# Food Defense

**Protecting the food supply from intentional harm**


University of Missouri Extension

MP914

# Food Defense

**Protecting the food supply from intentional harm**


## About this guide

This guide was designed to train food producers, processors and retailers to minimize the risk of intentional contamination of the food supply by developing a food defense plan for their operation.

For additional resources on this and other topics, visit your local University of Missouri Extension center or MU Extension online at extension.missouri.edu.

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# The importance of food defense

## Introduction

Food industry professionals see the U.S. food system as one of the safest in the world. However, the system's image has blurred in the eyes of consumers as food safety recalls have been reported in the news media time and again.

Businesspeople in the food industry — from spinach growers watching sales plummet, to beef producers facing decreased demand, to restaurateurs and grocers working to maintain brand identities — know that protecting the food supply is of paramount importance. The food safety already practiced in the industry can minimize unintentional contamination in the food system. Protecting our food supply from intentional contamination, on the other hand, requires the practice of food defense strategies. Food defense is a relatively new but extremely important concept because of the many vulnerable access points in the farm-to-table food supply chain.


This guide explains the importance of food defense and the benefits of developing a food defense plan, as well as outlining how you can:

- assess your operation's **vulnerabilities** to intentional contamination,
- write a food defense plan detailing **countermeasures** to reduce the risk of intentional contamination,
- prepare a **response** plan for fast, efficient containment of an emergency, and
- **manage** your food defense plan for the long term.

**Food defense**

*Food defense* means protecting the food supply from *intentional* contamination. Food defense is not the same as food safety or biosecurity, which both mean protecting the food supply from *unintentional* contamination.

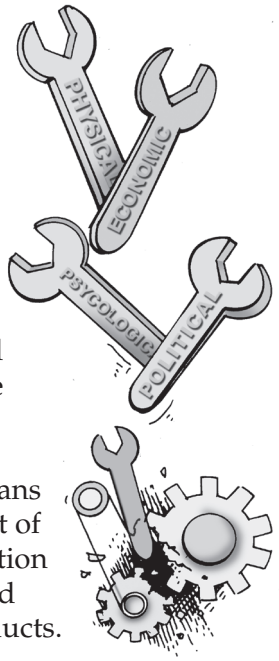
## Why food defense?

Based on an evaluation of critical infrastructures in the early 2000s, the federal government declared the food and agriculture sector to be one of 17 critical national infrastructures open to intentional attack (U.S. Department of Homeland Security, 2003). Even a mere threat to the food and agriculture sector could cause havoc within the food supply chain and have far-reaching consequences on the economy, human health and consumer confidence.

In military lingo, the U.S. food industry is considered a "soft" target because it is underdefended and could be overcome from many directions. Not only is it large and geographically dispersed, but it also comprises many different types and scales of operation across the country. Plus, the food industry employs almost one-fifth of our population and produces more than one-tenth of our gross domestic product. And most importantly, everyone must eat!

Threats to this foundational aspect of our everyday life have the potential to cause a great deal of harm, such as:

- **Physical** — Depending on the contaminant or where it's used, people or livestock could sicken or even die.
- **Economic** — Direct costs resulting from an intentional contamination could include medical costs, lost wages for unemployed workers, quarantines of infected humans and livestock or containment of food products, decontamination of facilities and products, and disposal of carcasses or products.



Indirect costs could include production down time, government compensation to producers for feed costs or livestock, and loss of suppliers or customers. An intentional contamination event could even affect international trade, causing U.S. producers to lose billions of dollars.

- **Psychological** — Intentional contamination could cause a loss of consumer confidence in a particular product or commodity, such as the rejection of spinach after the discovery of E. coli, or even a panic among consumers.
- **Political** — A widespread, severe contaminant could potentially cause political unrest.

## Who would intentionally contaminate the food system?

Clearly, the food industry is a potential place to wreak havoc. But what kind of person or group would try to contaminate our food supply, and why?

Many people immediately assume that intentional contamination is caused mainly by groups dissatisfied with how our food is produced. However, intentional contamination may be caused not only by people outside an operation but also by workers, family members or others with regular access, and most cases have occurred for more mundane reasons than ideology.

### Agricultural terrorism

According to the Weapons of Mass Destruction (WMD) Terrorism Database, 31 cases of agricultural terrorism occurred in the U.S. in 2004:

- 20 were contamination or threat of contamination in crops and foodstuffs
- 10 were against livestock
  - five involved a biological agent
  - four involved chemical agents
  - one involved an isolated plant toxin
- one was a nonspecific threat

*Source:* Kosal and Anderson (2004).

**Disgruntled workers:** Employees often must have access to many different areas of an operation in order to do their jobs effectively. When the relationship between a worker and employer goes bad, however, a disgruntled worker may decide

### example 1: Disgruntled worker contaminates hamburger

**Dec. 31, 2008, Byron Center, Mich.**

A 39-year-old employee in the meat department of a local supermarket had a conflict with his supervisor. Hoping to make his supervisor "look bad," he mixed Black Flag 40 (a now-banned pesticide containing 40 percent nicotine) into about 250 pounds of hamburger, which he then wrapped in retail-sized packages that were sold to the supermarket's customers.

Within two hours of eating the contaminated meat, consumers reported burning mouth and throat, nausea, vomiting, dizziness, diarrhea, sweating, blurred vision, headache, numbness, insomnia, tachycardia and more. Due to consumer complaints after consumption, the supermarket chain notified the Michigan Department of Agriculture and the USDA of a planned recall of 1,700 pounds of ground beef.

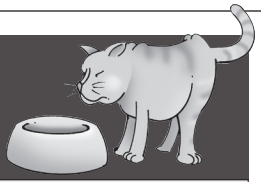
Within 10 days, laboratory testing identified the contaminant as nicotine. The dose detected in the raw product was potentially lethal, and the high concentration indicated possible intentional contamination. Investigation eventually determined that the contaminated product was ground and sold in only one store.

Extensive interviews with victims determined that 92 persons had some level of illness from this contamination. Most fell ill while the product was being sold, but some were identified up to 49 days after the last potential date of sale because they had frozen the product and missed the recall.

The employee pleaded guilty to the charge of poisoning food with the intent to cause serious bodily injury and was sentenced to nine years in prison followed by three years of supervised release and ordered to pay restitution of $12,000.

*Source:* Centers for Disease Control and Prevention (2003).

example 2:
**Shady business practice causes pet food recall**



**March 2006, Xuzhou, China**

The Chinese company Anying Biologic Technology Development Center posted an ad on the Internet seeking scrap melamine. Anying added the melamine to wheat gluten that was then sold to pet food manufacturers who used it for a protein source. Since melamine appears as protein on the most widely used protein analyses, adding it to the wheat gluten increased the gluten's apparent protein content at a much lower cost, making Anying a low-cost supplier.

Adding melamine to food ingredients to disguise protein content was a common practice among Chinese manufacturers. Although melamine is not an approved food ingredient for livestock feed, pet food or food for human consumption and does not add any nutritional value to food, it was not thought to be toxic.

Anying and other companies supplied melamine-tainted wheat gluten to a Canadian company that manufactured pet food for most pet food companies in North America. Dogs and cats that consumed the contaminated pet food became sick and many died.

In April 2007, pet food scraps and ingredients contaminated with melamine were sent to hog farms in eight states and chicken farms in Indiana. More than 50,000 hogs were quarantined by the end of April. Because subsequent testing revealed that the melamine did not stay in the meat, the hogs were released about two weeks later, after the producers had borne major feeding costs. Similarly, 80,000 chickens were placed on hold due to consumption of salvaged pet food and eventually cleared. Producers were compensated for costs associated with holding the livestock but not for lost production time.

Standard-setting organizations and industry groups are currently moving to develop screening and testing procedures that will reduce or eliminate the chance of future melamine contaminations.

*Source:* Snelson (2007) and *USA Today* (2007).

to contaminate the livestock or food products in the operation to embarrass the boss (Example 1) or company, or to cause as much economic damage as possible.

**Shady business practices:** Intentional contamination can also be caused by cutting corners to save money or other shady business practices. One of the largest recalls in the mid-2000s, of pet food containing melamine (Example 2), was caused by a manufacturer seeking to provide the lowest-cost product on the market that still met quality standards, in this case by fraudulent means. Although the aim of those trying to reduce costs by using inferior or fraudulent ingredients isn't to cause economic harm or disrupt society but just to save a buck, the results can still be far reaching.

**Emotional stress:** How a worker will behave in a stressful situation is difficult to predict. Even your most-trusted employees, including family members, may do or say things that are out of character at stressful moments in their lives. A worker may intentionally contaminate the food supply in a misguided response to an emotionally stressful situation, such as the love triangle described in Example 3.

**Political ideology:** As mentioned above, our first thoughts about intentional contamination are often about groups who may contaminate the food supply for ideological reasons, such as protesting the exploitation of animals, or to cause economic harm or physical disruption of daily life. As described in Example 4, groups may also contaminate the food supply for political reasons.

## Who is responsible for defending the food supply?

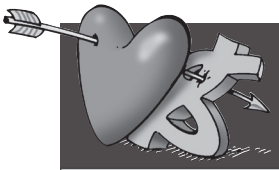
When the food supply is threatened, contaminated or disrupted, consumers tend to blame producers and manufacturers. Data collected by researchers at the University of Minnesota show that the public holds government and the food industry most responsible for protecting the food supply (Figure 1) and for picking up the tab for food defense (Figure 2) (Stinson et al., 2008). Consumers assume their food is safe when they buy it and aren't willing to pay extra for something they believe should be standard.

Perhaps more distressing for the food industry is that consumers are losing confidence in the safety of the food system. According to the University of Minnesota study, between 2005 and 2007, a period of several major food recalls, the number of consumers who were very confident in the safety of the food supply decreased and the number of consumers who were not very confident increased.

### Consumer concerns

When asked what products they believed were most likely to be intentionally contaminated, consumers identified meat, produce, dairy and seafood. They were less concerned about baked, canned or boxed foods.

*Source:* Stinson et al. (2008).



example 3:

### Love triangle leads to chlordane contamination

**December 1996, Berlin, Wis.**

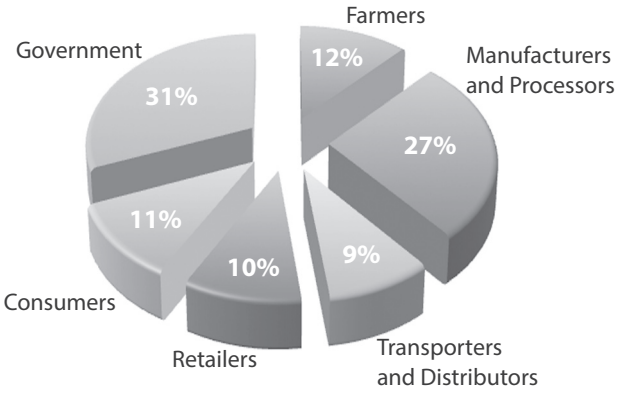
The organochlorine pesticide chlordane was intentionally added to livestock carcasses taken to a rendering plant. The contaminated carcasses were mixed into livestock feed that was distributed to more than 4,000 farms, mostly dairy operations, in a four-state area.

The perpetrator then sent letters to customers notifying them of the contamination, resulting in recalls of cheese, butter and ice cream. Product disposal cost more than $4 million. In addition, 4,000 tons of feed and 500,000 pounds of contaminated fat had to be destroyed. The cost to the feed producer targeted in the incident was over $250 million. The event economically impacted the affected farms, local feed companies, processors and others in the food supply chain.

A competitor of the targeted facility was charged for this criminal contamination. Apparently the competitor's wife had had a romantic involvement with someone at the targeted facility. The Wisconsin secretary of agriculture referred to the incident as an act of domestic terrorism.

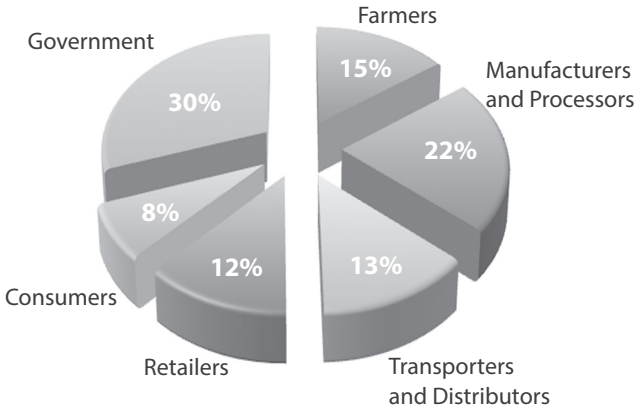
*Source:* Neher (1999).

**Figure 1. Who do consumers believe is responsible for food defense?**




*Source:* Stinson et al. (2008).

**Figure 2. Who do consumers believe is responsible for paying for food defense?**




*Source:* Stinson et al. (2008).

# Developing a food defense plan

## What are the benefits of developing a food defense plan?

Having a food defense plan for your operation can reduce the risk of intentional contamination to your operation and may ultimately benefit your bottom line.

Writing the plan helps you identify steps that can be taken to reduce the risk that animals or food in your facility can be harmed by intentional contamination. In addition, thinking through the processes used in your operation while developing your food defense plan can help you pinpoint inefficiencies and redundancies that are costing your operation money.

A well-developed response plan helps family members, employees and disaster response personnel respond appropriately to a suspected intentional contamination incident. It maps out a way to contain the damage and get your operation back to normal production levels more quickly. By helping you avoid a prolonged period of nonproduction, a food defense plan increases your business' chance of surviving a negative event.

All told, a food defense plan will help you provide safe, high-quality products to your customers, keep your employees safe and well informed, and protect the economic health of your business.

## What operations are required to have a food defense plan?

Operations supplying food for U.S. Department of Agriculture (USDA) feeding programs are legally required to have a food defense plan.

Food defense plans are recommended but not required by the following agencies for the specified food operations or products:

- USDA — preharvest agriculture
- USDA Food Safety and Inspection Service (FSIS) — meat, poultry, egg and catfish
- Food and Drug Administration (FDA) — foods other than those covered by FSIS

FDA and FSIS inspectors will ask if an establishment has a food defense plan and, if so, will view the plan. FSIS is continuing surveys of inspected plants, hoping to achieve 90 percent voluntary compliance before deciding whether to seek regulation requiring meat and poultry slaughter or processing facilities to have a food defense plan. At the same time, FDA is seeking more regulatory control over food safety and security. By developing a food defense plan now, your operation will be ahead of the game.

example 4:
**Cult seeks political gain through poisoning**

**1984, Wasco County, Ore.**

Having followed their cult leader Bhagwan Shree Rajneesh from India to a commune-style ranch in Wasco County, Ore., and subsequently assuming control of the Antelope town council, the Rajneeshees devised a plan to increase their sphere of influence.

After being denied the right to run candidates in the countywide election, they invited homeless people to Rajneeshpuram, formerly Antelope, to increase the number of Rajneeshee voters. The sect also decided to make many of the folks in the nearby town sick so they would not vote. They considered using the AIDS virus, typhoid fever or hepatitis, but settled on Salmonella typhimurium, which they purchased from a Seattle medical company.

Intending to contaminate the water supply, they multiplied the culture and first tested it on salad bars in 10 area restaurants. Nearly 800 people fell ill; 45 were hospitalized. The restaurants involved lost money due to loss of business and liability claims from customers who became ill.

It took one year for the FBI and other investigators to find that the contamination had been intentional, since it initially appeared as if the poisonings were due to poor sanitation. The intentional nature of the poisoning was only discovered as a result of other criminal investigations of the Rajneeshee cult. By that time, Bhagwan Shree Rajneesh had been deported and died in India. Group member Ma Anand Puja, the mastermind behind the contamination, was convicted of the poisoning. The group has disbanded and the town is once again called Antelope.

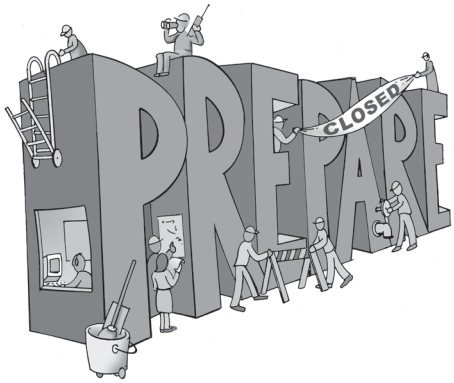
*Source:* Crowe (2007).

## What are the steps in developing a food defense plan?

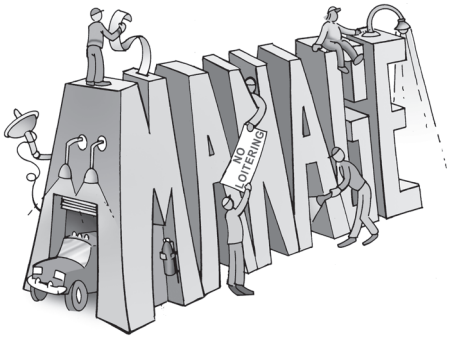
A food defense plan is not nearly so daunting to develop as some of the government-required plans you have already developed, such as a Hazard Analysis and Critical Control Points (HACCP) plan. You can develop a comprehensive food defense plan for your operation in four relatively easy steps.


**Assess vulnerabilities.** Look for areas where your operation may not be secure. You will need to consider, for example, the accessibility of various areas of your operation, the security of your internal processes and your shipping and receiving system, and the thoroughness of your employee screening and training procedures.


**Write your food defense plan.** Write a food defense plan that addresses your operation's vulnerabilities; specifies simple, practical and economical countermeasures to be implemented; and assigns responsibility and a timeline for implementation of each countermeasure.




**Prepare a response plan.** Because food defense planning reduces the risk of intentional contamination rather than eliminating it, you will need to write a response plan for fast, efficient containment of any emergency that does occur.




**Manage your food defense plan.** Plan management involves reviewing the plan periodically as well as anytime a change is made to your operation that could potentially open up new vulnerabilities, and testing the plan either randomly or on a set schedule two to four times a year.

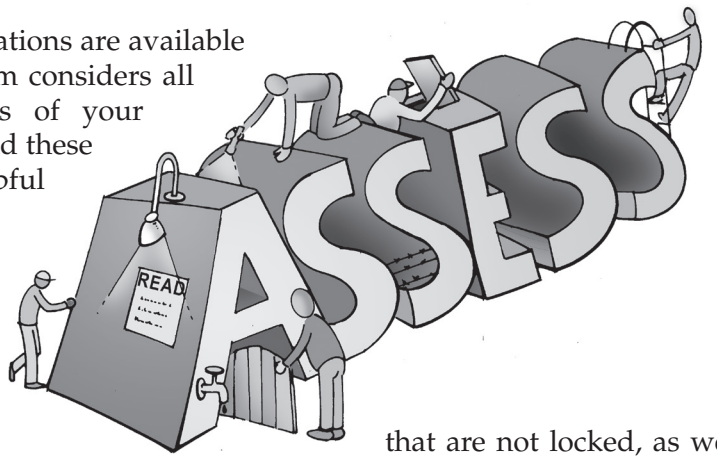
With a food defense plan in place, you can feel more confident in your operation's ability to protect the food supply from intentional contamination.

# Food defense planning

The remainder of this guide will take you step by step through developing a food defense plan for your operation. When you are ready to begin, gather the following documents:

- a labeled map of the facility
- all written operational procedures, such as HACCP, GAP, BMP, GMP and SOPs (See the Glossary on page 45.)
- procedures related to your workforce, such as preemployment screening and security training

Supplemental publications are available to help ensure your team considers all of the important areas of your operation. We have found these three to be the most helpful (see the resource list for more information):




- *Developing a Food Defense Plan for Meat and Poultry Slaughter and Processing Plants*
- *Guidance for Industry: Food Producers, Processors, and Transporters: Food Security Preventive Measures Guidance*
- *Pre-Harvest Security Guidelines and Checklist 2006*

Samples of work sheets that will make this task easier are included. Blank work sheets for you to complete, remove and post, as appropriate, are in the appendix.

Store copies of the completed food defense and response plans in more than one secure location. Keep one copy on the operation's premises and a second in a secure but accessible location outside of your operation, such as your home. Also consider saving a copy of your food defense plan online using a virtual document storage service.

## Assess vulnerabilities

The first step in developing a food defense plan is to conduct a vulnerability assessment. Look for areas of your operation that are accessible to someone wanting to intentionally contaminate your product. To find the vulnerabilities in your operation, think like a disgruntled worker, member of a political group or anyone wanting to harm your business, cause illness or death, make a statement for a cause or disrupt the food supply chain. Consider the various people who have access to your operation; look for places where contamination would be easily distributed through normal operations, such as a feed or ingredient mixer where a contaminant could be added and mixed in; and identify critical areas that are not locked, as well as areas that are not visible to other employees or where access is not limited.

Assessing the vulnerabilities of your operation should not be a one-person job. Instead, put together a team made up of the owner or manager and other key personnel or family members who are familiar with most aspects of the opera-

### Assessing vulnerabilities

When assessing your operation's vulnerability to intentional contamination, consider:

- People — those who spend time within the operation, such as workers, family members, delivery people, contract cleaners and visitors
- Processes and procedures — how tasks are completed within the operation, such as food processing, livestock handling, receiving shipments and marketing
- Facility — physical aspects of the operation, such as buildings, doors, windows, vents, fences, gates, cameras and lights

**Vulnerability Assessment Work Sheet** **Completed by:** Michael Jones **Date:** 12/9/09

| Instructions: • If all the elements are secure, answer the question yes. • If any elements are not secure, circle or list each insecure element, and answer the question no. • If the question does not apply to your operation, answer the question not applicable (N/A). | Yes | No | N/A |
|---|---|---|---|
| **1. Is your outside perimeter secure?** If not, circle or list areas needing attention: fencing, gates, locks, lighting, (cameras), exterior doors, (signage), pens and livestock visible from road. | | X | |
| **2. Is access within your operation limited?** If not, circle or list areas needing attention: (doors), key inventory, windows, vents, signage, visitor log, designated visitor parking, computer system, restrooms shared with restaurant. | | X | |
| **3. Are your processes or procedures secure?** If not, circle or list areas needing attention: procedures, machines, feeding, production lines, supplier's food defense plan, uniforms, laundry service, in-house laundry, personal items, visitor supervision, no visitor log. | | X | |
| **4. Is your shipping and receiving secure?** If not, circle or list areas needing attention: loading area and procedures, unloading area and procedures, package integrity, trucks and trailer bodies, liability determined, | X | | |
| **5. Do you have an inventory system for stored materials?** If not, circle or list areas needing attention: raw materials, bulk food items, processed ingredients, partially cooked foods, packaging, chemicals, pharmaceuticals, (feed), food. | | X | |
| **6. Is access to your water supply limited?** If not, circle or list areas needing attention: water source, inside water lines, Ice supply, (livestock water system). | | X | |
| **7. Is mail opened away from sensitive areas?** If not, circle or list areas needing attention: in a confined area, away from production, processing, preparation and storage, | X | | |
| **8. Do you have screening and training procedures for your workforce?** If not, circle or list areas needing attention: reference check, background check, (credit check), (security training), | | X | |
| **9. Is access to sensitive areas limited?** If not, circle or list areas needing attention: (storage), (livestock), processing, packaging, (feed mixing), feed distribution, pharmaceutical storage, (chemicals), cleaning supplies, maintenance, | | X | |

tion. University extension personnel, your insurance agent, your county emergency manager or a member of the law enforcement community can also be included on the team.

With the facility map and operational and workforce procedures on hand, the team should complete a Vulnerability Assessment Work Sheet. Each of the nine basic security questions on the work sheet includes a list of elements to consider, which are explained in detail on pages 12 and 13. The team should consider the security of the listed elements and additional elements specific to your operation. Answer each question as follows:

- If all the elements are secure, answer the question yes.
- If any elements are not secure, circle or list each insecure element, and answer the question no.
- If the question does not apply to your operation, answer the question not applicable (N/A).

Only the questions that are answered no will need to be included in your food defense plan.

## Vulnerability assessment work sheet questions

1. **Is our outside perimeter secure?**
   - Fencing restricts entry, within reason, and is inspected regularly.
   - Gates are locked when not in use to limit access to the operation.
   - Locks are located on exterior doors (deadbolts with a minimum throw of 1.5 inches are recommended), windows and other access points.
   - Vulnerable areas are well lit to make them more easily observable.
   - Cameras have been installed to make areas visible in a different way and to deter potential wrongdoers. (Even cameras that are not operational but simply visible can act as a deterrent.)
   - Exterior doors are metal or metal-clad and have tamper-resistant locking mechanisms.
   - Signage limits access to authorized persons or gives instructions for secure entry.
2. **Is access within your operation limited?**
   - Interior doors are locked to restrict access to sensitive areas.
   - Key inventory is kept up to date. Keys are returned by terminated employees. Keys are not left in machinery stored outside of buildings.
   - Exterior ladders used to access rooftops or storage bins are secured to prevent unauthorized access.
   - Interior windows are secured as necessary to limit access to sensitive areas.
   - Interior vents are locked as necessary to limit access to sensitive areas.
   - Interior signage limits access to sensitive areas.
   - A visitor log is maintained to record visitors' identification and the date and time of their visit.
   - Visitors park in a designated area that is monitored.
   - Computer system is password protected, has limited access and is protected from viruses. (Wrongdoers accessing an unprotected system can alter records to conceal tampering.)
3. **Are your processes or procedures secure?**
   - Procedures in general limit access to sensitive areas and ensure vulnerable production activities are observed by one or more employees at all times.
   - Machines have locked lids or secure openings or are observed by employees to prevent tampering.
   - Animal feeding procedures limit access, increase visibility and prevent tampering.
   - Production lines are enclosed where possible and observed at key points to limit opportunities for tampering.
   - Suppliers have a food defense plan. Contracts have been negotiated with suppliers requiring seals or locks and a procedure for checking them on delivery.
   - Uniforms do not leave the operation at any time unless with a laundry service.
   - Laundry service can describe the security of their operation as well as their pickup and delivery procedures.
   - In-house laundry facilities are secure and have procedures for daily uniform collection and distribution.
   - Visitor and employee personal items are not taken into production or other sensitive areas.
   - Visitors are supervised by an appropriate employee at all times.
4. **Is your shipping and receiving system secure?**
   - Loading area has limited access and procedures to deal with security issues such as sealing loads and recording seal numbers.
   - Unloading area has procedures to deal with unscheduled deliveries, checking delivery invoices and moving deliveries into storage.
   - A designated employee checks package integrity before supplies are placed in storage.
   - Trucks and trailer bodies within the facility are secured even when empty.
   - Contracts have been negotiated with carriers so that liability is with the carrier while goods or products are in their possession.
5. **Do you have an inventory system for stored materials?**
   - Inventory is maintained on feed materials and additives. (This practice calls attention to extra materials, which may be a sign of contamination.)
   - Hazardous production inputs are secured when not in use to prevent their being used to damage or intentionally contaminate your operation.

- Inventory of raw materials is reconciled with shipping invoices to identify overages or shortages, which might be an indicator of contamination.
- Inventory of packaging materials is reconciled with delivery invoices.
- Chemical inventories are reconciled with records of delivery and usage.
- Pharmaceutical usage is noted and reconciled with inventory.

**6. Is access to your water supply limited?**

- Water source is tamper-resistant, wellhead is locked, and external water pipes do not have openings.
- Inside water lines either have locks on access points or have access points that are easily observed by multiple employees.
- Ice-making facilities have limited access. For facilities separate from processing areas and not easily observed, steps have been taken to increase observation or otherwise limit the opportunity for tampering.
- Livestock water systems are easily observed by employees, family or neighbors.

**7. Is mail opened away from sensitive areas?**

- Mail is opened in a room separate from production areas with a separate ventilation system.

**8. Do you have screening and training procedures for your workforce?**

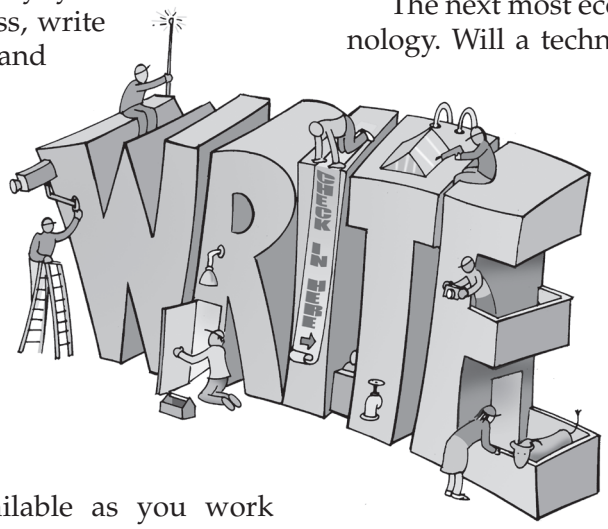
- Before an employee is hired, background, reference and credit checks are run.
- Employees receive basic security training on how to recognize and deal with suspicious activities and to whom to report such activities.

**9. Is access to sensitive areas limited?**

- Storage area access is limited by locked doors, entry logs or employee observation.
- Livestock access is limited with fences and signage.
- Processing and packaging area access is limited by locked doors, signage that restricts access, or employee badges or color-coded uniforms that designate work areas.
- Feed storage area access is limited by locked feed storage bunkers or by regular observation by employees, family or neighbors.
- Chemical storage area access is limited by locked doors, signage, entry logs or chemical usage logs.
- Maintenance area access is limited by locked doors, signage or color-coded uniforms for maintenance employees.

## Write your food defense plan

Now that you have identified your operation's vulnerabilities, it's time to write your food defense plan. In the food defense plan, you will address each vulnerable element and determine whether a simple, practical and economical countermeasure could be implemented to make the element more secure. For each vulnerability you consider impractical to address, answer the practical question no, and move on to the next element. For each vulnerability you consider practical to address, write down a countermeasure and indicate who is responsible for implementing it and by what date. Once the countermeasure has been implemented, have the person responsible date and initial the plan.




In addition to your Vulnerability Assessment Work Sheet, it may be helpful to have your map and operational and workforce procedures available as you work through the Food Defense Work Sheet. Once you have completed the work sheet, you will have a food defense plan that can stand alone or be added to any HACCP or other plans you may have.

### Developing countermeasures

Remember, the purpose of a food defense plan is to reduce the risk of intentional contamination in your operation. Countermeasures are actions you take to make vulnerable elements of your operation more secure. They protect your family, employees and customers; your product, reputation and livelihood; and your business, property and assets. The goal is to provide protection in the most economical ways possible.

As a general rule, procedural changes are the most economical. For example, checking references of potential employees is easy and inexpensive. Eligibility of new hires and validity of their Social Security numbers can be checked using the free E-Verify System.

The next most economical option may be technology. Will a technology such as dusk-to-dawn lighting or a lock reduce the risk of intentional contamination? If not, additional personnel may be needed, which is the least economical option.

Be freethinking and creative in countermeasure development, and keep in mind the three Ls suggested by the National Food Processors Association: light it, lock it, and limit access (Hollingsworth, 2002).

### Marketing challenges

Once you have addressed the more obvious vulnerabilities and countermeasures, you need to deal with some of the challenges presented by marketing. The biggest challenge marketing presents is assignment of liability, that is, determining who is responsible for protecting your livestock, produce or food product from contamination at

**SCAN**


Do not underestimate the value of your family members and employees as security agents. Train them to SCAN.

**See** — an unfamiliar person on the premises.

**Challenge** — the visitor in a nonthreatening manner by facing and making eye contact.

**Ask** — "Can I help you?"

**Notify** — an owner, manager or supervisor about the visitor.

*Source:* University of Tennessee College of Veterinary Medicine et al. (n.d.).

**Food Defense Work Sheet** **Completed by:** *Murray Maine* **Date:** *5/18/09*

Instructions:
- List each specific vulnerability identified on the Vulnerability Assessment Worksheet, including its question number.
- If developing a countermeasure would be practical, specify the countermeasure, the person responsible, and a timeline.
- If developing a countermeasure would be impractical, leave the rest of the row blank.
- When the countermeasure has be implemented, have the person responsible date and initial the item.

| Question number | Specific vulnerability | Practical (Yes/No) | Countermeasure | Who will implement? | Timeline to implement | Date completed/ initials |
|---|---|---|---|---|---|---|
| 1 | Driveway has no gate | yes | Add a gate at driveway entrance | Murray, Brandon, and Andrew | 11/18/09 | *10/10/09 M&M* |
| 1 | No exterior cameras | no | | | | |
| 1 | No signage on perimeter fence | yes | Add No Trespassing and No Hunting signs to fence | Murray, Brandon, and Andrew | 6/18/09 | *7/20/09 M&M* |
| 1 | Perimeter fencing is not monitored regularly | yes | Implement a schedule for monitoring fence line monthly | Brandon and Andrew | 6/18/09 | *6/10/09 M&M* |
| 2 | Door for pharmaceutical and chemical storage is not locked | yes | Add a lock to door and limit number of keys issued (family members only) | Murray | 6/18/09 | *11/15/09 M&M* |
| 3 | Feeding, doctoring and processing cattle are not done in secure manner | no | | | | |
| 3 | No visitor log | yes | Implement a visitor log system | Murray | 11/18/09 | *10/15/09 M&M* |
| 4 | Liability for cattle not spelled out in shipping and sellers agreement | yes | Negotiate the agreement so liability for calves sold at auction is with hauler and then auction facility | Murray | 6/18/09 | *6/7/09 M&M* |
| 5 | No inventory system for feed chemicals or pharmaceuticals | yes | Develop an inventory system | Murray | 11/18/09 | *9/23/09 M&M* |
| 6 | Wellhead is not locked | yes | Lock wellhead | Murray | 11/18/09 | *9/15/09 M&M* |
| 6 | Access to ponds not controlled | no | | | | |
| 8 | No security training for family | yes | Familiarize family with SCAN and other security training | Murray | 11/18/09 | *10/12/09 M&M* |
| 9 | Fences between farms don't limit access to livestock | no | | | | |
| 9 | Feed is not stored in a lockable facility | no | | | | |
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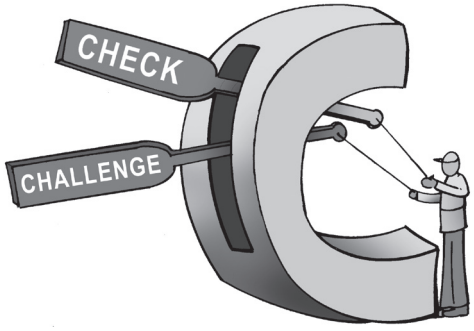
each step along its way from your operation to the consumer's table. For example, you need to determine who is liable for the livestock or food product while it is in transit or awaiting auction. Liabilities must be considered if you are:

- **niche marketing** — for example, retained ownership cattle or organic grain,
- **contract marketing**, or
- **direct marketing** — for example, farmers' markets or retail outlets.

We recommend a two-pronged approach to liability, which we refer to as the double C's: check and challenge.

**Check** your contract, whether oral or written, and negotiate the liability. The goal here is to make sure that you are liable only when the food is in your possession.



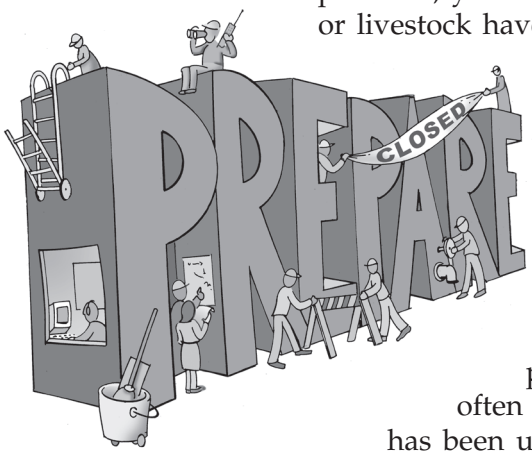

**Challenge** those who might want to contaminate your product by making contamination more difficult with:

- **physical barriers** — add layers to your packaging, use tamper-resistant packaging, and lock the trailer while in transit; and
- **procedural barriers** — work out transit details with your hauler that will reduce the risk to your cargo, and supervise visitors constantly during tours.

## Prepare a response plan

The countermeasures you develop can reduce the risk of intentional contamination but cannot prevent it. You still need to prepare to deal with an intentional contamination incident so that, should one occur, you can quickly and efficiently contain the damage and get your operation back to normal production levels. Getting back into production as quickly as possible is key to keeping your business afloat.

As you begin to prepare your response plan, have your facility map on hand and as well as contact information for your suppliers, customers and local emergency responders. You may also need to refer to operational plans, such as such as HACCP, GAP, BMP and SOPs, which may contain information valuable to your response plan such as regulatory agency phone numbers, emergency protocols or recall plans.




To contain and minimize an emergency situation, understanding what needs to happen and in what order is critical. In the case of possible intentional contamination, the steps that need to be taken are containment, diagnosis, recall, and disposal. Each of these steps needs to be addressed in your response plan.

**Containment:** As soon as you suspect an intentional contamination, isolate all product or animals that may have been contaminated. In your plan, identify a location within your facility where potentially contaminated food or livestock can be quarantined separate from uncontaminated animals or products.

For a livestock operation, you will also need to plan how you will care for the animals while contained. The sample Containment and Disposal form poses questions designed to help with the processes and planning for handling contaminated or potentially contaminated livestock or food products.

**Diagnosis:** To respond to the emergency appropriately, you need to know what contaminant was used and how. As soon as possible, contact the appropriate person to diagnose the contaminant. If you have issues with livestock, the first call will be to your veterinarian, while a food processing plant will need to call a food inspector: FSIS for meat, poultry, eggs or catfish; FDA for other foods. In your plan, include a list of emergency telephone numbers. The numbers on the list will vary depending on your operation and its location.

**Recall:** Contaminated food or livestock that have already left the facility will need to be recalled and contained. To effectively recall your products, you must know where all of the food or livestock have gone. Keeping reliable contact information for your suppliers, customers and processing lots will make this much easier. Include their contact information in your plan. HACCP plans or similar operational documents will contain information related to trace forward/trace back, which is a requirement for food processors. Also, because recalls often result from contamination that has been unwittingly passed on to you by suppliers, you need to prepare for that possibility in your response plan.

**Disposal:** Contaminated livestock or food must not be allowed to enter the food chain, so your response plan must include a plan for disposal of contaminated livestock or food products and possible decontamination of your facility. The sample Containment and Disposal Work Sheet poses questions designed to help with the processes and planning for handling contaminated or potentially contaminated livestock or food products. Regulatory agencies such as FSIS or FDA are valuable sources to help determine what type of disposal will be needed and who will need to sign off on the plan before contaminated food can be disposed of.

For livestock, you will need to plan for euthanasia as well as disposal. Again, the methods used will depend on the type of contaminant involved and recommendations will be made by the veterinarian or emergency management official in charge. See the resource list for helpful publications on the quarantine and disposal of contaminated livestock or food.

**Containment and Disposal Work Sheet** **Completed by:** Sally Stokes **Date:** 5/20/09

| Response questions | Procedures to be used | Location | Date completed/ initials |
|---|---|---|---|
| **1. Do you have a location to contain contaminated livestock or food products?** Containment may include: quarantine of livestock, feeding and watering quarantined livestock, and storage of food products (meat, dry and wet ingredients, and product that requires refrigeration) | We will rent a refrigerated trailer to hold any contaminated meat products away from our processing area and away from noncontaminated product. | We will locate the trailer in our parking lot behind the facility and it will be locked. | 7/1/09 BB |
| **2. Do you have a plan to (a) notify the appropriate regulatory agency and (b) recall contaminated food products?** Notification will include: Who the employee will notify and who will notify the agency. Recall may include: notification of customers and media communications. | We will contact our contract customers to retrieve any contaminated product and will use newspaper, radio and TV spots to contact our retail customers. | Regional TV station, local radio and local newspaper | 6/20/09 BB TT |
| **3. Do you have a plan to dispose of contaminated livestock or food products?*** Disposal may include: Euthanasia, disposal of euthanized animals and disposal of food products * Specific disposal will be approved and witnessed by regulatory authorities. | General disposal of meat includes visibly marking the product so that it appears inedible. General disposal of contaminated livestock includes euthanasia. Disposal is accomplished by rendering, incinerating or landfilling. | Marking of meat products will occur in the trailer in the parking lot. Euthanasia of livestock will occur in holding pens to prevent contamination of facility. Contaminated meat/livestock will be removed by commercial rendering company or by Flat Iron Municipal Waste Department. | 6/15/09 BB |
| **4. Do you have a plan for decontamination of your operation?*** Areas requiring decontamination may include: Equipment, vehicles, facilities, personnel and grounds. * Decontamination procedures beyond general procedures will be directed by emergency responders. | General decontamination: Skin - wash with soap and water and dry with clean towel or air dry. Clothing - wash with soap and water and allow to air dry. Surface/Tools/ Equipment - mix 1 ¼ cups of bleach/gallon of water, allow to sit on surface for 3 min., wipe with paper towel, wash with soap and water. Gloves and eye protection will be used, prepare fresh bleach solution and allow to stand for 30 min. | Decontamination will occur in the room or area that is contaminated. A temporary area for privacy of contaminated personnel will be set up in the room where contamination occurred. | 8/2/09 SS |

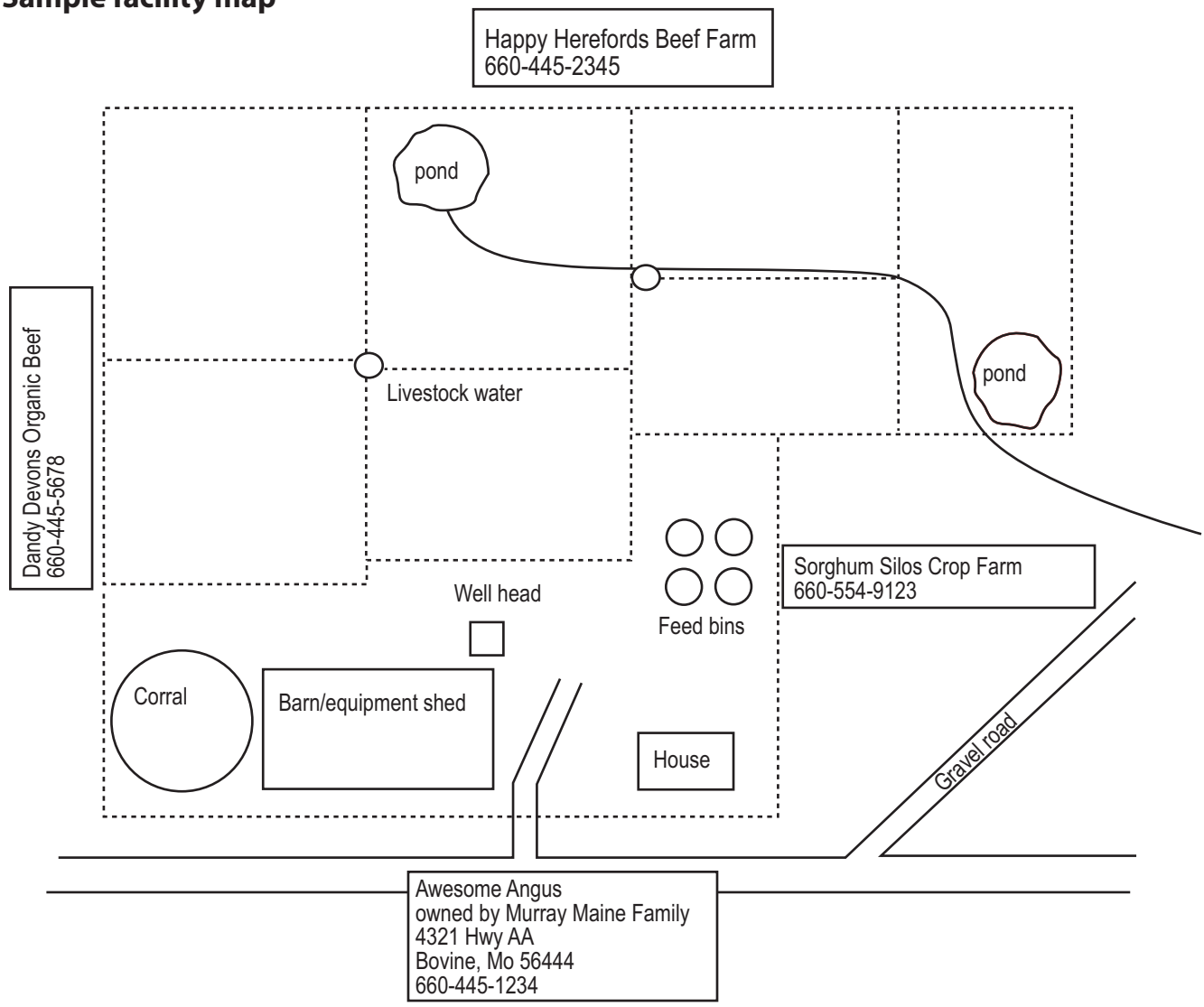
**Facility map:** A map of your operation or facility will be vital to emergency responders in any situation. The map should provide contact information for the owner or operator of the facility and show the following:

- the facility in relationship to other properties, structures or environmental landmarks, such as streams
- road access, transportation routes, perimeter boundaries and gates, including their dimensions
- locations of utilities, septic and sewer systems
- buildings, with doors and windows marked, and outbuildings, as well as building systems, such as ventilation, air conditioning and heating

**Emergency phone list:** The numbers on an emergency phone list will vary by location and type of operation, but in general should include the following categories:

- emergency responders, including sheriff, highway patrol, police, fire, hospital and poison control
- utilities, including electricity, water, phone and gas
- regulatory groups, including FSIS for meat, poultry, eggs and catfish; FDA for other food; Animal and Plant Health Inspection Service (APHIS) for animals (the responding vet will likely start the chain of phone calls)
- other state agencies, including your state's Department of Health and Senior Services, Emergency Management Agency, and Department of Homeland Security

## Sample facility map



**Supplier/customer phone list:** To effectively respond to an emergency that is unfolding at a fast pace, maintain a list containing the names and contact information of all your suppliers and customers.

**Employee emergency contacts:** Maintain an emergency contact list for your employees that includes their phone numbers and addresses. Keep the list where it can be accessed quickly in an emergency.

### Phone number tip

When compiling your emergency and other contact lists, be sure to include the area code even with local telephone numbers. During an emergency, calls may be made from a nonlocal phone.

### Emergency Phone List

| Contact | Phone number |
|---|---|
| Emergency | 911 |
| Police | 312-870-1111 |
| County Sheriff | 573-653-1111 |
| Missouri Highway Patrol | 800-525-5555 |
| Poison Control | 800-222-1222 |
| AmerenUE | 800-552-7583 |
| Decadetel | 800-824-2877 |
| American Gas Inc. | 312-555-3434 |
| Flat Iron Waste Disposal Department | 312-870-6666 |
| County Extension Office | 573-655-1234 |
| Local Inspector (cell phone) | 573-442-9876 |
| FSIS Regional Office (Lawrence, KS) | 785-841-0020 |
| FSIS 24-Hour Emergency Number | 866-395-9701 |
| Missouri Department of Health and Senior Services | 800-235-5503 |
| Missouri State Emergency Management Agency | 573-526-9100 |
| Missouri Department of Homeland Security | 573-522-3007 |

### Supplier Contact List

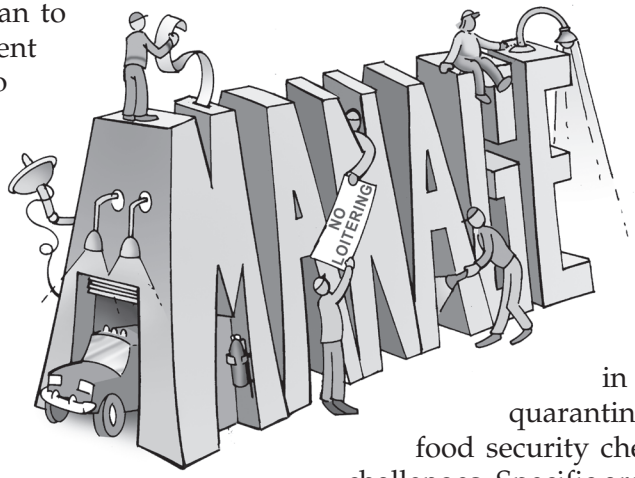
| Company | Item/Quantity | Phone number | Contact person |
|---|---|---|---|
| Kansas Beef Packers | Beef/case | 405-666-2310 | Abe Andrews |
| A-One Farms | Pork, fresh hams/truckload | 573-445-9021 | Hal Hampson |
| Box Me | Casings, packing materials/pallet | 201-555-0002 | Cal Cooper |
| Duluth Spices | Salt, spices, cure, seasoning mixes | 612-545-6219 | Polly Parker |
| Chlorax Co. Inc. | Cleaning chemicals, sanitizers/gallon | 218-432-7654 | Stanley Stokes |
| Hair-Off | Scalding solutions/50 gallon drum | 523-445-0987 | Charles Mann |

### Customer Contact List

| Buyer | Item/Quantity | Phone number | Contact person |
|---|---|---|---|
| Ann's ABC Grocery, Flat Iron | Sliced ham, bacon, deli meats/case | 312-870-1357 | Annie Oakley |
| Top-Notch Meat Distributing | Whole hams, turkeys, sliced meats/case | 573-555-3366 | Will Wharton |
| Commercial Rendering Ltd. | Hides, offal/truckload | 318-567-0987 | Charles Cook |

# Managing your food defense plan

Once the food defense plan has been written and implemented, the team needs to consider how the plan will be managed for the long term. Managing the plan may include periodic tests and annual reviews to see if the plan is still effectively reducing the risk of intentional contamination or if it needs to be updated to reflect changes in your operation. In addition to changes in your operation, a critical contamination event at another operation may prompt a test or review of your plan to ensure that you have sufficient countermeasures in place to reduce the risk of a similar incident. The food defense plan team should determine practical guidelines for managing the plan. Once the guidelines are in place, the food defense coordinator will be responsible for notifying the team when action is required.




**Plan reviews**

Reviews of the food defense plan should be conducted annually at a minimum but can also be triggered by changes in your operation, such as a new product line or category of livestock, change of supplier, expanded customer base, addition of new technology, newly developed or updated procedures or change of food defense coordinator. The review should answer the following questions:

- Are the countermeasures continuing to reduce the risk of intentional contamination in vulnerable areas?
- Do new products or livestock categories/species require additional countermeasures to reduce the risk of intentional contamination?
- Do new or updated procedures require additional countermeasures?
- Has supplier, customer and employee contact information been updated?

A record similar to the sample on page 21 should be used to track food defense plan reviews and kept with the food defense plan.

**Plan tests**

Tests of the food defense plan can be conducted randomly or scheduled two to four times a year, as determined by your food defense team, which should select an interval that is practical for your operation. The general purpose of these tests is to determine if the countermeasures are reducing the risk of intentional contamination. If the countermeasures are not adequately reducing risk, then new countermeasures should be developed and implemented. Tests that might be used include exercises in mock tampering, livestock quarantine, product recall, random food security checks and computer system challenges. Specific areas to be checked include:

- Entry points — Check that entry points are locked or secured.
- Signage — Check that signage is still in place and legible.
- Procedures — Conduct random checks for compliance with procedures regarding uniforms and employee personal items.
- Inventory — Check inventory log sheets of hazardous materials to see if files are being properly maintained.
- Entry logs — Check that entry logs maintained for sensitive areas are accurate and up to date.

A record similar to the sample on page 21 should be used to track food defense plan tests and kept with the food defense plan.

**Record of Food Defense Plan Review**

| Date | Reason for review | Action taken | Initials |
|---|---|---|---|
| 12/3/09 | New product line added | new countermeasure developed | RS |
| 12/3/09 | Annual review | none | RS |

**Record of Food Defense Plan Testing**

| Date | Test | Result | Action taken | Initials |
|---|---|---|---|---|
| 10/30/09 | Entry check | Door not locked | lock procedure changed | MM |

**Record of Employee Food Defense Training**

| Employee name | Date | Type of training received | Initials |
|---|---|---|---|
| Bill Montgomery | 11/12/09 | SCAN | BM |

## Employee training

Management of the food defense plan must also include ongoing employee training. New employees must receive basic instruction about their responsibilities in regards to the food defense plan. All employees need to know:

- What type of suspicious individuals or activities should be reported
- Who they should report suspicious individuals or activities to
- Which employee will be responsible for calling the authorities in a case of suspected intentional contamination
- What each employee's responsibilities are regarding security procedures such as locking up or filing inventory or access log sheets at the end of the day

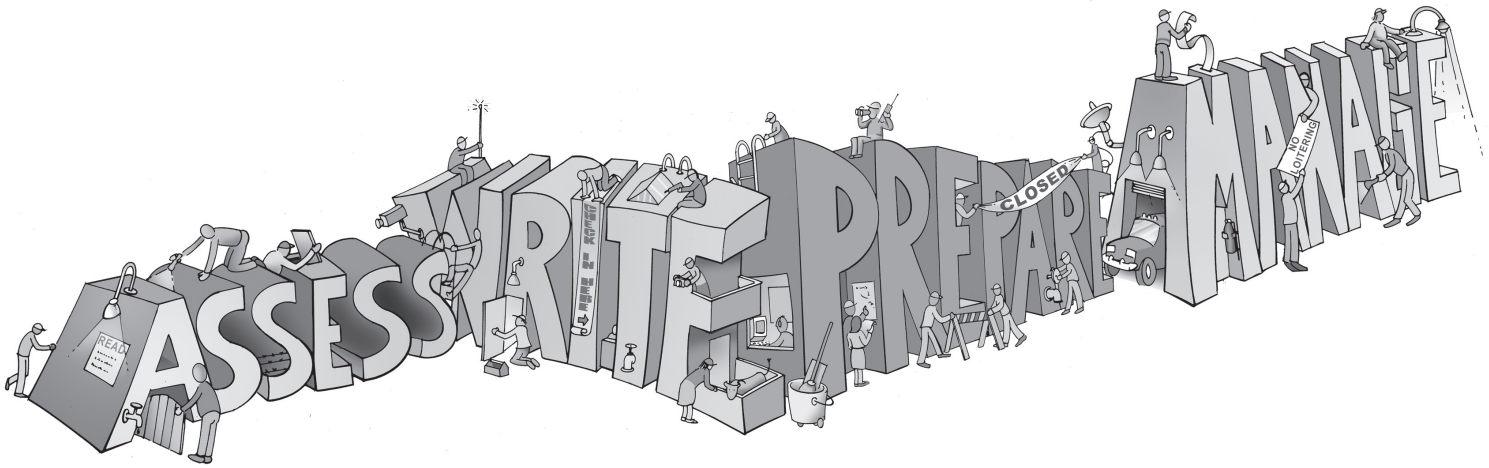
The team should set up procedures that ensure all employees are updated on changes to the food defense plan and to record employee food defense training activities. A record similar to the sample above should be used to track employee food defense and kept with the food defense plan.

The objective of a food defense plan is to help you provide a safe, high-quality product to your customers, keep your employees safe and well informed, and protect the economic health of your business. A well-thought-out management plan will help your food defense plan work for you for the long term.

# Food Defense

This appendix contains blank work sheets and forms that you can remove and use when developing and managing the food defense plan for your operation. Additional copies may be downloaded from the MU Extension Web site, extension.missouri.edu/fooddefense.





## Vulnerability Assessment Work Sheet

**Completed by:** **Date:**

| Instructions: • If all the elements are secure, answer the question yes.<br>• If any elements are not secure, circle or list each insecure element, and answer the question no.<br>• If the question does not apply to your operation, answer the question not applicable (N/A). | Yes | No | N/A |
|---|---|---|---|
| **1. Is your outside perimeter secure?**<br>If not, circle or list areas needing attention: fencing, gates, locks, lighting, cameras, exterior doors, signage, _____. | | | |
| **2. Is access within your operation limited?**<br>If not, circle or list areas needing attention: doors, key inventory, windows, vents, signage, visitor log, designated visitor parking, computer system, _____. | | | |
| **3. Are your processes or procedures secure?**<br>If not, circle or list areas needing attention: procedures, machines, feeding, production lines, supplier's food defense plan, uniforms, laundry service, in-house laundry, personal items, visitor supervision, _____. | | | |
| **4. Is your shipping and receiving secure?**<br>If not, circle or list areas needing attention: loading area and procedures, unloading area and procedures, package integrity, trucks and trailer bodies, liability determined, _____. | | | |
| **5. Do you have an inventory system for stored materials?**<br>If not, circle or list areas needing attention: raw materials, bulk food items, processed ingredients, partially cooked foods, packaging, chemicals, pharmaceuticals, feed, _____. | | | |
| **6. Is access to your water supply limited?**<br>If not, circle or list areas needing attention: water source, inside water lines, Ice supply, livestock water system, _____. | | | |
| **7. Is mail opened away from sensitive areas?**<br>If not, circle or list areas needing attention: in a confined area, away from production, processing, preparation and storage, _____. | | | |
| **8. Do you have screening and training procedures for your workforce?**<br>If not, circle or list areas needing attention: reference check, background check, credit check, security training, _____. | | | |
| **9. Is access to sensitive areas limited?**<br>If not, circle or list areas needing attention: storage, livestock, processing, packaging, feed mixing, feed distribution, pharmaceutical storage, chemicals, cleaning supplies, maintenance, _____. | | | |

## Food Defense Work Sheet

**Completed by:** **Date:**

Instructions:
- List each specific vulnerability identified on the Vulnerability Assessment Worksheet, including its question number.
- If developing a countermeasure would be practical, specify the countermeasure, the person responsible, and a timeline.
- If developing a countermeasure would be impractical, leave the rest of the row blank.
- When the countermeasure has be implemented, have the person responsible date and initial the item.

| Question number | Specific vulnerability | Practical (Yes/No) | Countermeasure | Who will implement? | Timeline to implement | Date completed/ initials |
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## Containment and Disposal Work Sheet

**Completed by:** **Date:**

| Response questions | Procedures to be used | Location | Date completed/ initials |
|---|---|---|---|
| **1. Do you have a location to contain contaminated livestock or food products?**<br>Containment may include: quarantine of livestock, feeding and watering quarantined livestock, and quarantine of food products or ingredients (meat, dry and wet ingredients, and product that requires refrigeration) | | | |
| **2. Do you have a plan to (a) notify the appropriate regulatory agency and (b) recall contaminated food products?**<br>Notification will include an employee notifying the appropriate manager, supervisor or owner and that manager, supervisor or owner notifying the appropriate regulatory agency.<br>Recall may include notification of customers and communicating with specific media outlets. | | | |
| **3. Do you have a plan to dispose of contaminated livestock or food products?***<br>Disposal may include: Euthanasia, disposal of euthanized animals and disposal of food products<br>* Specific disposal will be approved and witnessed by regulatory authorities. | | | |
| **4. Do you have a plan for decontamination of your operation?***<br>Areas requiring decontamination may include: Equipment, vehicles, facilities, personnel and grounds.<br>* Decontamination procedures beyond general procedures will be directed by emergency responders. | | | |

## Emergency Phone List

| Contact | Phone number |
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| Emergency | 911 |
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## Supplier Contact List

| Company | Item/Quantity | Phone number | Contact person |
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## Customer Contact List

| Buyer | Item/Quantity | Phone number | Contact person |
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## Employee Emergency Contacts

| Employee name | Home phone | Cell phone | Home address | Contact person |
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## Record of Food Defense Plan Review

| Date | Reason for review | Action taken | Initials |
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## Record of Food Defense Plan Testing

| Date | Test | Result | Action taken | Initials |
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## Record of Employee Food Defense Training

| Employee name | Date | Type of training received | Initials |
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# Glossary of abbreviations and acronyms

APHIS — Animal and Plant Health Inspection Service
BMP — Best management practice
FDA — Food and Drug Administration
FSIS — Food Safety and Inspection Service
GAP — Good agricultural practice
GMP — Good manufacturing practice
HACCP — Hazard Analysis and Critical Control Points
SOP — Standard operating procedures
USDA — United States Department of Agriculture

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The following publications were used in the development of this guide.


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# Resources on food defense

The following publications are helpful resources related to food defense, which you may want to refer to when developing your plan.


AVMA Guidelines on Euthanasia. June 2007. American Veterinary Medical Association; http://www.aphis.usda.gov/emergency_response/downloads/tools/euthanasia.pdf

Catastrophic Mortality and Associated Material Disposal: Standard Operating Guideline No. 002. October 30, 2008. Missouri Department of Agriculture; http://mda.mo.gov/animals/pdf/animalag_guide2.pdf

*Cleaning and Disinfection: Standard Operating Guide No. 004.* October 27, 2008. Missouri Department of Agriculture; http://mda.mo.gov/animals/pdf/animalag_guide4.pdf

Developing a Food Defense Plan for Meat and Poultry Slaughter and Processing Plants. January 2007; updated June 2008. U.S. Department of Agriculture Food Safety and Inspection Service; http://www.fsis.usda.gov/wps/wcm/connect/d132a345-034d-4ffb-8a80-7f989a6eaba5/Food_Defense_Plan.pdf?MOD=AJPERES

Extension Disaster Education Network, http://extension.missouri.edu/eden/

Food Defense (Web site). n.d. University of Missouri Extension; http://extension.missouri.edu/fooddefense

Guidance for Industry: Food Producers, Processors, and Transporters: Food Security Preventive Measures Guidance. March 2003; updated October 2007. U.S. Department of Health and Human Services, Food and Drug Administration, Center for Food Safety and Applied Nutrition; http://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/FoodDefense/ucm083075.htm

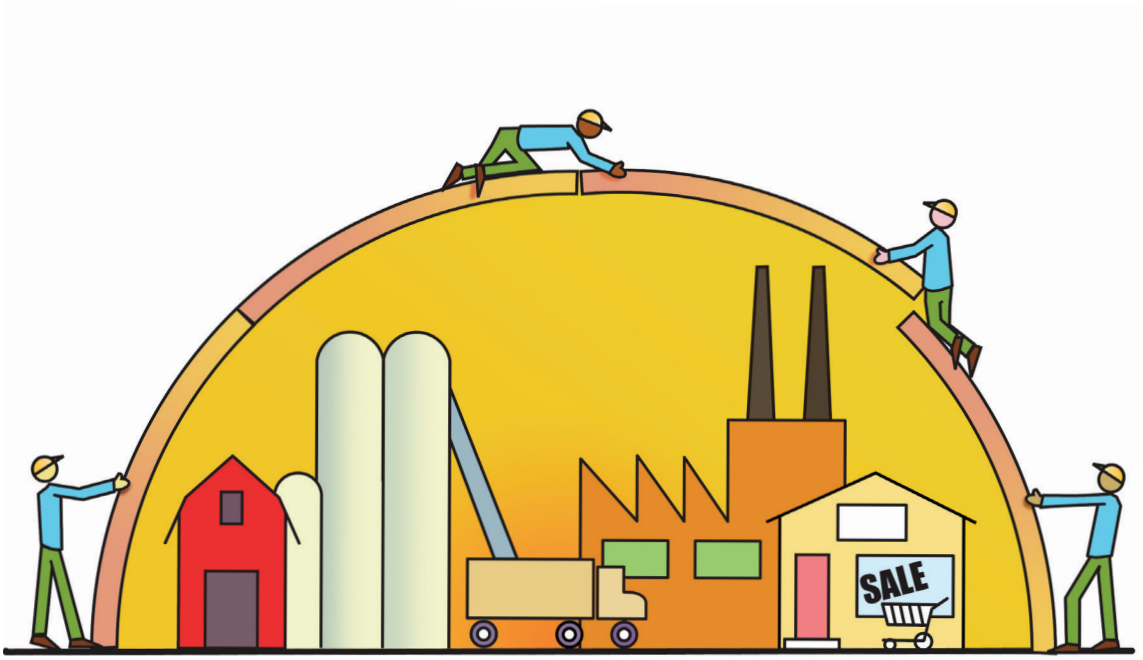
Guidance for Industry: Retail Food Stores and Food Service Establishments: Food Security Preventive Measures Guidance. December 2003; updated October 2007. U.S. Department of Health and Human Services, Food and Drug Administration, Center for Food Safety and Applied Nutrition; http://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/FoodDefense/ucm082751.htm

*Guidelines for the Disposal of Intentionally Adulterated Food Products and the Decontamination of Food Processing Facilities.* April 14, 2006. U.S. Department of Agriculture Food Safety and Inspection Service; http://www.fsis.usda.gov/wps/wcm/connect/2ad1ceca-b3b7-4cec-b0d9-127a9cf3e333/Disposal_Decontamination_Guidelines.pdf?MOD=AJPERES

*How to Dispose of Contaminated or Spoiled Food: A Notice from the Food and Drug Administration to Growers, Food Manufacturers, Food Warehouse Managers, and Transporters of Food Products.* No date. U.S. Food and Drug Administration; http://www.fda.gov/Food/RecallsOutbreaksEmergencies/Emergencies/ucm112717.htm

Pre-Harvest Security Guidelines and Checklist 2006. March 2006. U.S. Department of Agriculture; http://www.usda.gov/documents/PreHarvestSecurity_final.pdf

*Temporary Housing and Care for Livestock and Poultry: Standard Operating Guide No. 003.* October 28, 2008. Missouri Department of Agriculture; http://mda.mo.gov/animals/pdf/animalag_guide3.pdf

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