose of wastes through a municipal sewage system, a sub-surface septic tank system, a properly constructed and located pit, privy or latrine away from field; or collect waste water in a drainage tank to be correctly disposed of at a remote site. Sewage transport trucks should have access to toilet facilities.

Sanitation And Hygiene Component - Continued

- **Have a plan for containment and treatment of any effluent in the event of leakage or a spill.**

Growers and farm managers should be made aware and be prepared in the event of any incidence of leakage or spillage of effluent in a field. Refer to 40 CFR Part 503 for additional guidance.

Grove

Microbial contamination of avocados during pre-harvest and harvest activities may result from contact with soils, fertilizers, water, workers and growing and harvesting equipment. Any of these may be a source of pathogenic microorganisms.

- **Clean harvest storage facilities prior to use.**

Produce storage facilities should be cleaned and, as necessary, disinfected prior to harvest. Also inspect storage facilities for evidence of pests, such as rodents.

- **Clean muddy bins before using to transport avocados.**
- **Remove as much dirt and mud as practicable from the produce before it leaves the grove.**

Sanitation And Hygiene Component - Continued

At certain times, such as when groves are muddy, removing mud from the produce may not be practical; such mud would have to be removed at the packing stage. It is important to try to eliminate, as much as possible, the potential sources of microbial contamination of produce during the harvesting and handling operations.

Equipment Maintenance

Growers and handlers should consider the following guidelines:

- **Use harvesting and processing equipment appropriately and keep as clean as practicable.**

Any equipment used to haul garbage, manure or other debris should not be used to haul fresh avocados or have contact with cartons or pallets that come in contact with fresh avocados without first being carefully cleaned and disinfected.

- **Assign responsibility for equipment to the person in charge.**

The person in charge should be aware of how equipment is being used during the day, ensure that it is functioning properly and take steps to ensure proper cleaning of equipment when needed.

Sanitation And Hygiene Component - Continued

Packing Facility

Operations with poor sanitation in the packinghouse environment can significantly increase the risk of contaminating avocados. Pathogenic microorganisms may be found on the floors and in the drains in the packinghouse and on the surfaces of packing processing equipment. In the absence of good sanitary practices, any of these surfaces that come in contact with avocados pose a potential threat.

General Packing Considerations

- **Remove as much dirt and mud as practicable from the produce outside of packinghouses or packing areas.**
- **Clean muddy pallets, containers or bins before using to transport avocados.**

General Considerations for Facility Maintenance

Equipment used in packing avocados should be of such material and workmanship as to be adequately cleanable. The design, construction, use and general cleanliness of equipment can help reduce the risk of contamination.

Sanitation And Hygiene Component - Continued

- **Keep equipment or machinery that comes in contact with fresh produce as clean as practicable.**

All processing equipment that makes contact with fresh produce may serve as a vehicle for spreading microbial contamination. Remove mud and debris from processing and packing equipment frequently. Equipment such as cleaning brushes used on line in packinghouse operations should be cleaned and inspected for defects that make them uncleanable on a regular basis, and replaced as needed.

- **Use equipment appropriately.**

To reduce potential cross-contamination of equipment, personnel should not use packing equipment or machinery that has contact with avocados for other operations.

- **Clean packing areas at end of each day.**

Clean and disinfect, as necessary, packing areas, including packing lines, to reduce the potential for microbial contamination of produce.

- **Maintain the cooling system to ensure proper functioning of the equipment.**

Inspect all pre-cooling equipment daily, remove all debris and clean as necessary.

Sanitation And Hygiene Component - Continued

- **Clean product storage areas regularly.**

Remove all visible debris, soil, dirt and unnecessary items from product storage areas on an ongoing basis. Clean on a regularly scheduled and "as needed" basis. Free floating dust and other airborne contaminants should be kept to a minimum.

Pest Control

All animals, including mammals, birds, reptiles and insects are potential sources of contamination in produce environments because they harbor, or could be a vector for, a variety of pathogenic agents, such as *Salmonella*. Pest problems can be minimized by taking precautions, such as:

- **Establish a pest control system.**

For all facilities, a pest control program is essential for reducing the risk of contamination by rodents and other animals.

- **Maintain the grounds in good condition.**

- Grounds in the immediate vicinity of all packing areas should be kept clear of waste, litter and improperly stored garbage. Keep all grasses cut to discourage the breeding, harboring and feeding of pests, such as rodents and reptiles.

Sanitation And Hygiene Component - Continued

- Remove any unnecessary articles, including equipment that is no longer used, to eliminate areas hospitable to rodents and insects.

- Clean daily to remove product or product remnants that attract pests in and around the packinghouse and any other packing facility where product is handled or stored.

- Maintain adequate surface drainage to reduce breeding places for pests.

- **Monitor and maintain facilities regularly.**

- Regularly inspect all facilities to check for evidence of pest populations or animal contamination. Strive to minimize the availability of food and water to pests.

- Remove dead or trapped birds, insects, rodents and other pests promptly to ensure clean and sanitary facilities and to preclude exacerbating the situation by allowing carcasses to attract other pests.

- Ensure that all potential nesting or hiding places for pests have been eliminated.

- Clean surfaces soiled by birds or other wildlife.

Sanitation And Hygiene Component - Continued

- **Block access of pests into enclosed facilities.**

Strive to exclude pests by blocking area, such as holes in walls, doors, flooring, etc., and vents that allow entrance into the facility. Consider the use of screens, wind curtains and traps as needed.

- **Consider use of a pest control log.**

Maintain a pest control log to include dates of inspection, inspection report and steps taken to eliminate any problems. A pest control program should also include frequent monitoring of affected and treated areas to determine the effectiveness of the treatment applied.

Customer-Pick Operations and Road-Side Produce Stands

Growers who invite the public to pick their own avocados in the grove or who sell their own produce directly to customers should consider opportunities to educate consumers on good handling techniques.

- **Promote good hygienic practices.**

- Encourage customers to wash hands. Provide convenient, properly equipped handwashing stations in the grove.

Sanitation And Hygiene Component - Continued

- **Provide clean, properly supplied and convenient restrooms for customer use.**
- **Promote good handling/processing practices.**

Encourage all customers to thoroughly wash avocados prior to preparation for consumption.

Transportation

Operators are encouraged to pay particular attention to produce as it is transported between the grove and the cooler, packinghouse, processing facility, distribution and retail centers. Proper transport will help reduce the potential for microbial contamination. An active and ongoing discussion with personnel responsible for transportation is essential for assuring the success of any management program designed to deliver safe foods to the consumer.

Microbial Hazard

Microbial cross-contamination from nonfood sources and contaminated surfaces may occur during loading, unloading, storage and transportation operations.

Sanitation And Hygiene Component - Continued

Control of Potential Hazards

Wherever avocados are transported and handled, the sanitation conditions should be evaluated, especially between links in the distribution chain. Fresh produce should be segregated from other food and nonfood sources of pathogens in order to prevent contamination.

General Considerations

- **Workers involved in the loading and unloading of produce during transport should practice good hygiene (e.g., proper handwashing).**
- **Inspectors, buyers and other visitors should comply with established hygienic practices, such as thoroughly washing their hands before inspecting produce.**

General Transport Considerations

Operators should strive to assure that sanitation requirements for trucks or other carriers are met before loading produce to help reduce the likelihood for microbial contamination. Some specifics to consider are:

Sanitation And Hygiene Component - Continued

- **Inspect trucks for cleanliness, odors, obvious dirt or debris before loading.**
- **Keep vehicles clean to help reduce the risk of microbial contamination or cross-contamination.**

Operators should be aware of prior loads carried in a transport vehicle and take this information into consideration when determining use of a vehicle. Trucks that were recently used to transport animals or animal products, for example, would increase the risk of contaminating fresh produce if the trucks were not cleaned before loading. Consult local or State agencies or universities to determine the most appropriate cleaning and disinfection methods for individual operations.

- **Maintain proper storage temperatures to help ensure both quality and safety.**
- **Load produce in trucks in a manner that will minimize damage and reduce the potential for contamination during transport.**

When growers employ grove managers or other independent contractors for grove management, it is important to ensure that contractors have in place policies and

Sanitation And Hygiene Component - Continued

procedures conforming to all state and federal legal and regulatory requirements concerning sanitation and hygiene. Contractors should make instructions to crews available in English and Spanish. growers should require independent contractors to certify in writing compliance with all relevant laws and regulations.

The following interpretation of current relevant regulation regarding grower responsibility for sanitation practices and facilities is provided by legal counsel to the California Avocado Commission:

Agricultural employers operating hand-labor agricultural establishments are responsible for providing and maintaining potable drinking water and toilet and handwashing facilities meeting the requirements of Section 3457 of Title 8 of the California Code of Regulations. For purposes of Section 3457, and “agricultural employer” is a person, corporation, association or other legal entity that: (1) owns or operates an agricultural establishment, or (2) contracts with the owner or operator of an agricultural establishment in advance of production for the purchase of a crop and exercises substantial control over production, or (3) recruits and supervises employees or is responsible for the management and conditions of an agricultural establishment. Therefore, depending on the circumstances, it may be the grower who is responsible for field sanitation issues, it may be the grower’s farm labor contractor who is responsible, or it may be both the grower and the farm labor contractor in cases in which the two are considered “joint employers” under federal law. Joint employment describes a condition where a worker has more than one employer for the purposes of the Migrant and Seasonal Agricultural Worker Protection Act (MSPA). If a “joint employment” relationship exists, all employers of a covered worker are held mutually responsible for complying with the requirements of the MSPA. For example, if a farm labor contractor failed to post the required MSPA poster, then the agricultural employer using the services of the contractor would also be held responsible for the violation. To determine whether a joint employment relationship exists, all the facts in a particular case are considered. The factors considered include: (a) the nature and degree of control of the worker; (b) the degree of supervision, direct or indirect, of the work; (c) the power to determine the pay rates or the methods of payments to the workers; (d) the right, directly or indirectly to hire, fire or modify the employment conditions of the workers and; (e) preparation of payroll and payment of wages.

