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AGRICULTURE

Applying the One Health Concept in Medical Practice

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2019 Communicable Disease Summit



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Objectives

By the end of the presentation attendees should be able to:

1. Describe the One Health concept and give an example of One Health in practice.
2. Incorporate additional questions when taking a patient history to assess how animal and environmental factors may be impacting the health of the patient.
3. Recognize animal contact as a potential disease-causing factor in enteric disease and influenza-like illness in humans.
4. Identify some best practices for animal-assisted activities in healthcare settings to minimize disease and injury risks to patients and animals.
5. Describe the health effects of needlestick injuries to humans related to animal husbandry and provide suggestions to patients on how to avoid injuries in the future.



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Outline

- What is One Health?
- One Health in action internationally
- Importance of taking a thorough travel and social history
- Timely issues in One Health and impact on Delawareans
- Benefits, risks, and best practices for animal-assisted activities
- Room for improvement: needlestick injuries in veterinary medicine



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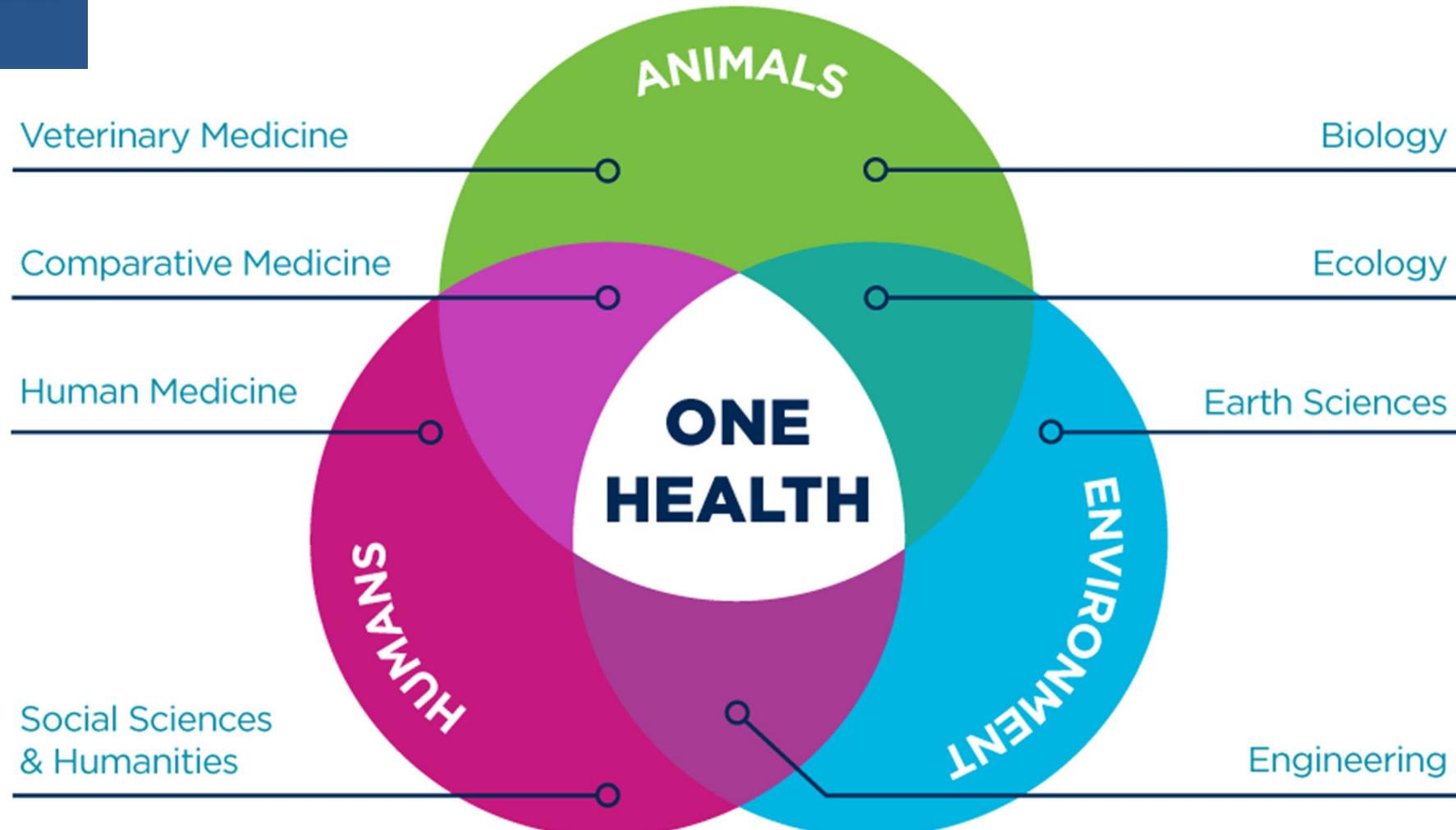
What is One Health?

- “***One Health*** recognizes that the health of people is connected to the health of animals and the environment. The goal of ***One Health*** is to encourage the collaborative efforts of multiple disciplines-working locally, nationally, and globally-to achieve the ***best health for people, animals, and our environment.***”
 - [US Centers for Disease Control and Prevention](#), 2018



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What is One Health?





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One Health in Action





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One Health in Action





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Partnership for One Health Delaware

- What is Delaware doing about One Health?
 - October 2016, Partnership for One Health Delaware formed



**DELAWARE HEALTH
AND SOCIAL SERVICES**
Division of Public Health





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Partnership for One Health Delaware

- Our mission:
 - "...promote, protect, and improve the health and well-being of people, animals, and the environment of Delaware by enhancing cooperation between the State's physicians, veterinarians, and other scientific professionals."
- Funding – federal grant focused on infectious disease preparedness
- Quarterly meetings facilitated by EMSPS staff
 - Presentations from members of the partnership
- Email newsletter, advisements of upcoming meetings



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Why is One Health important?

- At least 61% of all human pathogens are zoonotic
- Zoonotic diseases have represented 75% of all emerging pathogens during the past decade
 - Growth of human population → changes to the human-wildlife interface
 - Climate change, deforestation, intensive farming → new opportunities for pathogen and vector survival, disease transmission
 - Rapid speed of global travel and commerce → diseases spread quickly, too



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Patient Travel and Social History

- Travel: In the last 12 months...
 - Where?
 - CDC Health Information for International Travel – the “Yellow Book”
 - When?
 - Some infections may not manifest clinically for months after returning from the endemic region
 - Why and who?
 - Business, leisure, visiting family, medical tourism, etc.
 - Activities
 - How?
 - Accommodations
 - Meals
 - Prophylactics and immunizations



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Patient Travel and Social History

- Social:
 - Where?
 - House, apartment, etc. in urban vs. suburban vs. rural setting
 - Who?
 - Housemates – human and animal
 - Marital status and sexual preference
 - Contact with someone with similar symptoms
 - How?
 - Occupation
 - Diet, supplements, and exercise
 - Alcohol, tobacco, other drug use
 - What?
 - Hobbies, recreations



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Patient Travel and Social History

- **Harmful algal blooms (HABs)**

- Production of toxins by phytoplankton (e.g., blue-green algae/cyanobacteria)
- Toxin exposure associated with wide variety of symptoms: GI, neurologic, skin and eye irritation, hepatotoxic
- Salt, brackish, freshwater
- Role of climate change, nutrient discharges
- Humans, animal, and plants affected
 - Toxins themselves; food chain/filter feeders; blockage of sunlight
- 50% of unusual marine mortality deaths linked to HABs
- Dog deaths – sentinel events
- “When in doubt, stay out!”



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Patient Travel and Social History

Water Advisory

**Water may contain blue-green algae
that is harmful to humans and animals**



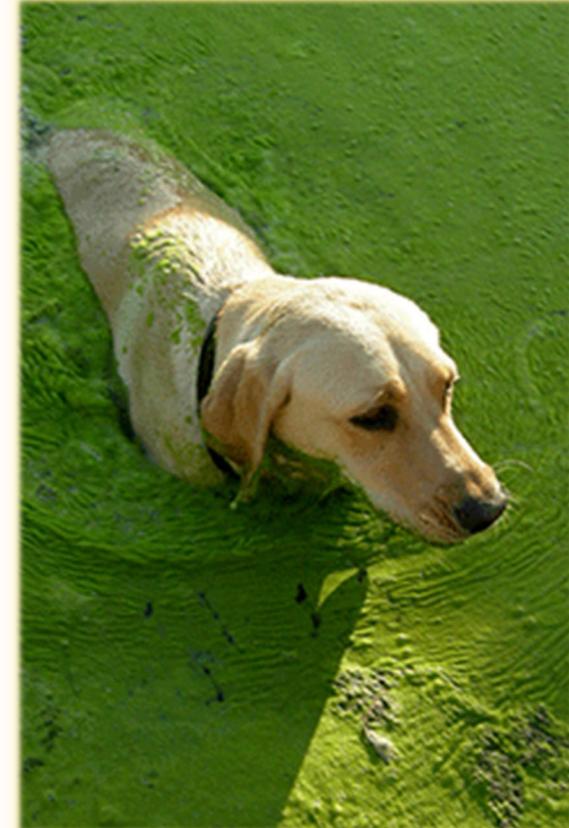
Avoid thick green, white, or reddish-brown scum on the surface of the pond.

Avoid activities that can result in swallowing water that contains scum. This may affect your health.

Wash with clean water as soon as possible following contact with blue-green algae.

If you, your children or your animals become sick after contact, call your doctor or veterinarian.

For more information go to www.wr.dnrec.delaware.gov





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Patient Travel and Social History

- **Plague**

- *Yersinia pestis* bacteria transmitted by the bite of a flea
 - Bubonic
 - Swollen, painful lymph nodes (“buboies”) from bite of an infected flea
 - Septicemic
 - Fever, chills, extreme weakness, abdominal pain, shock, hemorrhage, necrosis of extremities; from bite of infected flea or handling infected animal
 - Pneumonic
 - Dyspnea, chest pain, cough, hemorrhagic sputum, respiratory failure, shock; from inhaling infectious droplets, untreated bubonic or septicemic plague; person-to-person transmission possible



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Patient Travel and Social History

- **Plague**

- Cats, dogs, rodents, rabbits, other wildlife
 - Cats eat infected rodents
 - Cats and dogs bring infected fleas into the home and veterinary practice
 - Handling of infected cats and dogs in a veterinary or home setting
 - Wildlife die-offs due to plague leave fleas seeking other blood sources
 - Dressing of infected wildlife following hunting



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Patient Travel and Social History





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Patient Travel and Social History

FIGURE 1. Number of human plague cases reported, by state and decade — United States, 1944–1993

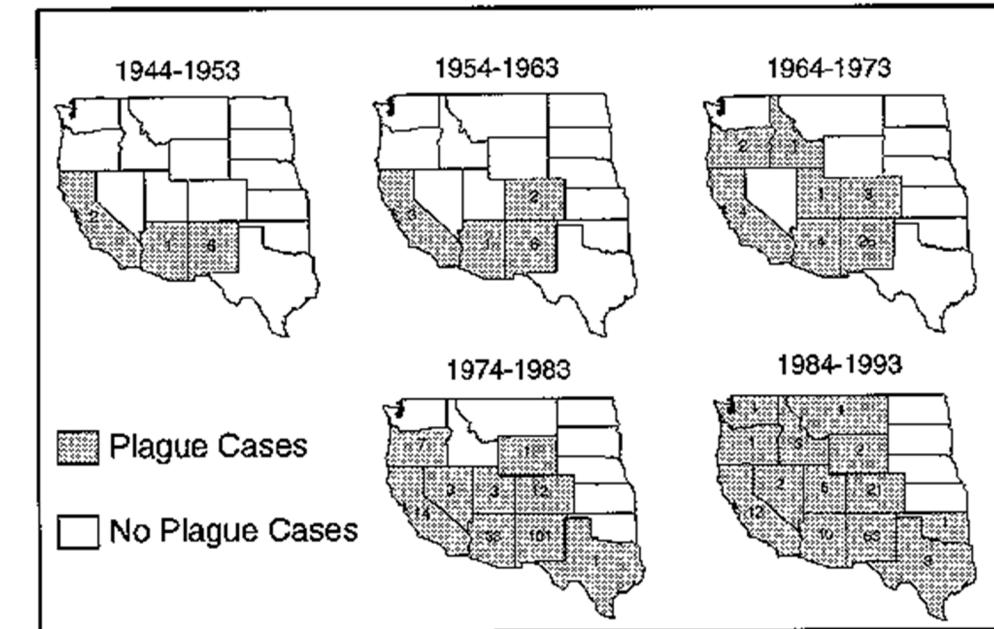
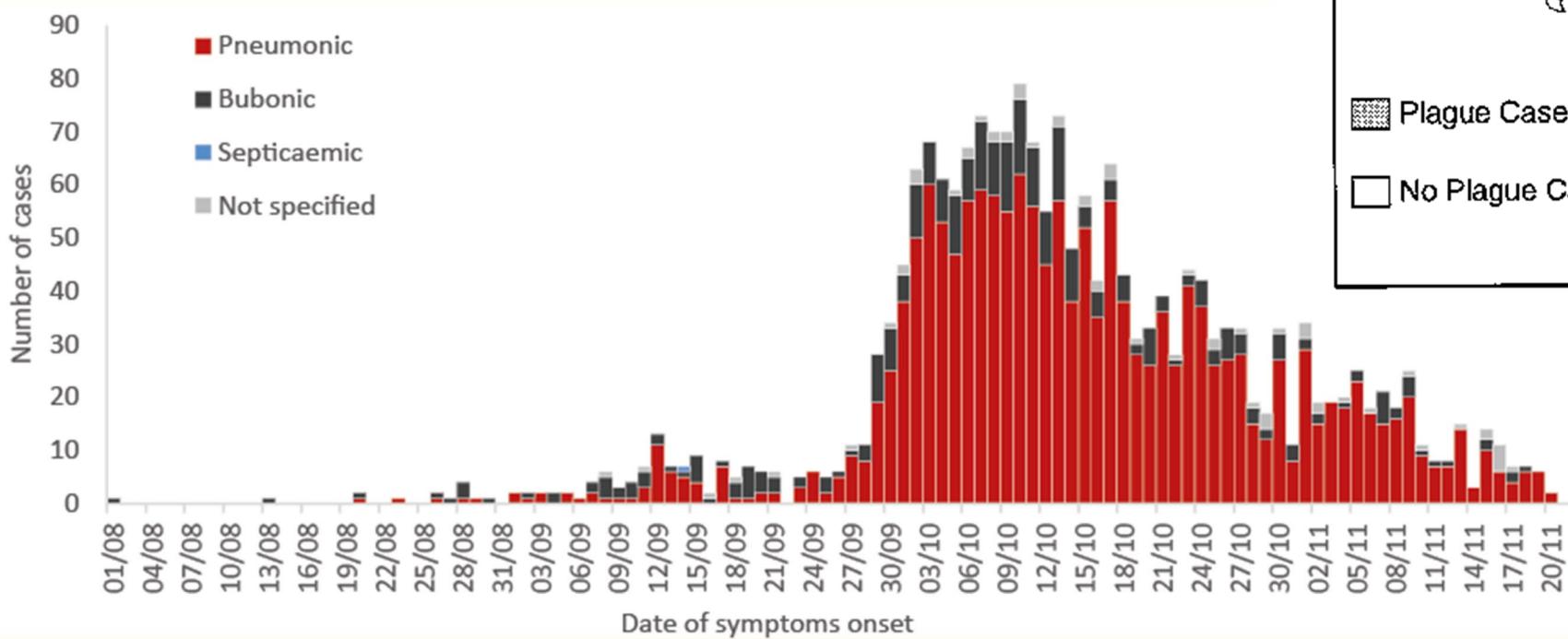


Figure 1: Number of confirmed, probable and suspected plague cases in Madagascar reported by date of illness onset from 1 August through 22 November 2017





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Patient Travel and Social History

- **Raw milk**

- Process of pasteurization serves to kill numerous pathogens:
 - *Campylobacter*
 - *E. coli*
 - *Listeria*
 - *Salmonella*
 - *Mycobacterium bovis* and *tuberculosis*
 - *Brucella*
 - *Cryptosporidium*
- Pasteurization parameters established based on need to kill most heat resistant organism of public health significance, *Coxiella burnetii*

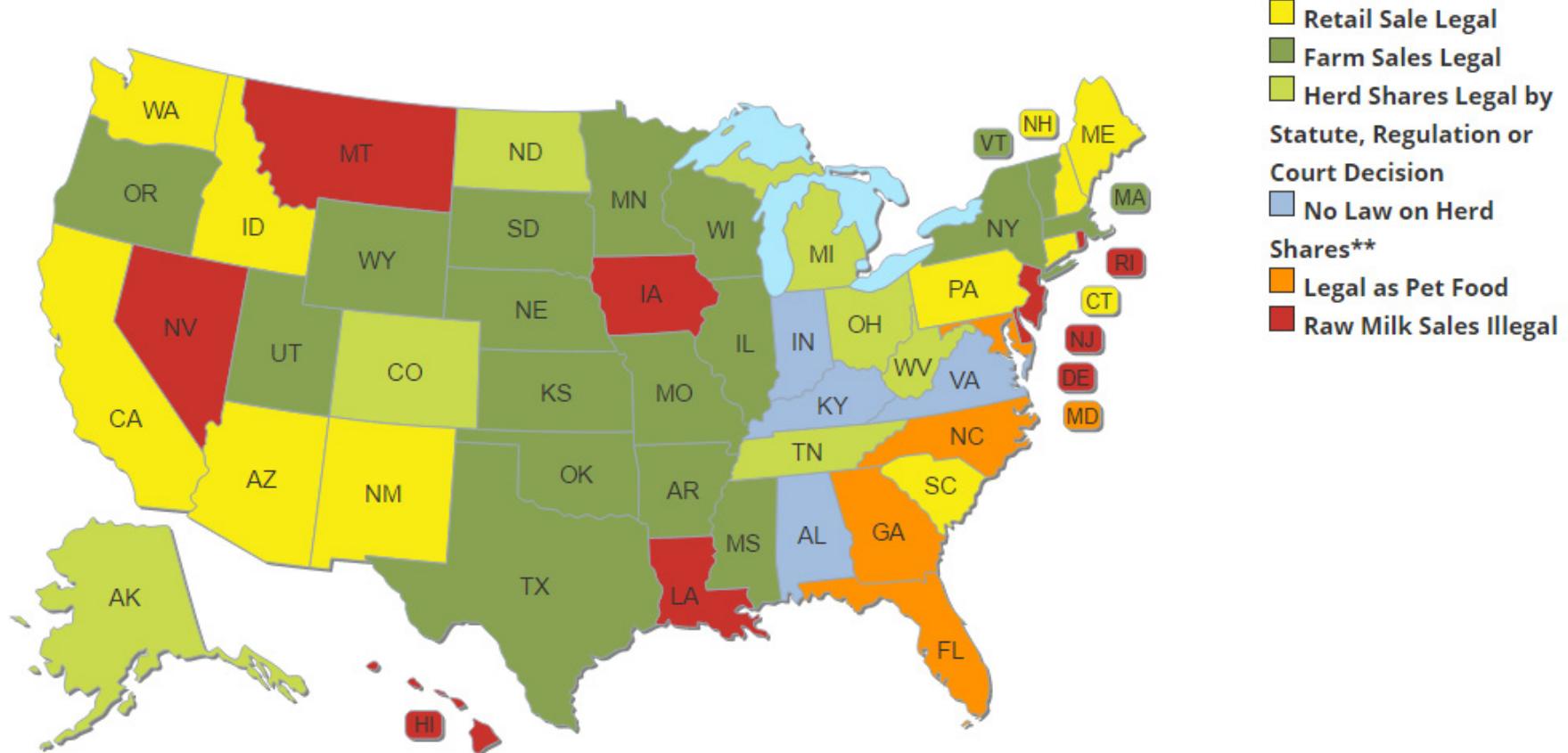


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Patient Travel and Social History

Raw Milk Nation – Interactive Map

State-by-State* Review of Raw Milk Laws





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Patient Travel and Social History

- **Raw milk**

- July 2017, Texas resident diagnosed with brucellosis (immunocompromised)
- Had purchased and drank raw milk from dairy in Paradise, TX
- *Brucella abortus* strain RB51 isolated
- Rifampin and penicillin resistant
- August 2017, RB51 also isolated from bulk tank at dairy
 - RB51 is an attenuated strain of *B. abortus* used to vaccinate cattle
 - Animals vaccinated as calves
 - Usually clear bloodstream in 3 days but chronic infections, intermittent shedders possible
- Between June 1 and August 7, 847 households in 8 States had purchased milk from the dairy
- Two cattle from farm tested positive and were culled



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Patient Travel and Social History

- **Raw milk**

- September 2017, NJ resident with neck pain and headache
- Blood culture positive for RB51, resistant to rifampin
- Patient consumed raw cow milk from Udder Milk, a home delivery company illegally selling raw milk in NJ
 - Small quantities in coffee, other family members primary consumers
- Dairy of origin not identified
- Patient completed antibiotic treatment
 - Laboratory workers, family members of case, and two other families that consumed raw milk from the co-op started PEP and symptom monitoring



Timely Topics for Delaware

- Agriculture is the number one industry in Delaware
 - Annual value of production = \$1.5 billion
 - Annual aggregate economic contribution = \$8 billion

Species	#DE premises	#DE animals
Cattle and calves	301 ¹	17,000 ²
Sheep & lambs	89 ¹	1,758 ¹
Goats	121 ¹	1,539 ¹
Hogs & pigs	55 ¹	6,500 ³
Horses and ponies		4,178 ¹
Commercial broiler	634 ⁵	52,484,748 ¹
Commercial layers/pullets	3	1,655,000
Non-commercial turkeys	2	3,000
Backyard flocks	1,500	Unknown



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Timely Topics for Delaware





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Timely Topics for Delaware

- **Backyard poultry and *Salmonella***
 - Backyard poultry is a growing trend in the United States
 - Novelty pets around Easter
 - Local and organic food production
 - Animal welfare concerns
 - Environmental concerns
 - Perceived learning experience for children
 - Perception that local eggs and meat are healthier and better quality than store-bought
 - Urban and suburban settings
 - Owners may have little husbandry experience



Timely Topics for Delaware

- **Backyard poultry and *Salmonella***
 - Poultry subclinically shed *Salmonella*
 - Feces, inside and outside of eggs
 - 53 *Salmonella* outbreaks associated with live poultry between 1990-2014
 - 2,630 illnesses, 387 hospitalizations, 5 deaths
 - Number of outbreaks and number of case-patient per outbreak increasing
 - 80% of outbreaks started in February, March, April, duration 1-12 mos. (avg. 4.9)
 - Median case-patient age: 9 years
 - 31% ≤ 5 years; 42% ≤ 10 years



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Timely Topics for Delaware

Figure 1. Number of live poultry–associated salmonellosis outbreaks and number of ill persons reported, by year, United States, 1991–2014.

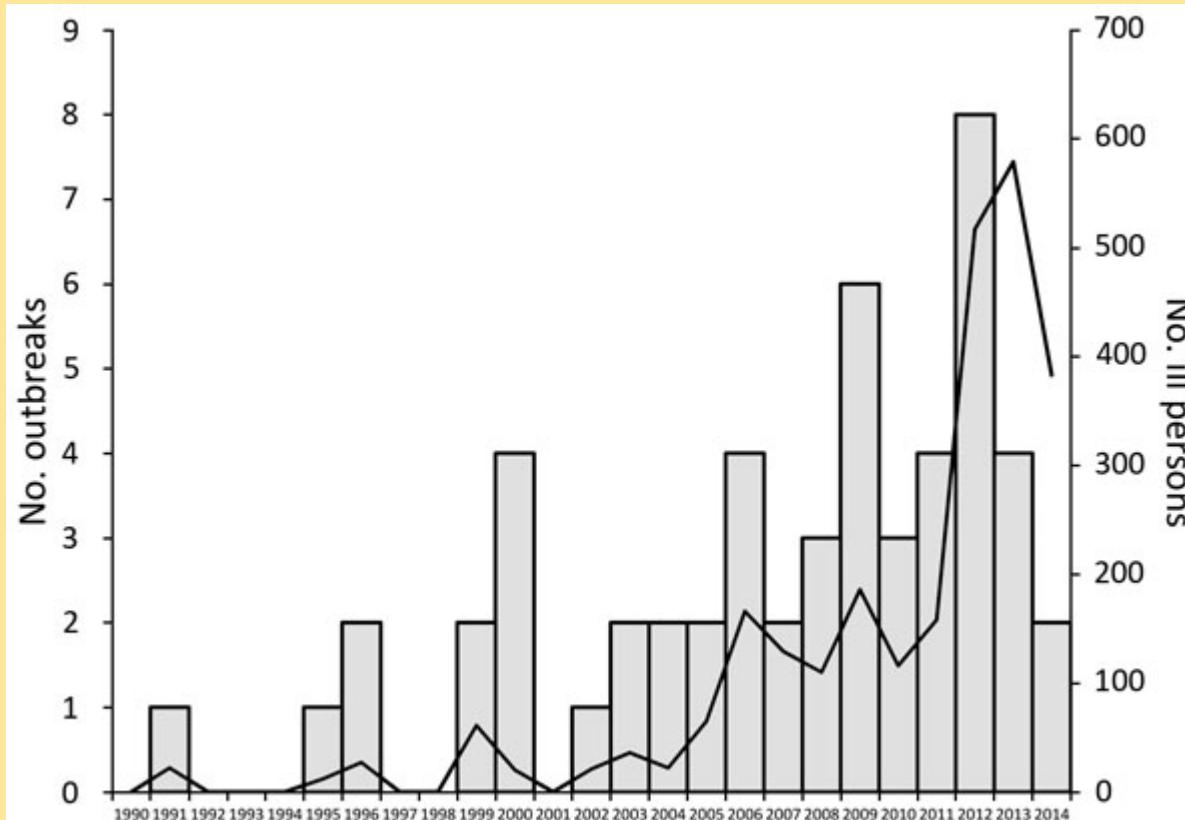
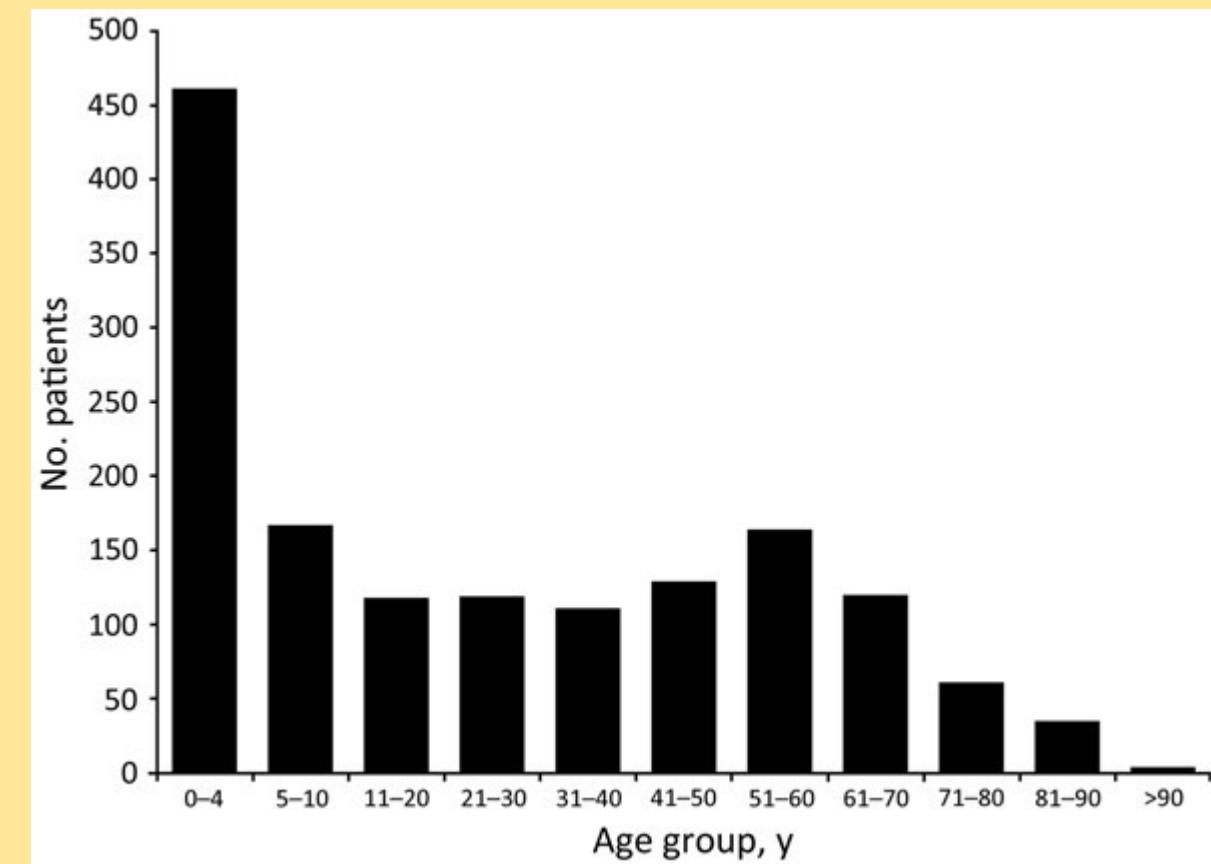


Figure 2. Number of patients in reported live poultry–associated salmonellosis outbreaks, by age group, United States 1991–2014.





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Timely Topics for Delaware

- **Backyard poultry and *Salmonella***
 - Nearly 46% reported keeping poultry inside the house
 - 22% living room, 12% kitchen, 10% bedroom, and 10% bathroom
 - Of those respondents with baby poultry exposure (74%),
 - 76% reported touching baby birds
 - 61% reported touching the cage/coop of baby birds
 - 49% reported snuggling baby birds
 - 13% reported kissing baby birds



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HEALTHY FAMILIES AND FLOCKS

Live poultry, such as chickens, ducks, geese, and turkeys, often carry harmful germs such as *Salmonella*. While it usually doesn't make the birds sick, *Salmonella* can cause serious illness when it is passed to people.

HANDWASHING PROTECTS YOU FROM GERMS



- Always wash your hands with soap and water right after touching live poultry or anything in the area where they live and roam.
- Adults should supervise handwashing for young children.
- Use hand sanitizer if soap and water are not readily available.

HANDLE BIRDS SAFELY



- Children younger than 5 years, adults older than 65 years, and people with weakened immune systems should not handle or touch chicks, ducklings, or other live poultry.
- Do not bring chicks, ducklings and other live poultry to schools, childcare centers, or nursing homes.
- Do not snuggle or kiss the birds, touch your mouth, or eat or drink around live poultry.

SAFELY CLEAN COOPS



- Clean any equipment used to care for live poultry outside, such as cages or feed or water containers.
- Set aside a pair of shoes to wear while taking care of poultry and keep those shoes outside of the house.

POULTRY BELONG OUTSIDE



- Do not let live poultry inside the house, especially in kitchens.
- Do not let live poultry in areas where food or drink is prepared, served, or stored.



U.S. Department of
Health and Human Services
Centers for Disease
Control and Prevention

Have a Backyard Flock? Don't Wing it.
Visit www.cdc.gov/features/salmonellapoultry
for more information

C527417BA



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Timely Topics for Delaware





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Timely Topics for Delaware

- **Variant influenza**
 - Swine-human interface created at agricultural fairs combined with an emerging infectious disease has led to outbreaks
 - Cases predominantly in children
 - Annual case occurrences 2011-2017
 - Summer of 2012 especially severe
 - 306 cases, majority Ohio (n=107) and Indiana (138)



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Timely Topics for Delaware

- **Variant influenza**

- At fairs, exhibitors show both market and breeding hogs
- Multiple stressors
 - Heat and poor ventilation
 - Hauling, sometimes long distance
 - Unfamiliar surroundings and high stocking density
 - Commingling, nose-to-nose contact with unfamiliar animals
- 1.5% of swine entering a Midwest fair positive for IAV
 - 60-90% positive after 72 hours
 - Widespread ILI not observed among fair pigs



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Timely Topics for Delaware

- **Variant influenza**
 - H1N1 and H3N2 swine influenza viruses are endemic among pig populations in the US
 - Outbreaks in pigs typically occur in colder weather
 - High morbidity, low mortality
 - Clinical signs in pigs similar to human influenza-like illness (ILI)
 - Fever, depression, coughing and dyspnea, nasal and ocular discharge, conjunctivitis, anorexia



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Timely Topics for Delaware

- **Variant influenza**
 - September 2017 – reports of sick pigs at Charles County Fair, Frederick County Fair in Maryland
 - 24 H3N2 positive pigs (1 died and 1 euthanized) belonging to 15 4-H exhibitors
 - St. Mary's County and Calvert County Fairs were closed to swine by emergency order of Maryland Secretary of Agriculture Bartenfelder
 - Fredrick County Fair swine barn closed to public
 - Terminal pigs allowed to go to slaughter
 - Immediate dismissal of breeding swine
 - Show and discharge all in one day
 - Strict biocontainment and biosecurity for pigs left on fairgrounds

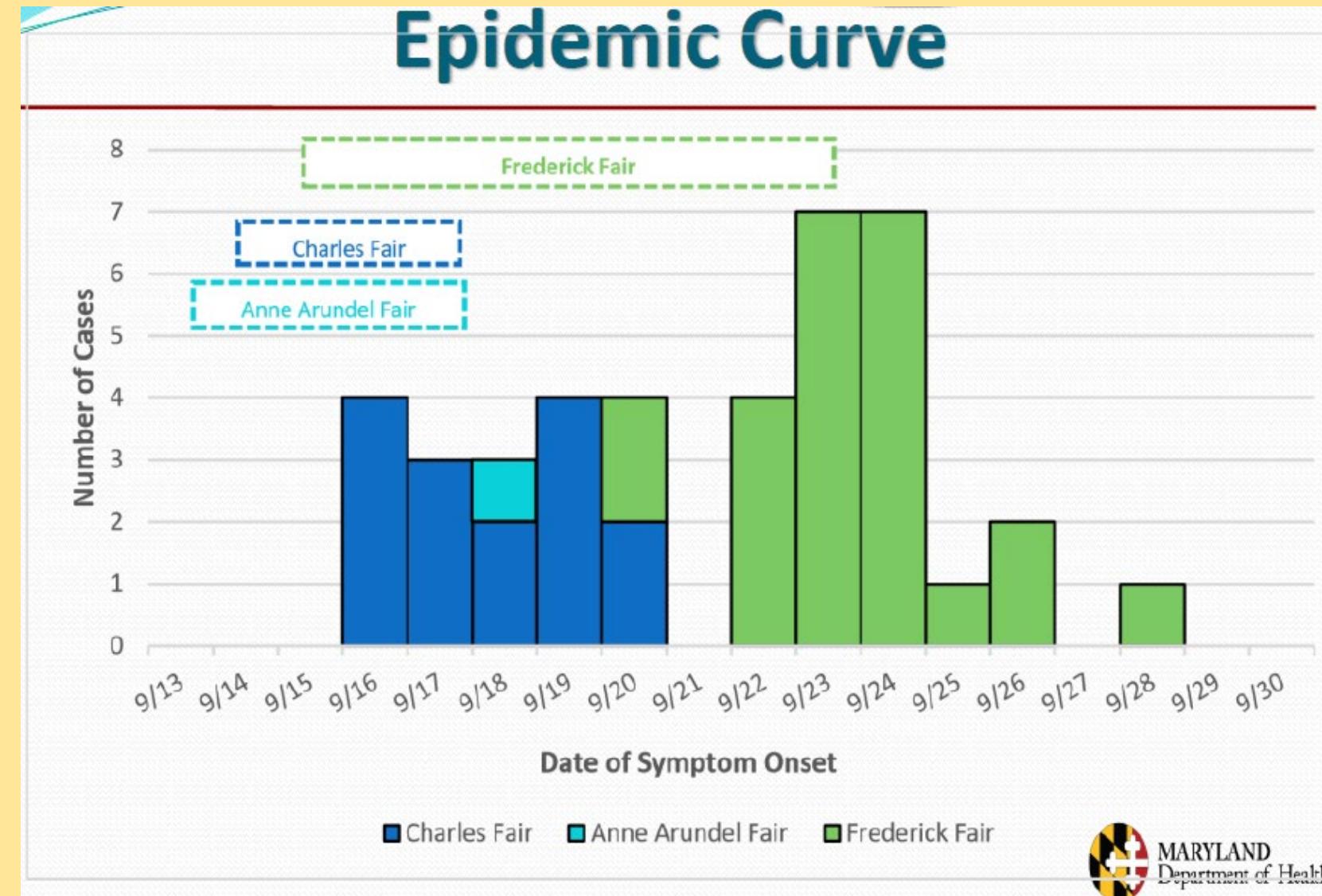


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Timely Topics for Delaware

• Variant influenza

- 40 children positive for H3N2v influenza
 - 2 hospitalizations
- 1 Delaware resident who visited the Anne Arundel County Fair
 - No sick pigs reported there
- 60% of sick children under 5 years of age

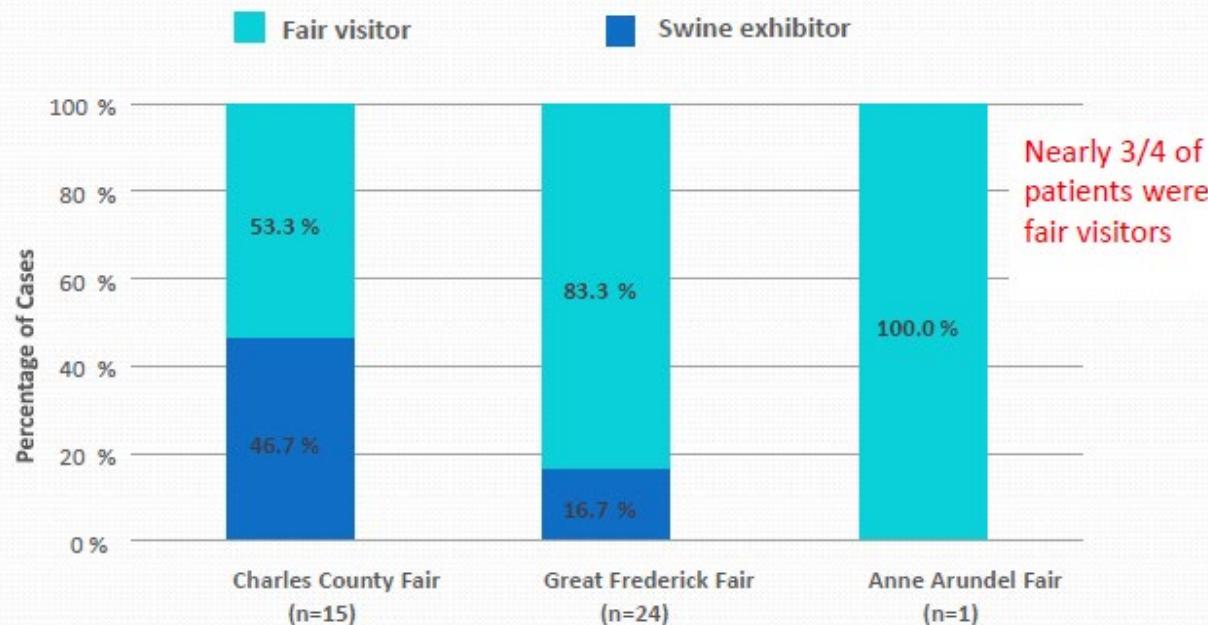




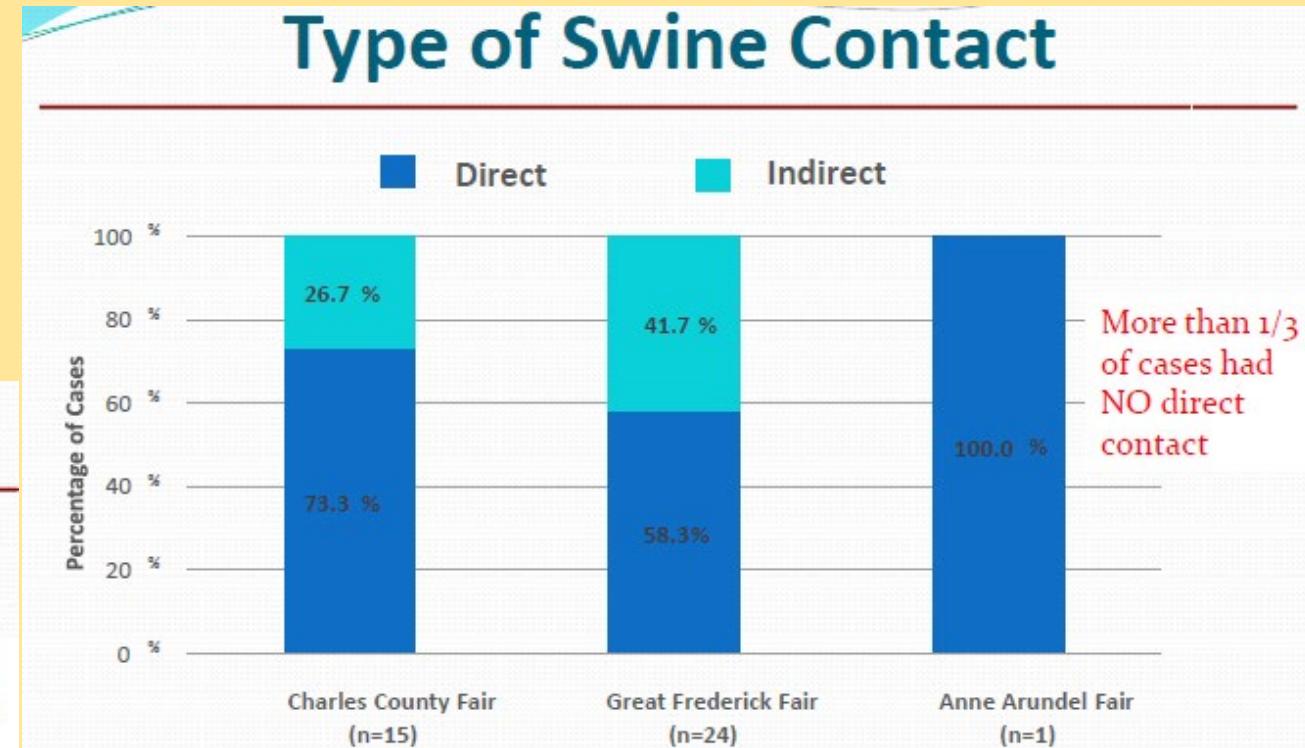
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Timely Topics for Delaware

Type of Fair Participation



Type of Swine Contact





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Timely Topics for Delaware

• Variant influenza

- Education – Delaware Livestock Expo, 2017
 - Observe your pigs
 - Wash your hands
 - No eating or drinking in the barn
 - Limit contact with pigs
 - Clean and disinfect equipment
 - Seek medical attention if you feel sick
 - Quarantine show animals upon returning home
 - Separate clothes and shoes for swine at home

SWINE INFLUENZA: WHAT AN EXHIBITOR SHOULD KNOW



OVERVIEW

- Swine influenza (aka swine flu) is a virus which commonly circulates in the pig population.
- Swine influenza is a zoonotic disease. It is rare for influenza viruses that normally infect pigs to spread to people, but it is possible, especially in those with direct exposure to pigs. While rare, limited human-to-human transmission of this variant also has occurred in the past, but never been widespread or sustained.
- People who are frequently around pigs, such as exhibitors and caretakers have the highest risk of exposure and should be following proper biosecurity practices to protect themselves and their animals.
- Swine influenza cannot be spread by eating pork or handling pork products. All pork products from exhibition pigs remain safe for human consumption if cooked according to USDA recommendations to an internal temperature of 160°F.

TO KNOW BEFORE THE EVENT

- A dedicated exhibitor will care for each unique animal or multiple animals from the same farm. Exhibitors are not to handle pigs or enter pens of pigs that are not under their care.
- All exhibitors should take and record rectal temperatures on pigs at home within 12 hours of loading. If any single show pig has clinical signs of influenza (coughing or barking, sneezing, high

fever, difficulty breathing, runny nose, not eating, and/or not wanting to get up and move around) OR rectal temperature ≥104°F, all pigs from that farm are to be left at home and not brought to the show.

PREVENTION STRATEGIES

While you are at the show site, there are several prevention strategies that should be implemented to keep you and your pigs healthy:

1. Observe your pigs

- Monitor your pigs for any illness. Make sure that you are getting your pigs up during feeding times to properly observe their behavior.
- Notify the Livestock Show Committee if pigs have: fever, gone off feed, nasal discharge, inactivity/huddling, high respiration rate (rapid breathing), sneezing or coughing (may sound like barking).

2. Wash your hands with soap and water

- Wash your hands with soap and water after you handle your pigs or their equipment (each time).
- Soap and water are the most effective way to prevent the spread of influenza.
- Lather with soap for 15 to 20 seconds.
- If soap and water are absolutely not available, hand sanitizer or hand wipes can be used.

3. No eating or drinking in the barn

- Eating and drinking in the barn is one way the virus can spread to humans. Make sure to consume beverages and food outside the barn at all times.
- Create an alternative place to socialize, eat and stay hydrated (instead of inside the pig barn).

4. Limiting contact with pigs

- Do not snuggle, hug, or kiss pigs.
- Avoid close contact with pigs that look or act sick.
- Avoid all contact with pigs if you are experiencing



Delaware Department of Agriculture



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Timely Topics for Delaware

- **Variant influenza**

- Additional human health guidelines
 - Ready access to handwashing facilities
 - Warning signage and traffic flow
 - YOPIs avoid pigs and swine barns
 - No toys, pacifiers, baby bottles, strollers into pig areas
 - Avoid contact with pigs if YOU have flu symptoms
- Additional animal health guidelines
 - Local veterinary presence on fairgrounds and for emergencies
 - Good ventilation, low stocking density in barns
 - Shorten the time of exhibition, strategically order exhibition





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Animal-Assisted Activities

- Generally speaking, programs for visitation in hospitals that use specially trained animals and their handlers
 - Recreational and social purposes
 - Goal-directed interventions in which an animal is involved as part of an organized treatment process, which may provide opportunities for motivational, educational, and/or recreational benefits to enhance a person's quality of life.
- AKA pet therapy, animal-assisted therapy, pet volunteer programs





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Animal-Assisted Activities

- Benefits
 - Community hospital mental health unit: significant decreases ($P < .05$) in depression, anxiety, pain, and pulse after animal-assisted activities program, compared to those in the more traditional stress management group
 - Alzheimer's disease: Nutritional intakes increased significantly when fish aquariums were introduced
 - Long-term care: Significantly reduced loneliness scores in comparison with the no animal-assisted therapy group
 - Hospitalized heart failure patients: improved cardiopulmonary pressures, neurohormone levels, and anxiety



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Animal-Assisted Activities

TABLE 1. Selected Diseases Transmitted by Dogs Stratified by Transmission Route

Transmission Route	Selected Diseases
Direct contact (bites)	Rabies (rabies virus) <i>Capnocytophaga canimorsus</i> infection Pasteurellosis (<i>Pasteurella</i> spp.) <i>Staphylococcus aureus</i> , including methicillin-resistant strains <i>Streptococcus</i> spp. Infection
Direct or indirect contact	Flea bites, mites Fungal infection (<i>Malassezia pachydermatis</i> , <i>Microsporum canis</i> , <i>Trichophyton mentagrophytes</i>) <i>Staphylococcus aureus</i> infection Mites (<i>Cheyletiellidae</i> , <i>Sarcoptidae</i>)
Fecal-oral	Campylobacteriosis (<i>Campylobacter</i> spp.) Paratyphoid (<i>Salmonella</i> spp.) Giardiasis (<i>Giardia duodenalis</i>) Salmonellosis (<i>Salmonella enterica</i> subsp <i>enterica</i> serotypes) <i>Chlamydophila psittaci</i>
Droplet	Ticks (dogs passively carry ticks to humans; disease not transmitted directly from dog to human) <ul style="list-style-type: none">■ Rocky Mountain spotted fever (<i>Rickettsia rickettsii</i>)■ Ehrlichiosis (<i>Ehrlichia</i> spp.)
Vector-borne	Fleas <ul style="list-style-type: none">■ <i>Dipylidium caninum</i>■ <i>Bartonella henselae</i>



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Animal-Assisted Activities

- Guidance

- Written policy, education of staff, and a visit liaison
- Dogs only – animals and handlers formally trained
- Infection Prevention and Control determine which locations and which patients are appropriate for interaction
- Preventive healthcare for handlers and dogs, avoid visits when sick
- Handler educated:
 - Appropriate handling of dog by patients, how to approach patient
 - Maximum of 1 hour visit, observe dog for signs of fatigue, etc.
 - Patient cannot eat or drink while interacting
 - Hand hygiene, disposable barrier
 - When to terminate visit, reporting incidents



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Needlestick Injuries in Animal Practice

- Scope of the Problem

- 80% of farmers working in animal agriculture have accidentally stuck themselves (Rendell 2008)
- “64% of female veterinarians, 73% swine veterinarians, and 87% of Zoo veterinarians reported at least one career needlestick injury.” (Jennissen, Wallace et al. 2011)
- In human medicine, considerable time and resources have been expended to reduce NSI’s
 - This is largely driven by the risk of blood-borne pathogens
- Injuries to hands, legs most common



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Needlestick Injuries in Animal Practice

- Products that present the greatest risk
 - Vaccines
 - Modified live vaccine with zoonotic potential (e.g., RB51)
 - Oil adjuvanted vaccines
 - Antibiotics
 - Workers with hypersensitivities to certain antibiotic classes or additives
 - Antibiotics containing oil (i.e., long-acting)
 - Hormones
 - Pregnant women
 - Sedatives
 - Etorphine
 - Xylazine



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Needlestick Injuries in Animal Practice

- Micotil 300/tilmicosin
 - Used to treat respiratory disease in cattle and sheep
 - Injection site pain, bleeding, swelling, inflammation most common signs
 - Nausea, tachycardia, dizziness, anxiety, an abnormal taste, headache, lightheadedness, limb pain, paresthesia, chest pain, and soreness
 - Only 156 (5%) reports involved serious adverse effects
 - 13 deaths





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Needlestick Injuries in Animal Practice



Gangrenous necrosis after
accidental needlestick infection
of thumb with *Actinobacillus*
pleuropneumoniae 14 days after
inoculation



Figure 3. Surgical excision of the ulcerative lesions in Figure 2,
extending from above the site of injection to below the area of
inflammation. This wound was left open to drain for 1 week.



Following injection with Johne's
vaccine



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Needlestick Injuries in Animal Practice

- Needlestick injury prevention
 - Employee practices:
 - Restrain animals properly
 - Get help from co-workers
 - Use the correct animal restraint techniques
 - Don't recap needles or use only needles/syringes with protective devices
 - Don't put syringes in your mouth
 - Discard bent needles
 - Don't carry needles/syringes in your pockets
 - Use approved sharps/needle disposal containers
 - Avoid removing sharps from disposal container
 - Use the “one-hand scoop” method
 - Report all needlestick injuries to management



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NEEDLESTICK PREVENTION *ON THE FARM*

OUCH!

Needlestick injuries are usually minor, but they can be serious.

Most common injuries

- Skin infections
- Allergic reactions
- Deep tissue wounds that require surgery

Don't Get Stuck

- Slow down - don't rush with injections
- Restrain animals properly
 - » Get help from coworkers
 - » Use the correct equipment and techniques
- Don't recap needles
- No needles/syringes in your pockets
- Don't hold caps in your mouth
- Discard bent or dull needles
- Use approved sharps containers

Did You Know?

- Over 80% of farm workers vaccinating animals have accidentally stuck themselves.
- Vaccines are the most common type of drug involved in needlestick injuries.

Got Stuck?

- Wash the skin with soap and water immediately
- Report injury to your supervisor
- Call your healthcare provider



Be Careful Especially with these Products

Tilmicosin (Micotil®)
Sedatives (e.g., Xylazine)
Oil-based products or vaccines
Brucella abortus Strain RB51 vaccine
Modified live vaccines (e.g. Erysipelas vaccine)
John's vaccine
Hormones - especially if pregnant
Antibiotics - especially if allergic



MORE INFORMATION:

<http://www.porkgateway.org/FileLibrary/PIGLibrary/Factsheets/e6672v1-a.pdf>
<http://www.cdc.gov/niosh/stopsticks/sharpinjuries.html>



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Recommended Resource

ProMED Digest, Vol 63, Is 16 | ProMED-mail

Secure | https://www.promedmail.org

Apps EDCC USDA APHIS | Anim GS USGS Arboviral Disease State of Delaware - CDC - Rabies Survey Public Health Conference DPH Reportable Disease APHIS wil

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TULAREMIA - SWITZERLAND (03): BIRD OF PREY ATTACK

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https://sat.gstsvs.ch/fileadmin/datapool_upload/gJournal/Artikel/pdf/SAT_03_2018_Ehrenspurger.pdf

The following publication illustrates an unusual source of tularemia reported in Switzerland:

Ehrenspurger F, Riederer L and Friedl A: Tularemia after attack of one buzzard on a jogger: A "One Health" case report. Schweiz Arch Tierheilkd 2018; 160:185-188, <https://doi.org/10.17236/sat00153> [in German, abstract in English]

Summary:
A female jogger was attacked by a common buzzard (*Buteo buteo*) and was scratched lightly at the back of the head. One week later she was taken ill with high fever and headache which was later diagnosed as ulceroglandular tularemia in regional lymph nodes, caused by *Francisella tularensis*. Recovery was only achieved after several weeks of systemic antimicrobial treatment (gentamicin/ciprofloxacin).

Tularemia is a well known zoonotic disease, called "rabbit fever", mainly affecting rabbits and hares, but also small rodents. Human infection occurs often following tick bites or bloodsucking insects, or in hunters or slaughterers handling infected animals. Bites by mice have also been reported as a cause of tularemia.

For the first time we report this case of tularemia as a result of an attack by a bird of prey. We assume that the bird acted as a vector just carrying the *F. tularensis* on its claws or beak, but we cannot exclude an infection of the bird itself. Several other joggers had also been attacked by a common buzzard in the same area shortly after the above described event and one of these also became infected with *F. tularensis*.

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