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Aplicaciones prácticas para el manejo de riesgos biológicos

Transmisión por Aerosol
Productores de Lácteos



This presentation will review some key points of biological risk management, general prevention steps that can be applied to every farm to decrease the risk of disease introduction and spread, and specific steps to reduce the chance of aerosol transmission on farm.

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Manejo de Riesgos Biológicos (MRB)

- Proceso general de concientización, evaluación y manejo
- Diseñado para mejorar el control de infecciones/enfermedades
 - Enfermedades exóticas y endémicas
- Proporcionar herramientas para minimizar el riesgo

Zona de Control de Enfermedades Animales

Se prohíbe la entrada a vehículos o bicicletas de uno privado más allá de este punto.

Está usted a punto de ingresar a una instalación ganadera.

Bienvenidos visitantes.

Favor de tomar un folleto donde aparecen descritos los pasos que estamos tomando para proteger su salud y garantizar su seguridad, así como para preservar la salud de nuestro ganado.

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Biological risk management is the overall process of awareness education regarding the risk of infectious diseases entering or spreading through an animal facility. It also involves evaluating and managing those risks. BRM is designed to help livestock producers understand the need for infection or disease control, not only for foreign animal disease threats but domestic diseases as well. Biological risk management provides the tools to minimize the risk (photo courtesy of: DB Weddle).

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Manejo de Riesgos Biológicos (MRB)

- No es posible eliminar totalmente el riesgo de enfermedades
 - El animal, su entorno
 - Disminuir la exposición a patógenos
- Minimizar la amenaza para animales y humanos
- No existe una misma respuesta para todos los casos



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BRM recognizes that diseases cannot be eliminated, but that the risk can be managed through effective control measures. As animal caretakers, it is our duty to be knowledgeable of the animal and its environment to minimize the risk of disease. For nearly all diseases there is a relationship between dose exposure and severity of disease. For disease that are always present (endemic), reducing the dose of infectious agent the animal is exposed to can positively affect the farm's economic impact and help justify the cost of implementing BRM. Many different solutions exist and because all cattle facilities are different, there is not a one-size-fits-all answer. Photo depicts two dairy employees working in a milking parlor (Photo courtesy of USDA - ARS).

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Vías de transmisión

- Propagación de patógenos
 - Animal ↔ animal
 - Animal ↔ humano
- Diferentes vías de transmisión

– Aerosol	– Oral
– Contacto directo	– Vector
– Fomite	– Zoonótica



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Disease agents can be spread from animal to animal, or animal to human, through a variety of transmission routes. For the purposes of the biological risk management materials, 5 main routes were identified: aerosol, direct contact, fomite, oral and rector-borne. The sixth route, zoonotic, can be spread from animals to humans through one of the 5 previously listed routes. Many infectious agents can be transmitted by more than one route of infection. This photo shows several dairy cows grazing in a pasture (Photo courtesy of USDA – ARS).

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Transmisión por aerosol

- Patógenos dentro de las gotas
 - Se transmiten a través del aire
- Los patógenos en su mayoría no permanecen estables en la gota
 - Tiene que haber una proximidad extrema
 - Entre animales infectados y animales susceptibles



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Aerosol transmission occurs when disease agents contained in droplets are passed through the air from one animal to another, or animal to human. Most pathogenic agents do not survive for extended periods of time within the aerosol droplets, and as a result, close proximity of infected and susceptible animals is required for disease transmission. The photo depicts a tunnel ventilated dairy building; aerosol transmission is of concern if not properly ventilated (Photo courtesy of DB Weddle, ISU).

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Algunas enfermedades que se propagan por aerosol

Enfermedades exóticas	Existentes en EE.UU.
• Pleuroneumonía contagiosa bovina	• Antrax
• Fiebre aftosa	• BRSV
• Fiebre catarral maligna	• BVD
	• IBR
	• <i>M. hemolytica</i>
	• <i>Mycoplasma</i>
	• Fiebre Q
	• Tuberculosis

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There are many diseases transmitted by the aerosol route, both diseases that are foreign animal diseases (FADs) and those that are present in the US (endemic). Some examples of foreign animal diseases include contagious bovine pleuropneumonia (CBPP), foot and mouth disease (FMD), and malignant catarrhal fever (MCF). The diseases that are already present in the US include anthrax, bovine respiratory syncytial virus (BRSV), bovine viral diarrhea (BVD), infectious bovine rhinotracheitis (IBR or red nose), *Mannheimia hemolytica* (was *Pasteurella*), *Mycoplasma pneumonia*, Q fever, and tuberculosis and others. The main point to drive home is that they are all transmitted by the same route and prevention practices aimed at one will protect against others. For a complete listing of all diseases transmitted by the aerosol route, please refer to the Bovine Routes of Transmission Handout-Aerosol.

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Vías de transmisión

- Atañen a todos los agentes infecciosos
- El animal tiene que estar expuesto para contraer la enfermedad
- Comprender las distintas vías de transmisión = obtener el control
- Es necesario identificar las áreas de riesgo
 - Diseñar protocolos para minimizar la exposición

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Every disease has to enter into an animal by some route, so looking at disease prevention through the routes of transmission makes sense. One advantage to this approach is that it will also help protect against new or unexpected infectious diseases. This classification system is effective and easy to understand without requiring knowledge about a wide range of diseases, like all those listed at the beginning of this presentation. While disease agents and the infections they produce vary, they all have one thing in common: the animal must be exposed to them to develop disease. Once it is understood that different diseases can be acquired through various routes of transmission (i.e. aerosol, oral, direct contact, fomite, vector), it is easier to gain control over them. From a management standpoint, it may be easier to identify risk areas, such as fomites, and then design protocols to minimize exposure.

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Transmisión de la enfermedad

- Es posible que los animales no muestren signos evidentes de la enfermedad
- El conocimiento de todas las vías de transmisión es esencial
 - Formular una estrategia que minimice el riesgo de enfermedad en la operación ganadera



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It is important to remember that disease transmission can occur without animals exhibiting obvious signs of disease. That is why awareness of the various routes of transmission becomes so essential when assessing and developing a strategy to minimize the risk of disease for a facility or operation. The photo shows a calf lying in a wooden calf hutch (photo courtesy of DB Weddle, ISU).

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Pasos preventivos generales

- Panorama general
 - Perímetro de la explotación lechera
 - Identificación de los animales
 - Salud animal
 - Animales enfermos/muertos
 - Aislamiento/cuarentena
 - Administración del abastecimiento
 - Manejo neonatal

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There are many general prevention steps that every farm could implement that would help prevent against a variety of diseases that are transmitted in various ways. Things such as knowing what is in the area of your farm perimeter- farms, neighboring livestock, wildlife; individual animal identification, animal health protocols, recognizing and dealing with sick and dead animals, isolation/quarantine, supply handling, and neonatal management. This next section will provide some general prevention recommendations for those areas.

S_Aerosol-Dairy

S l i d e 1 0	<p>Pasos preventivos generales</p> <ul style="list-style-type: none">• Restrinjan el contacto con animales como<ul style="list-style-type: none">– El ganado vecino– Fauna silvestre, aves– Perros, gatos que deambulan• Den mantenimiento a las cercas• Establezcan protocolos de bioseguridad para vehículos de reparto, del personal• Cierren con llave las entradas  <p><small>Center for Food Security and Public Health Iowa State University 2006</small></p>	<p>Limit contact with animals that may present a disease risk by coordinating with your neighbors to avoid fence line contact between herds. Prevent cats and dogs from roaming between farms. By maintaining fences (repairing/replacing posts, tightening wires), you minimize the risk of animals escaping, or other animals entering, and mixing with other livestock or wildlife species, which increases their risk of disease exposure. You should establish biosecurity protocols for delivery vehicles and personnel to follow on your farm. Gates are installed as a barrier to human entry and should be locked to prevent animal contact and subsequent disease exposure. Photo courtesy of Bryan Buss, ISU.</p>
S l i d e 1 1	<p>Pasos preventivos generales</p> <ul style="list-style-type: none">• Identifiquen individualmente a los animales• Importante para<ul style="list-style-type: none">– Comunicar su estado de salud– Las necesidades de tratamiento– La ubicación dentro de la explotación lechera– Llevar registros  <p><small>Center for Food Security and Public Health Iowa State University 2006</small></p>	<p>If more than one person works on an operation, individual animal identification is imperative for proper communication of health status, treatment needs, antibiotic withdrawal/residue prevention status, and location on farm. Individual animal identification is essential for proper record keeping (vaccinations, treatments, pregnancy status) which is an integral part of managing animals and minimizing disease risk on farm. Keeping treatment records on a dairy is an integral part of minimizing disease risk on farm because protocols can be tracked over time with your veterinarian and used to determine whether things are working in various disease situations. (photo courtesy of DB Weddle, ISU)</p>
S l i d e 1 2	<p>Pasos preventivos generales</p> <ul style="list-style-type: none">• Lleven registros del estado de salud de cada uno de los animales• Revisen los programas de vacunación y tratamientos<ul style="list-style-type: none">– Anualmente, semestralmente– Protocolo comparado con la realidad• Investiguen síntomas poco usuales, casos que no responden al tratamiento<ul style="list-style-type: none">– Neurológicos, animales caídos, muerte súbita  <p><small>Center for Food Security and Public Health Iowa State University 2006</small></p>	<p>To monitor health status, it is imperative to keep health records on every animal. There are many computer programs out there that can simplify this for producers as the photo depicts (courtesy of Dale Moore, UC Davis VMTRC). It is important to work with your veterinarian to review treatment and vaccination records so alterations can be made to the animal health protocols on farm; this will also help ensure what you think is happening is actually happening. Producers should work with their veterinarian to investigate those animals that present with unusual symptoms or are unresponsive to treatment, especially neurologic cases, downers and those that die suddenly.</p>
S l i d e 1 3	<p>Pasos preventivos generales</p> <ul style="list-style-type: none">• Capaciten al personal de la explotación para que reporte a los animales enfermos<ul style="list-style-type: none">– Inspeccionen a los animales diariamente– Equipo, botas, vestimenta limpios• De manera inmediata y adecuada, sacrifiquen a los animales terminalmente enfermos<ul style="list-style-type: none">– Retirándolos del predio o beneficiándolos para extraer grasa• Realicen la autopsia a los animales que hayan muerto por causas desconocidas  <p><small>Center for Food Security and Public Health Iowa State University 2006</small></p>	<p>By establishing and educating all employees on what to look for regarding sick animals and having a reporting system so that those in charge can make treatment decisions or the veterinarian can be contacted, serious diseases can be identified early on and minimize the risk of disease spread. It is important to clean any equipment, boots or clothing that is used between groups of animals with differing health status. Animals that are not going to recover can serve as a reservoir for many disease organisms and should be euthanized humanely and in a timely manner. Dead animals can also serve as a reservoir for many disease organisms and should be promptly removed from the operation. Dead animals need to be rendered, composted or buried in a timely manner so predators, wild birds, etc do not spread disease. By having a veterinarian necropsy animals that die of undetermined causes, a diagnosis may be obtained by sending samples into a diagnostic laboratory. Unusual diseases may not present in a manner you are used to, so involving a veterinarian may help identify a potentially infectious disease before it becomes widespread on your facility. Photo depicts an Ayrshire calf being necropsied and samples being collected for diagnostic testing (courtesy of UC Davis VMTRC).</p>

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Pasos preventivos generales

- Aíslen de inmediato a los animales enfermos
 - Sin ventilación compartida, sin contacto directo con otros animales
- Pongan en cuarentena a los animales de reciente introducción
 - Compras nuevas, animales que regresan
- El lapso de tiempo se determina junto con el médico veterinario
- Realicen pruebas para detectar enfermedades clave antes de colocarlos con el resto del hato



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Iowa State University 2006

Cattle of all ages that are identified as ill should be removed from the rest of the herd immediately and placed in an isolation area where ventilation, feed/water, and other equipment and is not shared and direct contact with other animals does not occur in order to minimize the risk of disease spread. Newly introduced animals, including show cattle/calves that have been away from the farm as pictured here, may be carrying diseases that your home herd is not immune to, so quarantine them for a period of time. Time spent in isolation and quarantine varies depending on the risk so this should be determined together with your herd veterinarian. Before taking animals out of isolation or quarantine, it is a good risk management plan to test them for key diseases (determined together with your herd veterinarian) and make sure they are not carrying diseases that could be introduced into the home herd. Photo courtesy of DB Weddle, ISU.

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Pasos preventivos generales

- Almacenen las vacunas y antibióticos que no requieren refrigeración fuera de la luz de sol ya que ésta podría desactivarlos
- Monitoreen mensualmente la temperatura de refrigeración
 - Temperatura ideal 36-46°F
- Restrinjan el acceso a las medicinas para que solo lo tenga el personal debidamente capacitado



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Sunlight can deactivate vaccines resulting in inadequate protection; it can also reduce effective treatment by rendering antibiotics ineffective. Vaccines and medicines that need to be refrigerated are susceptible to changes in temperature and may not be effective if they get too warm (greater than 46 degrees Fahrenheit) or too cold/frozen (less than 36 degrees Fahrenheit); monitoring your refrigerator at least monthly can help ensure the products are adequately stored. Work with your veterinarian to teach proper handling procedures to all people who routinely deal with vaccines and medicine and restrict access to only trained personnel. The photo depicts a refrigerator on a dairy farm with a thermometer- purchased for less than \$3 at a large retail store (photo courtesy of DB Weddle, ISU).

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Pasos preventivos generales

- Garanticen la ingestión adecuada de calostro libre de enfermedades durante las 6 primeras horas de vida
- Eviten el contacto con animales mayores, ambientes contaminados



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Adequate ingestion of colostrum is the most important consideration for calf's resistance to disease and all calves should receive colostrum within 6 hours of birth. A calf's immune system depends on the antibodies in colostrum. After 6 hours of life, the calf's ability to absorb antibodies from colostrum diminishes. Once a calf is born, subsequent milk production in the cow will dilute colostrum and therefore require the calf to consume more for maximum antibody absorption and immune function. Another good practice is to prevent contact of the neonate with older animals and also contaminated environments. This will decrease the pathogen load to the newborn and give the colostrum the ability to provide protection. The photo depicts colostrum in a freezer that is stored in palpation sleeves (with the fingers tied off), labeled with the cow ID number and dated. This allows for easy thawing and making sure the calf gets colostrum from one cow (photo courtesy of DB Weddle).

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Control de la transmisión por aerosol

Now that we have discussed some general prevention steps, let us look specifically at aerosol transmission and control measures you can apply on your dairy farm to minimize disease spread.

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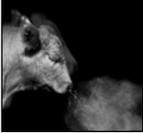
Algunas enfermedades que se propagan por aerosol	
Enfermedades exóticas	Existentes en EE.UU.
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• Fiebre aftosa	• BRSV
• Fiebre catarral maligna	• BVD
	• IBR
	• <i>M. hemolytica</i>
	• <i>Mycoplasma</i>
	• Fiebre Q
	• Tuberculosis

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There are many diseases transmitted by the aerosol route, both diseases that are foreign animal diseases (FADs) and those that are present in the US (endemic). Some examples of foreign animal diseases include contagious bovine pleuropneumonia (CBPP), foot and mouth disease (FMD), and malignant catarrhal fever (MCF). The diseases that are already present in the US include anthrax, bovine respiratory syncytial virus (BRSV), bovine viral diarrhea (BVD), infectious bovine rhinotracheitis (IBR or red nose), *Mannheimia hemolytica* (was *Pasteurella*), *Mycoplasma pneumonia*, Q fever, and tuberculosis and others. The main point to drive home is that they are all transmitted by the same route and prevention practices aimed at one will protect against others. For a complete listing of all diseases transmitted by the aerosol route, please refer to the Bovine Routes of Transmission Handout-Aerosol.

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Aerosol	
• Los pasos preventivos básicos significan	
– Aumentar la distancia entre animales enfermos y animales sanos	
– Maximizar la ventilación	
• Proporcionar aire fresco a los animales	
• Disminuir la humedad y la acumulación de olores	

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Aerosol transmission occurs when infected droplets are passed through the air from one animal (infected) to another animal (susceptible) as this graphic depicts. There are various prevention steps that can help ensure aerosol transmission does not occur. One essential step is to increase the distance between sick and susceptible animals. Another is to maximize ventilation so that fresh air is provided to all animals and humidity and odors do not build up. These basic steps will go a long way in preventing aerosol disease transmission. Graphic designed by Clint May, ISU.

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Aislamiento/Cuarentena	
• La distancia es importante	
• Eviten que los animales enfermos compartan el mismo espacio de aire que los animales sanos	

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Isolation and quarantine were discussed under general prevention, so we will not cover that in detail here, other than to point out that for aerosol spread diseases, distance is extremely important. Air space should not be shared between sick and healthy animals as is depicted in this photo with the sick cow isolated by herself in an outdoor pen (courtesy of Geni Wren, Bovine Veterinarian Editor).

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Parición	
• Los corrales de parición no deberán usarse para alojar a animales enfermos	
• Las vacas deberán parir por separado de las vaquillas para minimizar la exposición a la enfermedad	

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The birthing process is a stressful time in an animal's life. Calving pens should be designated for this purpose and not used to house sick animals due to the risk of disease organisms being shed into the environment and exposing stressed animals at calving. Calving cows/heifers individually and following proper hygiene procedures between animals will also help minimize the risk of disease exposure. In this photo we have a perfectly clean, bedded calving pen with some lye which is a good environment for the animal placed there. The problem can be that if we house a sick animal in the next pen or the same air space, aerosol transmission can still occur; even with our excellent "clean" setup (photo courtesy of Colorado State University).

S_Aerosol-Dairy

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Looking at this picture (left picture appears first) what do we see? A nice western setting, with a hard working cowboy. Reminiscent of the old west. (press next and the next picture and wording will appear). Now what do we see? DUST! Now looking back to our pretty picture on the left do we have the same perspective. Photos source: left – The Animal Photo Archive; right – Pat Gordon, DVM.

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Alojamiento

- En el caso de corrales secos, controlen el polvo
 - Un tracto respiratorio dañado = enfermedad
 - Utilicen agua en cantidades limitadas



Dust is an irritant to the throat, lungs and eyes and can predispose cattle to conjunctivitis and respiratory disease if their mucous membranes get damaged. There are products available to minimize dust in dry lots, as well as water mists that can be applied; however, excessive amounts of water can lead to mud which is not ideal for cattle either. Photo depicts a dry lot dairy in the SW U.S. where water is used as a coolant for cows in the heat but must not be used in excess due to mud (courtesy of DB Weddle, ISU).

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Alojamiento

- Regulen la ventilación interior
 - Ventiladores, paredes laterales de cortina, aspersores
 - Los requerimientos varían dependiendo de la construcción
- Mantengan bajos los niveles de humedad al interior
 - Los patógenos se acumulan cuando existe demasiada humedad



Adequate ventilation is essential to respiratory health and barns should be equipped to handle heat and humidity extremes (fans, curtain side walls, sprinklers) and prevent the buildup of stagnant air (ammonia, methane). Ventilation requirements vary based on building style but for every foot of fan diameter placed at a 30 degree angle, it will blow 10 feet. High humidity levels in a barn can decrease ventilation and air, carrying disease pathogens, can become stagnant making animals more susceptible to respiratory disease. Monitoring humidity in the barn is part of a good ventilation plan, allowing you to make fan and side curtain adjustments so that air does not become stagnant and pathogens build up that can cause respiratory disease. Photo depicts 3 foot diameter fans and sprinklers over the feedbunk with open curtain sidewalls in the background (courtesy of DB Weddle, ISU).

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Alojamiento neonatal

- Los cobertizos individuales para becerros son ideales para lograr una menor exposición por aerosol



Neonatal housing is important with regards to aerosol exposure. To minimize the risk, individual calf hutches are ideal to limit aerosol exposure with other calves, as the photo on the left depicts (courtesy of DB Weddle, ISU). The structure on the right could have excellent air flow, good quality air, and low humidity which is ideal for calves, but the risk of aerosol spread increases (photo courtesy of DB Weddle, ISU). Producers must decide what types of risks they are willing to accept- what can they manage.

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Resumen

- La transmisión por aerosol ocurre diariamente en las explotaciones lecheras
IBR, BVD, BRSV, *Mycoplasma*
- Las enfermedades exóticas también pueden propagarse por aerosol
 - CBPP, FMD
- Los pasos preventivos que hemos descrito aquí pueden ayudar a minimizar sus riesgos

Aerosol transmission occurs on farms with everyday diseases like Infectious Bovine Rhinotracheitis (IBR) or 'red nose', Bovine Respiratory Syncytial Virus (BRSV), Bovine Viral Diarrhea (BVD), and *Mycoplasma bovis*. Should a foreign animal disease occur in the US, such as Contagious Bovine Pleuropneumonia (CBPP) or Foot and Mouth Disease (FMD), they too can be spread through aerosol transmission. Taking some of the basic prevention steps as described in this presentation can help you decrease your risk of disease introduction and spread on your farm.

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Objetivos clave de aprendizaje

- El manejo de riesgos biológicos es importante
- Todas las enfermedades se transmiten a través de unas cuantas vías comunes
- Los riesgos de enfermedad pueden manejarse
- La concientización es esencial
- ¡Ustedes desempeñan una función esencial!

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Throughout this presentation, we have stressed that biological risk management is important. All diseases are transmitted by a few common routes and managing disease exposure will help decrease the level of disease. While disease risk cannot be completely eliminated, it can be managed. Awareness education is essential for effective disease control and each of YOU play a critical role!

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¿Tienen preguntas?

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