S_Vector Transmission-Dairy

Slide 1

Aplicaciones prácticas para el manejo de riesgos biológicos

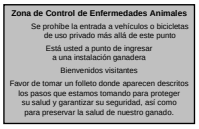
Transmisión por Vector
Productores de Lácteos

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.

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



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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).

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

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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 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

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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 source USDA – ARS).

Slide 5

Transmisión por vector

- Un insecto
- Adquiere el patógeno a partir de un animal
- Lo transmite a otro animal
  - Vectores biológicos
    - Pulgas, garrapatas, mosquitos
  - Vectores mecánicos
    - Moscas, cucarachas

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Vector-borne transmission occurs when an insect acquires a pathogen from one animal and transmits it to another. Fleas, ticks, and mosquitoes are common biological vectors of disease, and flies and cockroaches are a common mechanical vector. The top photo shows a calf with two old insecticide ear tags and numerous face flies, while the bottom photo shows an adult deer tick, *Ixodes scapularis* (photo source USDA).

Slide 6

Algunas enfermedades que se propagan por vectores

Enfermedades exóticas
- Akabane
- Lengua azul
- Hidropericardio/ Cowdriosis
- Dermatosis nodular contagiosa
- Fiebre del Valle de Rift

Existentes en EE.UU.
- Anaplasmosis
- Ántrax
- Mastitis contagiosa
- Conjuntivitis (*Moraxella bovis*)
- Estomatitis vesicular

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There are many diseases transmitted by the vector 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 akabane, bluetongue, heartwater, lumpy skin disease, and Rift Valley fever. Examples of diseases that are already present in the US include anaplasmosis, anthrax, contagious mastitis, pink eye (*Moraxella bovis*) and vesicular stomatitis. 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 vector route, please refer to the Bovine Routes of Transmission Handout- Vector.

Slide 7

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 by various routes of transmission (i.e. aerosol, oral, fomite, direct contact, 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.

Slide 8

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).

Slide 9

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.

Slide 10

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

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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.

Slide 11

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

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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 12

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 pocousuales, casos que no responden al tratamiento
  - Neurológicos, animales caídos, muerte súbita

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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 13

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
- 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

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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, 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).

Slide 14

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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Cattle 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.

Slide 15

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

Slide 16

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, 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).

Slide 17

Control de la transmisión por vector

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

Slide 18

Control de vectores

- Reducción de fuentes
  - Moscas, jejenes, mosquitos
- Controlen a los adultos
  - Moscas, mosquitos
- Minimicen la interacción con animales
  - Garrapatas, jejenes
- Protocolos de tratamiento

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Vector control begins with an understanding of the insect's life cycle. Insect life stages vary and so do the specific, effective control measures. For instance, the egg laying grounds for flies are different than that of mosquitoes and midges and one approach does not work for all. We will discuss options in future slides. Controlling adult insects, be it flies or mosquitoes, often involves the use of insecticides. This is often less effective, so more effort should be focused on controlling breeding areas. Finally, minimize the opportunities for insects to even interact with animals, such as ticks or midges. Treatment protocols for each of the areas will be discussed in the next slides.

Slide 19

Reducción de fuentes

- Moscas
  - 4 etapas de vida
    - Huevecillo, larva, pupa, adulto
    - Ciclo tan breve como de 10 días en clima cálido
  - Depositan los huevecillos en materia orgánica
    - Estiércol, alimento, camas húmedas
    - Revuelvan semanalmente para evitar su desarrollo
  - Limpien el alimento derramado, los comederos

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Flies have a four stage life cycle. The adult female fly lays her eggs in organic matter, be it manure, feed or wet bedding. These eggs then develop into larva, which change to pupa and finally emerge as adult flies. This process can be as short as 10 days in warm weather. One way to decrease the prevalence of flies is to minimize areas where they can lay their eggs by disturbing the piles of organic matter weekly. Flies lay their eggs in organic matter, be it manure, feed or wet bedding. One way to decrease their prevalence is to minimize these areas by disturbing them weekly to prevent eggs from developing. Keep pastures rotated, drag dry lots to break up the fecal pats, clean up spilled feed, clean around feed bunks. The photo depicts an excellent area for flies to lay their eggs- old feed (courtesy of DB Weddle, ISU).

Slide 20

Reducción de fuentes

- Larvicidas para moscas
  - Aditivos en el alimento
    - A todos los animales de la explotación, 3 semanas antes de que inicie la época
  - Las avispas parásitos se alimentan de pupas de mosca
  - Los ácaros, escarabajos depredadores se alimentan de larvas

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Feed additives (larvicides) have some effectiveness but the key is to get it in the feed at least 3 weeks before fly season, feed it to ALL animals on farm and maintain it in the feed until the end of fly season. This should be in addition to some of the other hygiene procedures of cleaning yards, barns and feeding areas. Parasitic wasps, predatory mites and beetles feed on pupae/larvae living in manure, bedding, vegetation. Certain insects can only be used in certain areas because they may feed on other beneficial insects, so check with your local extension specialist for recommendations.

Slide 21

Reducción de fuentes

- Adulticidas
  - Exterminadores que matan a las moscas al contacto en lugares con concentraciones elevadas
  - Substancias residuales para paredes, techos de corrales
  - Cebos, trampas para moscas junto con otros métodos

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Adulticides such as knockdowns that kill a fly on contact should be applied in areas of high fly concentrations because they do not last long in the environment (1-2 hours). Residual sprays can be applied to shaded surfaces (barn walls, ceilings) where flies rest to kill them through contact. To avoid insecticide resistance, it is a good idea to alternate between area and residual sprays. Baits and fly traps work against house flies but should be part of an integrated pest management system for best efficacy.

Slide 22

Control de adultos

- Traten zonas clave de la explotación
  - Salas de ordeño, cobertizos de los becerros
  - Establos
  - Animales

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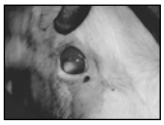
Target key areas on farm, such as calf hutches and barns, with insecticides to minimize cost. Milking parlors should be treated with approved chemicals only. Sprays approved for animals are another cost effective way to spend money on insecticides. Bottom photo depicts a heifer barn and feeding area that was recently sprayed for flies unlike the calf hutch in the top photo (courtesy of DB Weddle, ISU).

Slide 23

Transmisión de enfermedades

- Las moscas pueden propagar
  - Mastitis contagiosa
  - Dermatofilosis
  - Larvas
  - Dermatosis nodular contagiosa
  - Conjuntivitis (*Moraxella bovis*)
  - Gusano barrenador



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Flies are capable of spreading contagious mastitis, *Dermatophilus* (rain rot), grubs, lumpy skin disease, pink eye (*Moraxella bovis*) pictured here, and screwworm. Photo courtesy of Addison Biological Laboratories.

Slide 24

Reducción de fuentes

- Los jejenes hematófogos (*Culicoides variipennis o sonorensis*)
  - Depositan sus huevecillos en vegetación en descomposición, tierra húmeda, lodo
  - Las larvas necesitan humedad, materia orgánica
  - Los adultos vuelan de 1 a 2 millas desde su lugar de origen
  - Manejen los estanques asentados, el agua estancada

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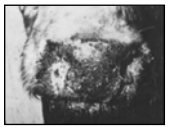
Biting midges, or no-see-ums, lay their eggs in decaying vegetation or wet soil or mud, and larvae need moisture and organic matter to survive. Adults stay pretty close to their breeding sites, so manage those areas by agitating settling ponds and minimize stagnant water. It is more difficult to manage the larval sites due to their vastness and hard to treat regions. Photo is a biting midge, courtesy of Ed T. Schmidtmann, USDA/ARS http://creatures.ifas.ufl.edu/aquatic/Biting_midges_02.htm

Slide 25

Transmisión de enfermedades

- Los jejenes hematófogos (*Culicoides variipennis o sonorensis*) pueden propagar
  - El virus de la Lengua Azul



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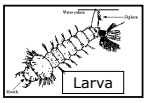
The biting midge, *Culicoides variipennis* or *sonorensis* transmits bluetongue virus which causes erosions around the muzzle of cows, as pictured here. Photo courtesy of The Gray Book.

Slide 26

Reducción de fuentes

- Mosquitos
  - Depositan huevecillos únicos en suelos húmedos
  - Depositan huevecillos sobre superficies de agua
- Las larvas y pupas viven de cabeza en el agua
  - Respiran a través de un sifón o trompeta en la superficie del agua
  - Las larvas necesitan materia orgánica para desarrollarse



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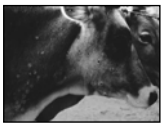
There are about 200 different species of mosquitoes in the United States, all of which live in specific habitats, exhibit unique behaviors and bite different species of animals. Some lay single eggs on damp soil that is later flooded by water; others lay an egg raft on the water's surface. Eggs hatch to larvae then to pupae, both of which live in the water and come to the surface to breathe by utilizing a siphon tube or trumpet while hanging upside down from the surface of the water. The larva require large amounts of nutrients for maturation and feed on organic matter in the water.

Slide 27

Transmisión de enfermedades

- Los mosquitos puede propagar
  - El virus del Nilo Occidental
  - La Fiebre del Valle de Rift
  - La dermatosis nodular contagiosa
  - La estomatitis vesicular



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Since there are over 200 species of mosquitoes, they are not all capable of spreading disease, only certain types can spread certain diseases. Some of the diseases they can spread include West Nile virus, Rift Valley fever, lumpy skin disease (as pictured here) and vesicular stomatitis. Photo courtesy of USDA APHIS.

Slide 28

Reducción de fuentes

- Eliminen el hábitat de larvas de mosquitos
- Rellenen los huecos de los árboles
- Vacíen semanalmente los recipientes que contienen agua
- Hagan circular el agua de lagunas y tanques
- Hagan perforaciones en los neumáticos desechados o utilicen las mitades para pilas de material ensilado

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Source reduction consists of eliminating larval habitats or making them unsuitable for larval development. Tree holes can be good breeding grounds for some mosquitoes, so those should be filled. Containers that hold water, like stock tanks or water troughs, should be emptied weekly or agitated weekly them to keep mosquitoes from laying eggs there. By minimizing standing water through circulating lagoons or water tanks, a lot can be done to minimize their breeding areas. Another problem on farms are old tires used for silage piles, as pictured on the bottom (courtesy of DB Weddle). Not only do mosquitoes transmit disease to animals, but to humans too and a farm walk through to identify and eliminate trash containers is good prevention.

Slide 29

Larvicidas de mosquitos

- Utilícenlos cuando la reducción de fuentes y el control biológico no sean realizables
- Más eficientes y dirigidos al objetivo
- Menos controvertidos que los adulticidas
- Se aplican en áreas geográficas más pequeñas
  - Las larvas se concentran en lugares específicos

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Larvicides are used when immature mosquito populations become larger than source reduction can manage or biological control can handle. They are often more effective and target-specific than adulticides, making them less controversial. They can be applied to smaller geographic areas than adulticides because larvae are often concentrated in specific locations, such as standing water.

Slide 30

Control de mosquitos adultos

- Insecticidas/adulticidas
- Menos eficientes que la reducción de fuentes
- Requieren que se hagan aplicaciones múltiples
- Requieren contar con condiciones ambientales adecuadas
  - Viento ligero, sin lluvia
- Pequeñas gotas que entren en contacto con los adultos

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Insecticides are often the least efficient control program and often require multiple applications. Effective adult mosquito control with adulticides requires small droplets that drift through mosquito areas and come in contact with adults to kill them as pictured here. Insecticides are applied in a concentrated form at very low volumes such as 1 oz (29.6 mL) per acre. Excessive wind and updrafts reduce control, but light wind is necessary for drifting spray droplets.

Slide 31

Minimizar la interacción con animales

- Garrapatas
  - Sieguen los pastizales
  - Acaricidas
- Jejenes
  - No existe tratamiento animal eficaz
  - Incrementen la distancia desde la fuente
  - Confinen a los animales

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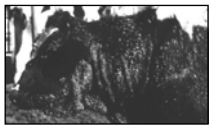
While source reduction will help decrease numbers of insects in the area, often times it is necessary to minimize the interaction with animals. This could involve environmental management such as mowing pastures, as the top picture depicts, to reduce tick habitats to chemical treatments with acaracides (tick killing chemicals) every 2-4 weeks during tick season. Other ways to minimize interaction is to confine the animals to an insect proof structure. In the case of vesicular stomatitis outbreaks or bluetongue, it is necessary to confine the animals in a stall as the bottom photo illustrates, until the insect season has passed. This can be difficult to do depending on the farm or types of animals raised. But if it is the only way to prevent disease, temporary structures could be put up. Both photos were found at: http://www.equestrianservicesllc.com/gallery.cfm

Slide 32

Transmisión de enfermedades

- Las garrapatas pueden propagar
  - Anaplasmosis
  - Babesiosis
  - Dermatofilosis
  - Hidropericardio/ Cowdriosis
  - Fiebre Q



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There are many different species of ticks and some are capable of spreading diseases such as anaplasmosis, babesiosis, dermatophilus (rain rot- pictured here), heartwater and Q fever. Photo courtesy of DB Weddle, ISU.

Slide 33

Resumen

- La transmisión por vector ocurre diariamente en las explotaciones agropecuarias
  - Mastitis, conjuntivitis (*Moraxella bovis*), anaplasmosis
- Las enfermedades animales exóticas también pueden ser propagadas por vectores
  - Fiebre del Valle de Rift, hidropericardio/cowdriosis
- Los pasos preventivos que hemos descrito aquí pueden ayudar minimizar sus riesgos

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Vector-borne transmission does occur on farms with everyday diseases like mastitis, pink eye, and anaplasmosis. Should a foreign animal disease occur in the US, such as akabane, Rift Valley Fever, or heartwater, they too can be spread through vector-borne 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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