Bioterrorism/Biosecurity Awareness:  
The Protection of Human and Animal Health

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The significance of national security became as evident as it is today because of the events of September 11, 2001. The terrorist attacks that occurred on that day created a sense of vulnerability that we, as American citizens, have yet to fully recover from. Shortly afterwards, the question of bioterrorism and biosecurity came to the forefront of the minds of Americans with the occurrence of events such as the anthrax attacks and the “mad cow” disease scares.

As our personal and national safety become of even greater concern, the topics of bioterrorism and how biosecurity measures can be used to protect you should be of utmost importance. Members of the American agricultural industry should be particularly concerned because the mobility and interconnectedness of the industry makes it susceptible to disease outbreaks. Furthermore, a disease outbreak or biological attack on the American livestock industry could cripple the nation by causing widespread losses of livestock and diminishing the confidence of consumers -both domestic and international- in the safety of the products that are produced. In this article, bioterrorism and the role that zoonotic diseases play will be discussed. Biosecurity and some basic disease control methods that you can implement will be presented. Then, some of the governmental agencies that are involved in protecting the nation will be highlighted. Finally, some recommendations will be given in the event that a bioterrorist attack is suspected to have taken place.

Bioterrorism is defined as “the use of microorganisms or toxins derived from living organisms to cause death or disease in humans, animals, or plants in civilian settings” (Huxsoll et al., 1987). Although the possible motivations behind an attack of this kind are numerous, the most important aspect of bioterrorism is to be able to recognize the signs or clues that an attack has occurred as soon as possible. When attempting to detect a bioterrorist attack, some indications that a biological agent has been released include: 1) an abnormal grouping of illnesses or deaths that may be temporal or geographical in nature that affect a large number of people or animals, which may include unusual or unexplained symptoms; 2) healthy individuals become ill suddenly; 3) unusual symptoms for a particular area arise; 4) an unusual age distribution among affected individuals; or 5) the disease appears outside of its “typical” season.

Many of the potential agents that are used in bioterrorism are zoonotic. Zoonotic organisms are organisms that can be transmitted from animals to humans. This is an important fact to consider when dealing with zoonotic diseases for numerous reasons. First, some diseases may manifest symptoms in animals before they are seen in humans. Second, animals -including pets, livestock, and wildlife- may serve as sentinels. A
sentinel is an individual in a group or population that is susceptible to a disease being monitored for the appearance of the causative agent ("sentinel", n.d.). These sentinels can also serve as vectors and spread the disease to large areas in the case of wildlife that can travel long distances, which makes them potential sources of infection for both humans and other animals. Some factors that promote the spread of zoonotic diseases are frequent contact with animals, either wild or domestic, poor animal sanitation practices, poor animal healthcare practices, and poor personal hygiene.

In a disease control program, one should first understand how disease is transmitted. Disease may be transmitted through direct contact, indirect contact, and aerosol transmission. Direct contact occurs when the infectious organism makes contact with the affected individual through gel, liquid, or a powder form. Infection could occur if the agent contacts a scratch on the body or a droplet containing the agent contacts the mucous membranes. Indirect contact occurs through ingestion of contaminated food or water, or through injection by a vector into the skin. Another form of transmission is through aerolization, which is when the agent spreads as small particles that float through the air.

The general public can do a variety of things to control disease and protect themselves from zoonotic diseases. Immuno-compromised individuals should pay particular attention to these guidelines. The first thing that can decrease your risk of exposure to zoonotic diseases is to practice basic hygiene like hand washing. It is also a good practice to clean and disinfect areas that have been contaminated with animal waste, including areas inhabited by livestock, pets, wildlife, and rodents. Some other suggestions that will decrease the risk of exposure to zoonotic agents include selecting pets cautiously, avoiding petting zoos, cooking food properly, controlling the stray population in your area by notifying proper authorities, and regularly visiting and communicating with your physician and veterinarian.

Producers in the animal industry also play apart in disease control and biosecurity. Maintaining a healthy herd will reduce the risk of outbreaks of disease. This can be done by implementing a protocol that includes vaccination and proper hygiene for both animals and handlers. It is also important for producers to purchase animals from a reputable source and to quarantine all incoming animals before introducing them to the rest of the herd. In addition, sick animals should be identified as quickly as possible and quarantined from the rest of the herd. The herd veterinarian should be contacted immediately if unusual illness or signs are noticed. Table scraps and garbage should not be fed to farm animals. Producers should also control insects, birds, rodents and other animals that may introduce and spread disease on their farm, while paying particular attention to feed storage areas.

Other biosecurity measures that the producer can implement on the farm include controlling the flow of traffic into the farm and regulating visitors. Some suggestions to control the flow of traffic include posting signs that clearly show approved entrances and exits, limiting access to the farm to a one gated road, keeping the gate locked when not in use, and keeping all unused buildings locked. Vehicles that enter and leave the farm should be clean and sanitized to avoid the transfer of dirt, mud, or manure and parked away from livestock areas and barns, preferably on concrete. Visitors to the farm should be kept to a minimum. If someone must enter the farm, be sure that signs are posted to inform visitors of the guidelines to follow while on the farm. Be sure that they have on
clean clothing and boots that have been disinfected or provide them with disposable plastic boot covers. Do not take visitors to livestock areas or barns unless it is necessary. It is also a good idea to monitor and document all visits to your farm. Concerning personnel and animal handlers, prescreen new employees and train them to spot common disease signs and patterns, so they can recognize abnormalities in the herd. Personnel that visit or work on multiple farms should: 1) wash hands thoroughly with disinfectant soap before and after accessing livestock areas; 2) use clean coveralls and rubber or disposable boots for each farm; 3) place dirty coveralls in a plastic bag after each farm visit; 4) and clean and disinfect boots after each visit. It is also a good idea to always have on hand the contact information for the herd veterinarian, the state veterinarian office, USDA/APHIS area office, animal extension personnel, and the state public health and agriculture departments.

The US government is also doing its part in maintaining the security of the public. On June 12, 2002 the “Public Health Security and Bioterrorism Preparedness Response Act of 2002’ was enacted to improve the ability of the United States to prevent, prepare for, and respond to bioterrorism and other public health emergencies. A new Department of Homeland Security (DHS) was also established through the Homeland Security Act of 2002. The DHS, whose mission is to prevent, protect, and respond to acts of terrorism on US soils, is divided into 4 parts, which includes 1) border and transportation security, 2) emergency preparedness and response, 3) chemical, biological, radiological and nuclear countermeasures, and 4) information analysis and infrastructure protection. The Centers for Disease Control and Prevention (CDC), which has been working for decades to respond to public health emergencies, is the leading federal agency for protecting the health and safety of the people. The CDC enacted their bioterrorism plans in 2001 and was actually one of the first agencies to respond to the anthrax attacks. One of the programs of the CDC, the National Pharmaceutical Stockpile (NPS) Program, ensures that life-saving pharmaceuticals, antidotes, and other medical supplies that can be used to counter the effects of a bioterrorist attack are available and can be packaged and transported to any location within the US where a civilian population is attacked with a biological, toxin, or chemical agent.

The CDC’s Bioterrorism Preparedness and Response Office developed the Category ABC Bioterrorism Agent List in order to classify agents based on the threat they pose to public health. Based on certain criteria, the agents were scored and divided into A, B, and C categories with A being reserved for agents of the highest priority. When one is just beginning to learn about these types of diseases, it is important to understand the term “weaponization” of agents. Weaponization happens when the characteristics of the disease are altered making the agent a more effective weapon. The agent may be altered to enhance transmission, to make it highly infectious, to make it resistant to antibodies, to eliminate the ability of vaccine protection, or to alter the clinical signs.

In Table 1, some common symptoms that may suggest that a group or individual were exposed to a bioterrorist agent are presented. If bioterrorism is suspected, remember to stay informed and remain calm, follow the advice of the public health officials, follow the state and federal guidelines that pertain to the event, and limit movement if necessary. Also, it is important to realize that response varies with the event and that it is everyone’s responsibility.
In today’s world, bioterrorism is a real threat. Awareness and vigilance are two of the most important tools that can be used to deal with threats of this type. Remember that many bioterrorism agents are zoonotic and that prevention, recognition, and response involve everyone including you.

Table 1. Common presentations to identify the possibility of a bioterrorist attack

<table>
<thead>
<tr>
<th>Body Area</th>
<th>Symptoms</th>
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</thead>
<tbody>
<tr>
<td>Skin</td>
<td>Eruptions, vesicles, or rashes; sores on feet, mammary tissue, or in mouth</td>
</tr>
<tr>
<td>Respiratory System</td>
<td>Secretions from nose or mouth; difficulty breathing; coughing</td>
</tr>
<tr>
<td>Digestive System</td>
<td>Vomiting; nausea; diarrhea, profuse saliva; lack of appetite, weight loss</td>
</tr>
<tr>
<td>Nervous System</td>
<td>Paralysis; incoordination</td>
</tr>
<tr>
<td>Reproductive System</td>
<td>Difficult births; abortion; infertility; low birth weights</td>
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References

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