Land Use Overview

When assessing food safety risks on your farm, it is important to understand current production practices as well as prior land use. Consider biological, chemical, and physical risks that may result from current and past uses such as animal feed lots or if the land was previously a building site or dumping ground. In addition to your own farm, nearby land uses need to be considered. Whether the surrounding land is occupied by private homes, animal production farms, wooded areas, or a bustling city, there is potential for food safety risks to be present. Contamination of crops, soil, and water has resulted from leaking septic tanks, runoff from animal production farms, and fecal deposits from wildlife that enter fields. Being aware of current and past field uses as well as nearby land use will help you develop practices that reduce any food safety risks that may exist.

To begin evaluating your farm’s land use risks, draw a map of your fields and land features. Be sure to include man-made structures such as irrigation systems, ditches, and roads, as well as natural topography. The map should include key pieces such as:

- Crop production and packing areas. Make note if these areas were previously used in ways that could introduce biological, chemical, or physical hazards
- Field sanitation units (e.g. Porta-Potties)
- Location of active wells and septic systems
- Surface water sources
- Areas that are prone to flooding
- Raw and composted manure storage sites/composting areas
- Animal pasture areas and/or barns where they are kept on your farm.
- Chemical storage areas
- Nearby land uses such as animal operations on neighboring farms, including distances from fields and impact on any water sources used by your farm

It may also be helpful to include these things on the map so that it can be incorporated into your overall farm food safety plan to support production logs, traceability, and other produce safety related practices:

- Soil and drainage maps
- Copy of field records and growing history
- Physical address or GPS location of the farm
- Road names that form farm borders
- Name or number you assign to each field for traceability practices

To minimize food safety risks, crop production areas and water sources should be a sufficient distance from any raw manure sources, which include animal production farms, manure containment areas, and composting facilities. While there is no conclusive research that validates exact distances needed between fields and potential sources of contamination, this decision tree uses recommendations from the California Leafy Green Marketing Agreement.1

Recommended distances can be adjusted depending on characteristics of your farm related to topography including land slope, physical barriers such as trees or grass-covered land, and other attributes such as the number of animals present. For example, if the field is located on top of a hill and a dairy operation is downwind and at the bottom of the hill, the risk is minimal and the recommended distance may be decreased. Physical barriers such as berms, vegetative buffer strips, containment structures, and ditches can prevent runoff from contaminating crops. If physical barriers are in place, the recommended distances may be decreased. High concentrations of wildlife (e.g., deer, waterfowl) or domestic animals (e.g., cows, sheep, horses) increase
the potential contamination risk because they can harbor harmful pathogens in their feces. If wildlife activity is high and fecal material is present, actions should be taken to reduce their activity in or around fresh produce fields and packinghouses (see Domestic Animal and Wildlife Decision Tree). Keep in mind that with more animals present, there may need to be a greater distance between the animals and the produce fields. When assessing the risk of manure sources near production water sources, consider the distance from the manure source to the water and any ditches, canals, or land slope issues that feed the water source.

If your land is prone to flooding, consider the risks present to the crop and water sources. There are two types of flooding. The first occurs after a heavy downpour when fields become saturated and water pools on the soil surface. This type of flooding can reduce yields and even kill plants, but does not necessarily introduce water from surrounding areas that may contain contamination. The second type of flooding occurs when runoff from the surrounding areas or surface waters, such as rivers, lakes, or steams, overflow and run into fields. Flood waters, as described in the second scenario, are more likely to contain chemical and biological contaminants that may be harmful to the health of humans and animals. According to the FDA, edible portions of crops that are contacted by this type of flood water are considered adulterated and cannot be sold for human consumption.

Awareness of previous and nearby land use will help you to assess risks on your farm. There are many actions that can be taken to reduce identified risks such as planting agronomic crops in higher risk fields or extending buffer areas between nearby lands and produce fields. Remember, the focus should be on risk reduction since you can never completely remove all risks.

References


Land Use Decision Tree

Having a written history of current and prior land uses is critical to identifying food safety risks and developing a food safety plan. Although the farm owner or manager may intuitively know this information, not all workers may be aware of the farm's history and current land uses which could potentially pose food safety risks during the production of fresh produce. Providing a written history allows the farm to review its practices annually or as conditions change on the farm. Written assessments of land use may also be required for some third party food safety audits. This decision tree will walk you through evaluating various situations, both past and present, which may affect the safety of produce. Use the Land Use Risk Assessment Log and Land Use Risk Assessment SOPs. After you have identified any previous land uses that may pose risks, evaluate how the land is currently being used and whether those uses may pose food safety risks to the crop.

1. Do you have a written record of current and past land use?
   - No

2. Are crops grown on land that has a history of flooding or recently experienced a flood?
   - Yes

Flood waters can carry potential contaminants from nearby areas and spread it over a wide area. If you farm on land with a recent history of flooding, soil should be tested before crops are grown. Consider testing soil for coliforms and heavy metals before crops are grown. If the edible portion of a crop is exposed to flood waters, the produce is considered adulterated under section 402(a)(4) (21 U.S.C. 342(a)(4)) of the Federal Food, Drug, and Cosmetic Act and should not enter human food channels.5

When assessing the level of risk posed by flooding, some factors to consider are:

- Whether the crop grows close to the ground (e.g. leafy greens) not (e.g. tree or vine crop)
- If the edible portion comes into contact with the soil or flood waters
- Potential sources of contamination in the flood plain (e.g. raw manure)
- Timing of the flood—whether the flood happens in the spring before planting or a flood that occurs when the crop is in the field

To reduce risks when planting after a flood: allow soil to dry out, till thoroughly, allow time for microbial pathogens to decline (the longer the better), add organic matter to promote decomposition of biological contaminants, or sow a cover crop.
No

Is produce grown in fields that might receive runoff from neighboring fields, pastures, or barnyards?

Runoff or wind spread from animal pens, and grazing pastures, or fields receiving manure applications can contaminate your produce field. Pathogens and contaminants can persist in soil for a prolonged period of time. For example, *E. coli* O157:H7 can survive in soil for up to 21 months. Pathogen populations in raw manure tend to rapidly die off, but can survive in the soil at low populations for a prolonged amount of time. Factors such as exposure to the sun (solarization) and wind (desiccation) may help reduce pathogen populations. Monitor the field for any signs of runoff from adjacent land. If there is a risk present, reassess field use or create physical barriers such as windbreaks, buffer strips, or diversion ditches to protect produce fields.

Are produce fields located near municipal/commercial sewage treatment facilities or waste material landfills?

Chemicals and pathogens may leach from landfill and sewage areas to contaminate crops, soil, and ground water used for production. Landfills and sewage treatment facilities can also attract unwanted wildlife and pests such as birds, rats, and raccoons. If fields are close to treatment facilities or landfills, assess the likelihood of contamination from runoff, wind, and pests.

Are produce fields located within 30 feet of a septic system leach field or tank?

Underground septic systems can leach chemicals and pathogens into soil and water. Septic systems should be inspected yearly to make sure they are working properly and produce fields should not be located within 30 feet of septic tanks and septic leach fields. The safe distance may be increased or decreased depending on risk factors such as age of the septic tank, whether the septic leach field is inactive or active, whether it is located uphill or downhill of crop, and what physical barriers are present in the event that a back-up or spill occurs. Use the Septic System Inspection Log.
Large scale animal operations are (also called Concentrated Animal Feeding Operations—CAFO) a significant food safety risk because of the high concentration of animals that may shed pathogens in their manure. These types of operations are often surrounded by bare ground which increases the likelihood of runoff and windborne movement of pathogens.

When assessing your farm’s risk, factors to consider are:
- The number of animals present
- Whether the crop is downhill and/or downwind from source
- Whether the ground is bare or has vegetation
- Evidence of runoff into water sources or near production areas
- Whether physical barriers are present
- If manure management programs are used by the operation

Are grazing lands and domestic animals (including hobby farms and non-commercial livestock) located within 30 feet\(^{1,7}\) of produce fields?

No

Domestic animals on adjacent land present a food safety risk if there is a chance of wind or runoff spreading fecal matter to produce fields. When assessing risks to your farm, some factors to consider are whether physical barriers are present (fencing, ditches, berms), location of crop field (uphill, downhill) from animal grazing area, number of animals present, and the likelihood of runoff and wind spread. Some research suggests a 30 foot buffer\(^7\) is sufficient to protect produce crops from animals grazing on vegetated land. Remember, if you farm with horses or use other animals during production, there should be a plan for their presence in the field, especially close to harvest. See the Wildlife and Animal Management tree for more specific recommendations.
Land Use Decision Tree

Is raw untreated manure from livestock, manure containment structures, storage piles, and composting facilities located within 400 feet of produce fields? Yes

If manure is close to production areas, there is a risk that it will contaminate produce by runoff or wind spread. When assessing your farm’s risk, factors to consider are the amount of manure present, crop location (downhill and/or downwind) from source, likelihood of runoff or leaching, physical barriers present, and how storage piles/facilities are protected.

Is raw untreated manure located within 200 feet of well heads? Yes

Manure storage areas can leach pathogens into the soil, wells, and other water sources. Wells are particularly susceptible to contamination if they are not capped or properly constructed. When assessing your farm’s risk, factors to consider are well construction, presence of risks in well-recharge areas, presence of back-flow devices on all lines fed by the well, location of wells (uphill or downhill) from manure areas, likelihood of leaching, and presence of physical barriers that prevent contamination.

Is raw untreated manure located near surface water sources used during the production of fresh fruits and vegetables? Yes

Raw manure storage areas near surface water can result in water contamination, either by runoff or through leaching. Safe distance recommendations from the surface water source depend on soil type and slope of land. The Leafy Greens Marketing Agreement (LGMA) recommends at least 100 feet if soil is sandy, 200 feet if soil is clay or loam, and 300 feet if slope is greater than 6%.
Composted manure is at a much lower risk for contaminating crop and water sources than raw manure; however, the best practice is to cover and store the compost as far away as possible from water sources and produce fields. When assessing your farm’s risk, some factors to consider are the field location (uphill or downhill) from compost, likelihood of wind-spread, presence of runoff or leaching, amount of compost being stored, and any physical barriers that are present.

References

Sample SOP: Land Use Risk Assessment

Revision: 3.0
Date: 7/2/2014

1—Purpose
Describes how to assess previous and nearby land use for risks to make sure that they are not a source of contamination to fresh fruit and vegetables.

2—Scope
Applies to people involved in deciding where crops are to be planted or those responsible for assessing produce fields prior to planting.

3—Responsibility
Prior to planting, farm owners/managers should evaluate previous and nearby land uses for possible sources of contamination and document the assessment. When necessary, actions should be taken to correct or reduce contamination risks that are identified to prevent contamination of the produce crop.

4—Materials
- Land Use Risk Assessment Log
- Pen or pencil

5—Procedure
To be completed before planting produce fields, reviewed, and updated annually or as relevant changes in commodities, farming practices, land use, or environmental conditions occur.

1. Review and assess field risks including previous and adjacent land uses.
   a. Check sewage treatment or septic systems on site (if present) to make sure they are properly maintained to prevent contamination to fields and water sources.
   b. Review condition and location of sanitation units in the field to make sure they are properly located and have not leaked or spilled.
   c. Assess wildlife activity by reviewing the Wildlife and Domestic Animal Activity logs. Determine whether actions need to be taken to minimize animal activity in produce fields.
   d. Gather information related to application of chemicals to land or near your fields that may pose a food safety hazard.
   e. Review your water sources including wells, open water sources, and municipal systems to ensure there are no potential sources of contamination nearby.
   f. Assess impact from nearby land. Be sure to evaluate animal operations that are nearby your land, talk with neighbors about their current land uses, and gather information about previous land uses.

2. Choose fields for production based on where there is the least likelihood of contamination.
   (This could mean not planting in a field or planting a lower risk crop in a field of concern.)
3. Record any risks in the *Land Use Risk Assessment Log*.

4. If you identify any risks, make the necessary changes to correct or reduce the risks. Depending on the risk, this might include actions such as testing the water or soil for chemical and biological contaminants, creating buffer zones, building berms to contain manure/compost, or constructing fences to keep domestic animals away from produce growing areas or water sources.

Record all corrective actions taken in the *Land Use Risk Assessment Log*.

Keep records [*enter location here*] and review before planting each season.
# Sample Land Use Risk Assessment Log

**Name of farm:** ____________________________________________

This evaluation should be completed yearly or as changes are made to the farm or production practices.

<table>
<thead>
<tr>
<th>Task</th>
<th>Yes or No</th>
<th>Observations</th>
<th>Corrective Actions</th>
<th>Date</th>
<th>Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are there any current or previous land uses that may represent a risk of contamination to fruit and vegetable production?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have there been any significant changes to land use this year (e.g. addition of grazing animals, field location changes)?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have neighboring properties changed or added activities that might affect fields and water sources (e.g. animals, manure or compost storage)?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has there been any runoff from compost and manure storage areas, animal pens, or grazing areas?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Were there any flooding events this year or last year?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have you inspected your well head to make sure it is in good condition and not in need of any repair?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Sample Land Use Risk Assessment Log (cont.)

| Name of farm: | ______________________________________________________ |
| Task | |
| Task Description | Yes | No |
| Have you inspected your septic tank and leach field to make sure they do not leak. | | |
| Are portable toilets and handwashing stations used in the field functioning properly (e.g., no leaks or spills) and located away from produce growing and handling areas? | | |
| Has fecal contamination or damage to crops by wildlife or domestic animals occurred in the past year? (Check Wildlife and Domestic Animal Activity Logs) | | |
| Have there been any treatments or chemical applications to the land that may pose a risk to food safety? | | |

Reviewed by: ____________________________________
Title: __________________________________________
Date: _________________________

This evaluation should be completed yearly or as changes are made to the farm or production practices.
## Septic System Inspection Log

<table>
<thead>
<tr>
<th>Date</th>
<th>Observations of Drain field:</th>
<th>Tank Condition</th>
<th>Lid Condition</th>
<th>Identified by (Initials):</th>
<th>Corrective Actions:</th>
<th>Date Corrective Action Completed</th>
<th>Completed by (Initials):</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-26-14</td>
<td>Smelly odor, soggy ground</td>
<td>intact</td>
<td>intact</td>
<td>ABC</td>
<td>Had it pumped, receipt on file. No risk to crops, located well away from growing area.</td>
<td>5-5-14</td>
<td>ALW</td>
</tr>
</tbody>
</table>

**Reviewed by:** ___________________________________________ **Title:** ___________________________ **Date:** ___________________________
Template Language for Land Use Section of a Farm Food Safety Plan

Risk Assessment

Current and previous uses of production fields and nearby land can introduce biological, chemical, and physical risks to fresh produce fields, soil, and water sources. To reduce the risk of contamination during production of produce, we have assessed previous uses of all fields intended to grow fruit and vegetable crops as well as current nearby land uses that may represent produce safety risks. Our farm conducted an assessment of risk on [enter date] to determine whether the land was safe to use prior to planting fruit and vegetable crops for human consumption.

Our assessment included:

- Reviewing the lands’ history and current uses
- Susceptibility to flooding
- Identification and inspection of well heads and well pads to ensure they are in good condition
- Identification and inspection of septic tanks and sewer systems on the farm to ensure they are functioning properly
- Assessment of water sources; both the source (e.g. pond, stream) and the distribution system
- Identification of all manure/compost storage areas and assessment of the risk of runoff or windborne contamination of produce fields
- Identification of all lands used for animal production on our farm and assessment of risks of manure runoff or windborne contamination of produce fields
- Evaluation of activities on neighboring properties and land that may be a potential source of contamination
  - Large scale animal operations
  - Manure and compost storage areas that may leach into water sources or fields
  - Areas of high wildlife activity
  - Any other changes in building structures or activities that may affect land or water sources

The map used for this assessment is included in this farm food safety plan. The farm map identifies septic tanks and sewer access, portable toilets and handwashing stations, wells and other production water sources, water distribution lines, animal holding pens and grazing areas, areas prone to flooding, compost and manure storage areas, and other relevant food safety risk factors to our land and crop production areas including adjacent land uses. The map also identifies general land topography to evaluate the potential for runoff or windblown contamination.

Actions

After completing our assessment, risks are evaluated to determine whether our farm needs to take action. Our farm documents any actions taken to minimize or eliminate the identified food safety risks.
Examples include:

- Talking to neighboring land owners about mitigating a risk on their land that may affect our land, water sources, or crops.

- Avoiding planting produce crops in specific locations that have been identified as having food safety hazards such as areas that are prone to flooding, fields that are contaminated with pathogens or chemicals (if identified), or areas that have been used as prior waste or industrial sites.

- Testing soil and water sources to determine the level of risk that is present and keeping these tests on file for at least 2 years.

- Installing barriers to prevent runoff from compost and manure storage areas or animal grazing and holding pens.

- Establishing buffer distances between produce growing and handling areas as well as compost and manure storage, animal grazing and holding pens, septic leach fields and tanks, or other food safety risks present on the land.

- Developing a co-management approach to minimizing risks from wildlife, while keeping environmental conservation in mind.

The assessment of risk is reviewed each year or whenever relevant changes to farming practices, land use, or conditions occur.