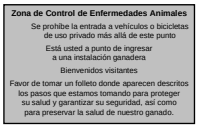
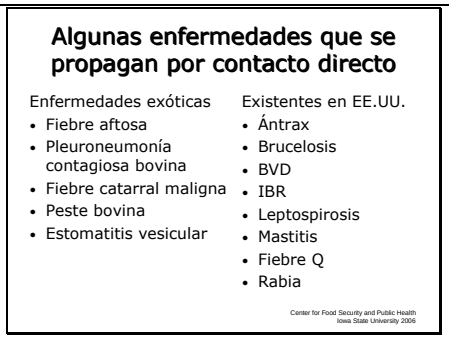
S_Direct Contact Fomite Transmission-Beef

Slide 1	Aplicaciones prácticas para el manejo de riesgos biológicos Transmisión por Contacto Directo y Fomites Productores de Carne de Res	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.
Slide 2	**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 prohibe la entrada a vehículos o bicicletas de uso 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. Center for Food Security and Public Health Iowa State University 2006	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).
Slide 3	**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  Center for Food Security and Public Health Iowa State University 2006	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 cattle in a pasture and the owner walking through them monitoring for illness (courtesy of USDA, taken by Bill Tarpenning).
Slide 4	**Vías de transmisión** • Propagación de patógenos – Animal ⟷ animal – Animal ⟷ humano • Diferentes vías de transmisión – Aerosol – Contacto directo – Fomite – Oral – Vector – Zoonótica  Center for Food Security and Public Health Iowa State University 2006	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 cow-calf pairs being herded to another pasture in Oregon (courtesy of USDA, image # 95cs0779, taken by Doug Wilson).
Slide 5	**Transmisión por contacto directo** • El patógeno se encuentra en el animal o en el medio ambiente – Heridas abiertas, membranas mucosas, piel – Sangre, saliva, contacto nariz con nariz, frotación, mordeduras • Transmisión reproductiva – Durante el servicio – De la madre a la cría   Center for Food Security and Public Health Iowa State University 2006	Transmission by **direct contact** requires the presence of an agent or organism in the environment or within an infected animal. A susceptible animal becomes exposed when the agent directly touches open wounds, mucous membranes, or the skin through blood, saliva, nose to nose contact, rubbing or biting as could occur when a newborn calf is being licked off by its mother (photo courtesy of USDA). It is important to note that depending on the disease agent, it is possible for direct contact transmission to occur between animals of different species as well as to humans. For the purposes of the BRM information, reproductive transmission will encompass those diseases spread through venereal and in-utero routes. **Reproductive transmission**, a type of direct contact, is

the spread of pathogenic agents from animal to animal through breeding. **In-utero** transmission, another type of direct contact, is the spread of pathogenic agents from dam to offspring during gestation. The bottom photo depicts a time when reproductive transmission could occur- breeding (courtesy of USDA, Image Number: 01cs0192 taken by: Bill Tarpenning).

Slide 6

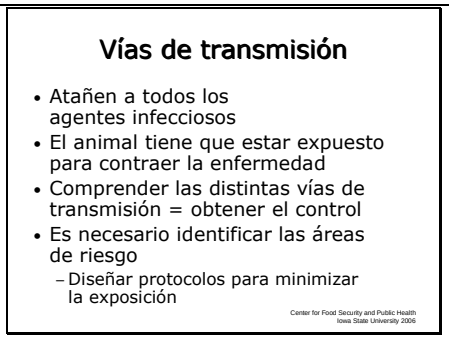


There are many diseases transmitted by the direct contact route, both diseases that are foreign animal diseases (FADs) and those that are present in the US (endemic). Some examples of foreign animal diseases include foot and mouth disease (FMD), contagious bovine pleuropneumonia (CBPP), malignant catarrhal fever (MCF), rinderpest and vesicular stomatitis. The diseases that are already present in the US include anthrax, brucellosis, bovine viral diarrhea (BVD), infectious bovine rhinotracheitis (IBR or red nose), leptospirosis, mastitis, Q fever, rabies 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- Direct Contact.

Slide 7

A component of direct contact transmission are fomites. A **fomite** is an inanimate object that can carry pathogenic agents from one susceptible animal to another. Examples of fomites include contaminated brushes, clippers, needles, balling guns (middle picture; photo courtesy of DB Weddle) clothing, milking units, teat dip cups, feed or water buckets, and shovels. These items must be managed as fomites but they will transmit disease when they have direct contact with a susceptible animal. The top photo depicts a situation in which disease transmission may occur via a fomite, grooming equipment; photo source USDA. **Traffic transmission** is a type of fomite transmission in which a vehicle, trailer, or human spreads organic material to another location, like the pickup and trailer pictured here (courtesy of Bryan Buss, ISU).

Slide 8



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 by 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.

S_Direct Contact Fomite Transmission-Beef

Slide 9

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

Center for Food Security and Public Health
Iowa State University 2006

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 pasture (photo source USDA).

Slide 10

Pasos preventivos generales

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

Center for Food Security and Public Health
Iowa State University 2006

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.

Slide 11

Pasos preventivos generales

- Restrinjan el contacto con animales como
  - 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

Center for Food Security and Public Health
Iowa State University 2006

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 DB Weddle, ISU.

Slide 12

Pasos preventivos generales

- Identifiquen individualmente a los animales
- Importante para
  - Comunicar su estado de salud
  - Las necesidades de tratamiento
  - La ubicación dentro de la explotación lechera
  - Llevar registros

Center for Food Security and Public Health
Iowa State University 2006

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.

Slide 13

Pasos preventivos generales

- Lleven registros del estado de salud de cada uno de los animales
- Revisen los programas de vacunación y tratamientos
  - Anualmente, semestralmente
  - Protocolo comparado con la realidad
- Investiguen síntomas poco usuales, casos que no responden al tratamiento
  - Neurológicos, animales caídos, muerte súbita

Center for Food Security and Public Health
Iowa State University 2006

To monitor health status, it is imperative to keep health records on every animal. 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.

Slide 14

Pasos preventivos generales

- Capaciten al personal de la explotación para que reporte a los animales enfermos
  - Inspeccionen a los animales diariamente
  - Equipo, botas, vestimenta limpios

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Iowa State University 2006

Educate all employees on how to recognize sick animals and have a reporting system so that treatment decisions can be made or the veterinarian can be contacted. It is important to clean any equipment, boots, 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 so predators, wild birds, etc do not spread disease. Unusual diseases may not present in a manner you are used to, so have a veterinarian necropsy those odd cases to help identify a potentially infectious disease before it becomes widespread on your facility. Photo depicts a steer being necropsied by veterinary students at a feed yard (courtesy of Dan Thomson, KSU).

Slide 15

Pasos preventivos generales

- De manera inmediata y adecuada, sacrifiquen a los animales terminalmente enfermos
  - Retirándolos del predio o beneficiándolos para extraer grasa

- Realicen la autopsia a los animales que hayan muerto por causas desconocidas

Center for Food Security and Public Health
Iowa State University 2006

Educate all employees on how to recognize sick animals and have a reporting system so that treatment decisions can be made or the veterinarian can be contacted. It is important to clean any equipment, boots, 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 so predators, wild birds, etc do not spread disease. Unusual diseases may not present in a manner you are used to, so have a veterinarian necropsy those odd cases to help identify a potentially infectious disease before it becomes widespread on your facility. Photo depicts a steer being necropsied by veterinary students at a feed yard (courtesy of Dan Thomson, KSU).

Slide 16

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

Center for Food Security and Public Health
Iowa State University 2006

Cows 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.

Slide 17

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 36-46oF
- Restrinjan el acceso a las medicinas para que solo lo tenga el personal debidamente capacitado

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Iowa State University 2006

Sunlight can deactivate vaccines resulting in inadequate protection; it can also reduce effective treatment by rendering antibiotics ineffective. When using these in your animals, make sure you read the label and store them properly. 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 with a

thermometer- purchased for less than $3 at a large retail store (photo courtesy of DB Weddle, ISU).

Slide 18

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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Iowa State University 2006

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. (Photo courtesy of USDA, image # 95cs0931, taken by Fred S. White).

Slide 19

Control de la transmisión por contacto directo y por fomites

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

Slide 20

Contacto directo, fomites

- Los pasos preventivos básicos significan
  - Aislar a los animales enfermos
  - Conservar el medio ambiente limpio y seco
  - Conservar limpio el equipo
  - Establecer un programa reproductivo utilizando fuentes confiables de semen, toros que hayan arrojado resultados negativos en las pruebas

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There are various prevention steps that can help ensure direct contact and fomite transmission are minimized, and this presentation will discuss these. One essential step in prevention is to isolate all sick animals immediately so that they do not contact other susceptible animals. Another is to keep the animal housing environment as clean and dry as possible to minimize risk of environmental exposure. Finally, as reproductive diseases are spread through direct contact, it is essential to use only semen from reputable sources in your artificial insemination programs or purchase bulls that have been tested for diseases of concern and are negative. These basic steps will go a long way in preventing direct contact disease transmission.

Slide 21

Perímetro de la explotación agropecuaria

- A través de cercas, eviten el contacto con otro ganado y entre animales de distinta edad
- Den mantenimiento a sus cercas para conservar a sus animales dentro y a los demás fuera
- Minimicen el contacto con especies silvestres
- Coloquen anuncios para limitar que visitantes no autorizados tengan acceso a los animales

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Iowa State University 2006

It is important to prevent fence to fence contact with other livestock, or those on farm of differing ages, due to disease spread by direct contact from neighboring animals. 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. Wildlife can transmit many diseases to cattle (e.g. external parasites, leptospirosis, brucellosis in some areas) and contact should be minimized. Posting signs with clear instructions, like the one pictured here, regarding your farm policy for visitors and locking gates will help limit unauthorized

access to your animals, feed, and equipment. (photo courtesy of: DB Weddle, ISU)

Slide 22	**Vehículos de la explotación agropecuaria** • Designen un área de estacionamiento – Alejada del tránsito principal de animales • Minimicen el movimiento vehicular en la explotación – Carga/descarga, beneficio para extracción de grasa en el perímetro – Tengan vehículos distintos para uso "dentro" y "fuera" de la explotación  Center for Food Security and Public Health Iowa State University 2006	By having a designated parking area away from animal traffic areas with posted signs, visitors and employees have no reason to drive personal vehicles onto the farm and introduce disease agents on their tires. Minimize vehicular traffic on farm by loading/unloading animals and keeping rendering piles only at the perimeter of the operation. Rendering trucks can visit several farms in one day picking up animals that may have died from contagious diseases. By having the dead pile at the perimeter of the operation, the risk of disease introduction is minimized. Another way to minimize the disease introduction is to designate certain vehicles for use on-farm only and other vehicles for off-farm only. If this is not possible, vehicles used off-farm should be cleaned and disinfected appropriately before coming into contact with animals or their travel paths on farm. In warmer climates, golf carts make excellent on-farm vehicles to minimize disease spread (photo courtesy of: DB Weddle, ISU).
Slide 23	**Vehículos de la explotación agropecuaria** • No compartan equipo con otras explotaciones – Tractores, remolques de ganado  • En caso de hacerlo, enjuagar completamente, lavar con jabón, frotar, enjuagar y desinfectar antes de ponerlo en contacto con los animales • No permitan que los conductores de camiones de leche/alimento atraviesen los caminos transitados por animales Center for Food Security and Public Health Iowa State University 2006	Do not share equipment with other farms, such as tractors for cleaning barns or livestock trailers, because the risk for disease introduction increases. If equipment is shared, it should be inspected for cleanliness and cleaned appropriately (washed down, soap washed, rinsed, disinfected and allowed to dry) before use. It is also good prevention to prevent milk or feed truck drivers from driving in areas where animals will cross the tire path or come into contact with the truck. Photo courtesy of Bryan Buss, ISU.
Slide 24	**Personas que visitan la explotación agropecuaria** • Exijan que se obtenga autorización previa antes de ingresar a las instalaciones • Pidan que se anoten e informen sobre contactos recientes con ganado • Exijan vestimenta limpia, calzado limpio – De ser necesario, proporciónenlos  Center for Food Security and Public Health Iowa State University 2006	Since visitors and sales people have had unknown animal contact prior to visiting your farm, require them to make appointments or notify you prior to their visit. Have visitors sign in and disclose their last known cattle contact so you can decide what, if any, animal contact they should have on your farm. Collecting this information is also important with regard to disease tracking, should an outbreak occur on your farm or in your area. Clean clothes and footwear should be required of anyone entering your operation and if not, entry should be denied as the risk of disease introduction increases. By providing clean clothing (coveralls, tyvek suits) and clean boots (disposable or rubber) to all persons, including employees and herd veterinarians, you can help ensure they will not introduce disease organisms. Photo courtesy of: Dr. Sandy Amass, Purdue University.

Slide 25

Personas que visitan la explotación agropecuaria

- Asegúrense que todos los visitantes conozcan el plan de MRB
  - Coloquen anuncios, sostengan reuniones de empleados, denlo a conocer a los visitantes
- No permitan el acceso a aquellos que hayan viajado al extranjero
  - NINGÚN contacto con animales en los 7 a 10 días anteriores

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In order to have an effective Biological Risk Management plan, anyone who enters your farm should understand the protocols. This can be done through posting signs (as pictured here), employee meetings, sending letters to those people who frequent your facility, and verbalizing your protocols to anyone on your farm. Many foreign countries have diseases that animals in the United States have no immunity against. By limiting access of people who have recently (last 7-10 days) been to a foreign country, the risk of disease introduction is minimized; often times a devastating disease. Photo courtesy of: DB Weddle, ISU.

Slide 26

Alojamiento de animales

- Proporcionen instalaciones limpias, secas
- Declive fuera del corral de 2 a 4% para drenaje
- Coloquen montículos al exterior
  - De 4 a 6 pies de alto, declives de 1 a 5 pulgadas

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It is important to provide a dry place for animals to lay down when outside so that their udders do not become covered with mud/feces as this can lead to infections/mastitis. Mounds should be included in pens where there is a tendency for water buildup after a rain to give animals a high and dry place to lay. The slope of the entire pen should be 2-4% to allow for drainage with occasional low, flatter mounds (4-6 feet high, 1 to 5 inch slopes, 35 sqft per head) for animals to lay on and keep dry. (Photo courtesy of Bryan Buss, ISU)

Slide 27

Reproducción

- Establezcan un programa de reproducción libre de enfermedades
  - Inseminación artificial – obtener semen de una fuente confiable que realice pruebas a los toros para detectar enfermedades
  - Natural- todos los toros deben ser sometidos a pruebas para detectar enfermedades relacionadas con la reproducción o de otro tipo; colóquenlos en cuarentena a su llegada
- Investiguen los abortos
  - Trabajen con un médico veterinario para establecer un protocolo

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Semen can carry disease causing organisms resulting in unbred cows, infected calves or cows, abortions, and other fertility problems so it is best to establish a disease free breeding program. Artificial insemination (AI) poses less of a disease spread risk than natural breeding if semen is obtained from a reputable source and good hygiene is practiced at the time of insemination (new, clean obstetrical sleeves, sanitary lubrication, clean pipette, and clean vulvar area). Reputable semen companies test their bulls for various infectious diseases and have minimum health requirements for their animals; this information should be provided to you upon request so as to ensure high quality, disease free semen is being brought onto your farm. If natural breeding is used, all bulls must be tested for reproductive diseases of concern and quarantined for a period of time (determined together with your veterinarian) before introducing into the herd. Abortions can be caused by a variety of things so if more occur than expected (as determined together with your herd veterinarian), it may be worthwhile to submit samples to a diagnostic laboratory to identify the cause and best course of treatment. Photo depicts a liquid nitrogen tank used to store frozen semen.

Slide 28

Parición

- Durante el parto, separen a las vacas de las vaquillas para minimizar la exposición a enfermedades
- Limpien los corrales después de cada uso para minimizar la exposición

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Calving cows/heifers individually and following proper hygiene procedures between animals, such as cleaning pens and putting in fresh bedding, will help minimize the risk of disease exposure. Photo courtesy of Bryan Buss, ISU.

Slide 29

Manejo neonatal

- No alojen a animales enfermos en corrales de parición
  - Los animales enfermos propagan enfermedades
  - Los becerros son los animales más susceptibles de las explotaciones agropecuarias

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Iowa State University 2006

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. Photo courtesy of Bryan Buss, ISU.

Slide 30

Resumen

- La transmisión por contacto directo, a través de fomites ocurre diariamente en las explotaciones agropecuarias
  - Mastitis, leptospirosis, BVD
- Las enfermedades animales exóticas también pueden propagarse a través del contacto directo
  - FMD, MCF, peste bovina
- Los pasos preventivos que hemos descrito aquí pueden ayudar minimizar sus riesgos

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Iowa State University 2006

Direct contact transmission does occur on farms with everyday diseases like mastitis, leptospirosis, and Bovine Viral Diarrhea (BVD. Should a foreign animal disease occur in the US, such as Foot and Mouth Disease (FMD), Malignant Catarrhal Fever (MCF), or Rinderpest they too can be spread through direct contact 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.

Slide 31

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 by managing disease exposure, the level of disease will decrease. 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!

Slide 32

¿Tienen preguntas?

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Slide 33

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RMA

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Iowa State University