

Preventing the Spread of Infectious Disease on Farms, Ranches and Ag Workplaces



farmdoc



College of Agricultural,
Consumer &
Environmental Sciences

UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN

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Central States
Center for Agricultural
Safety and Health

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Rights & Responsibilities

Employees are entitled to:

- ▼ Safe & healthy working conditions
- ▼ Fair compensation for all hours worked
- ▼ Report unsafe conditions without retaliation

Employers are responsible for providing a safe workplace free from known hazards.

For more information: www.OSHA.gov or www.whistleblowers.gov



A little about me...

- Researcher – Tuberculosis and leprosy, periodontal disease, cancer, pesticides and nerve agents, farm Injuries and fatalities
- Ag safety and health outreach gal
- Admirer of giant horses
- Hog farmer
- Cattle wrangler
- Mom/Grandma



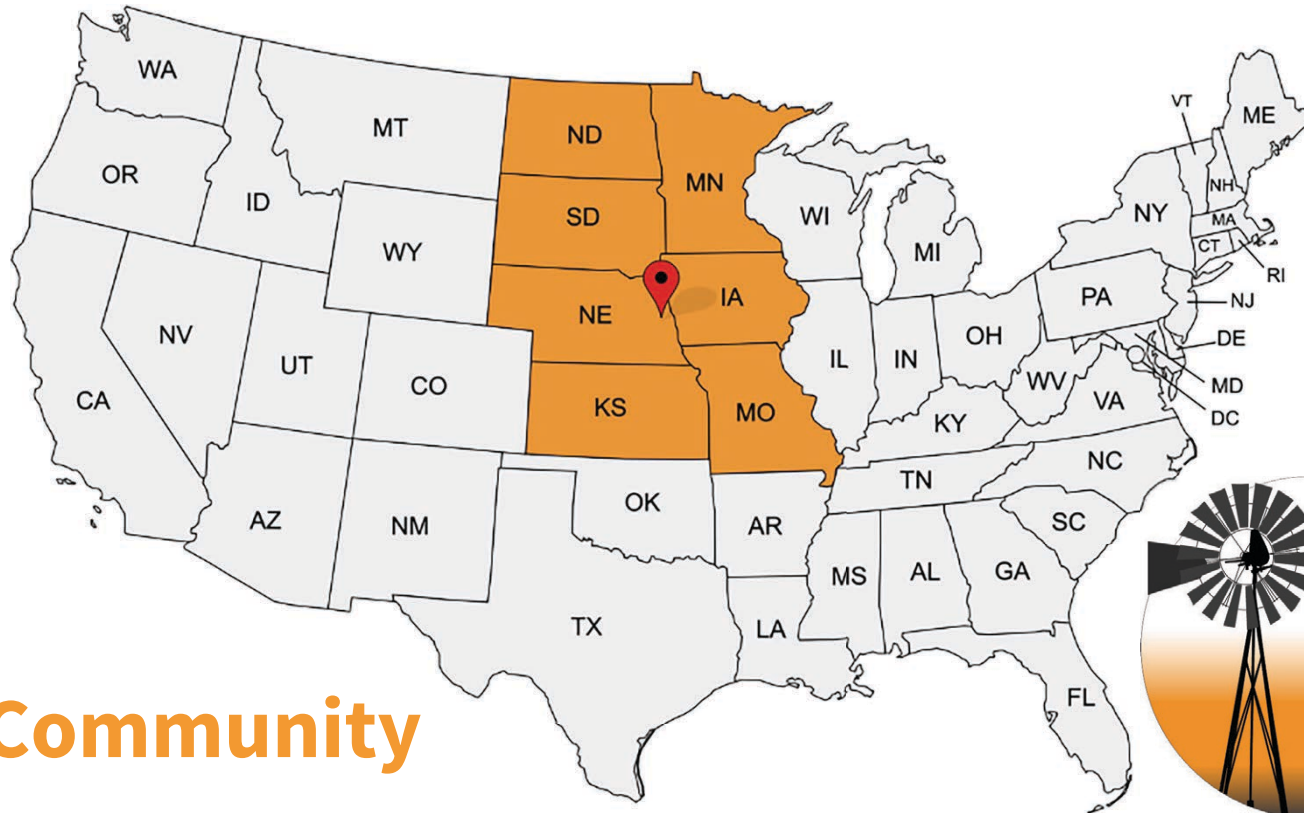
Central States Center for Agricultural Safety and Health University of Nebraska Medical Center

National Institute for Occupational Safety and Health Funded

Ag, Forestry and Fishing Safety and Health Center



- 12 US Ag Centers
- 7 States in CS-CASH Region
- Prevention
- Education
- Outreach
- Research



Here to serve the Ag Community

Take home messages

Define

Define an Emerging Disease.

Identify

Identify causes of Emerging Infectious Disease in agricultural settings

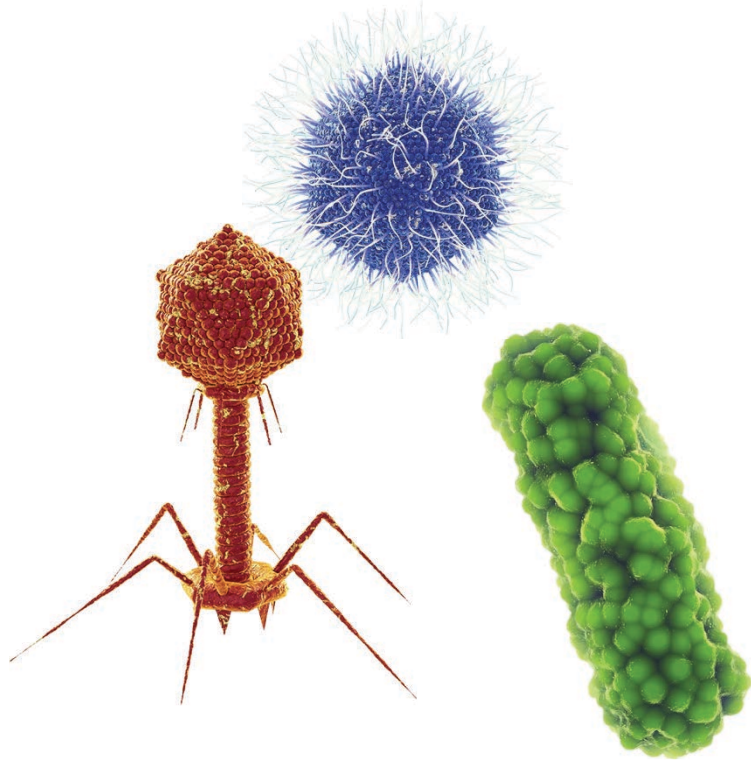
Understand

Understand how infectious agents are transmitted to and between humans.

Discuss

Discuss simple solutions that can be implemented into your risk management plan.

Infectious Disease Terminology



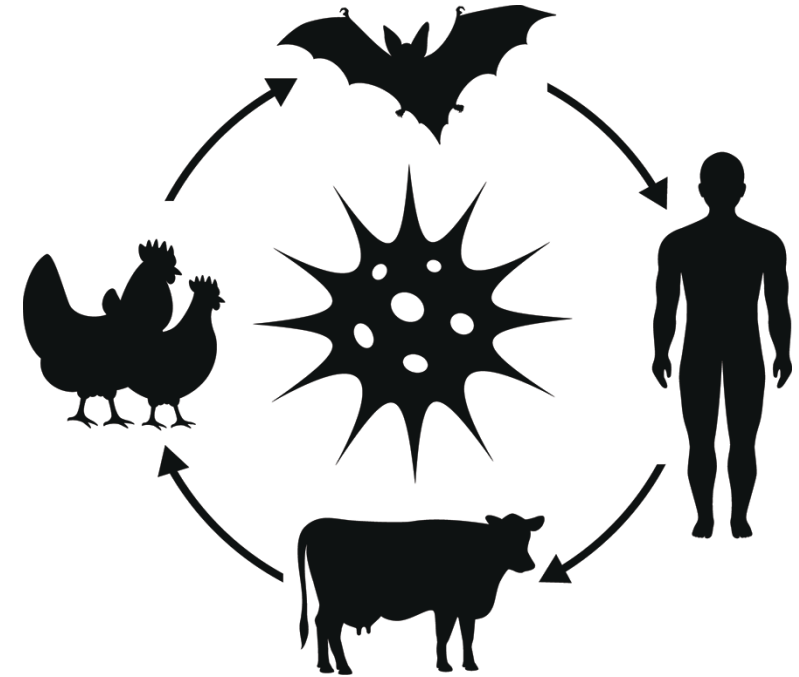
Pathogen

Organisms that cause infectious disease



Contagious

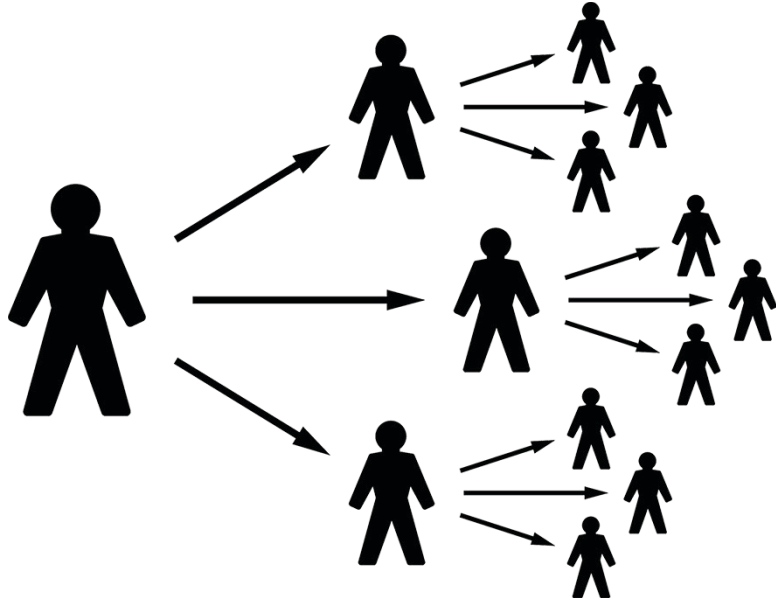
Infection spread from person to person



Zoonosis

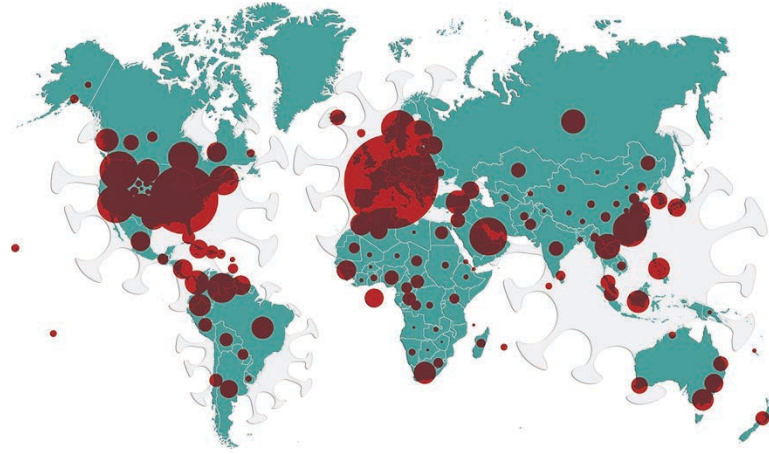
Spread from one species to another

Infectious Disease Terminology



Epidemic

An outbreak that is actively spreading and may have potential to become a pandemic.



Pandemic

An epidemic of an infectious disease that has spread across a large region, for instance multiple continents or worldwide



Endemic

Consistently present but limited to a particular region. This makes the disease spread and rates predictable.

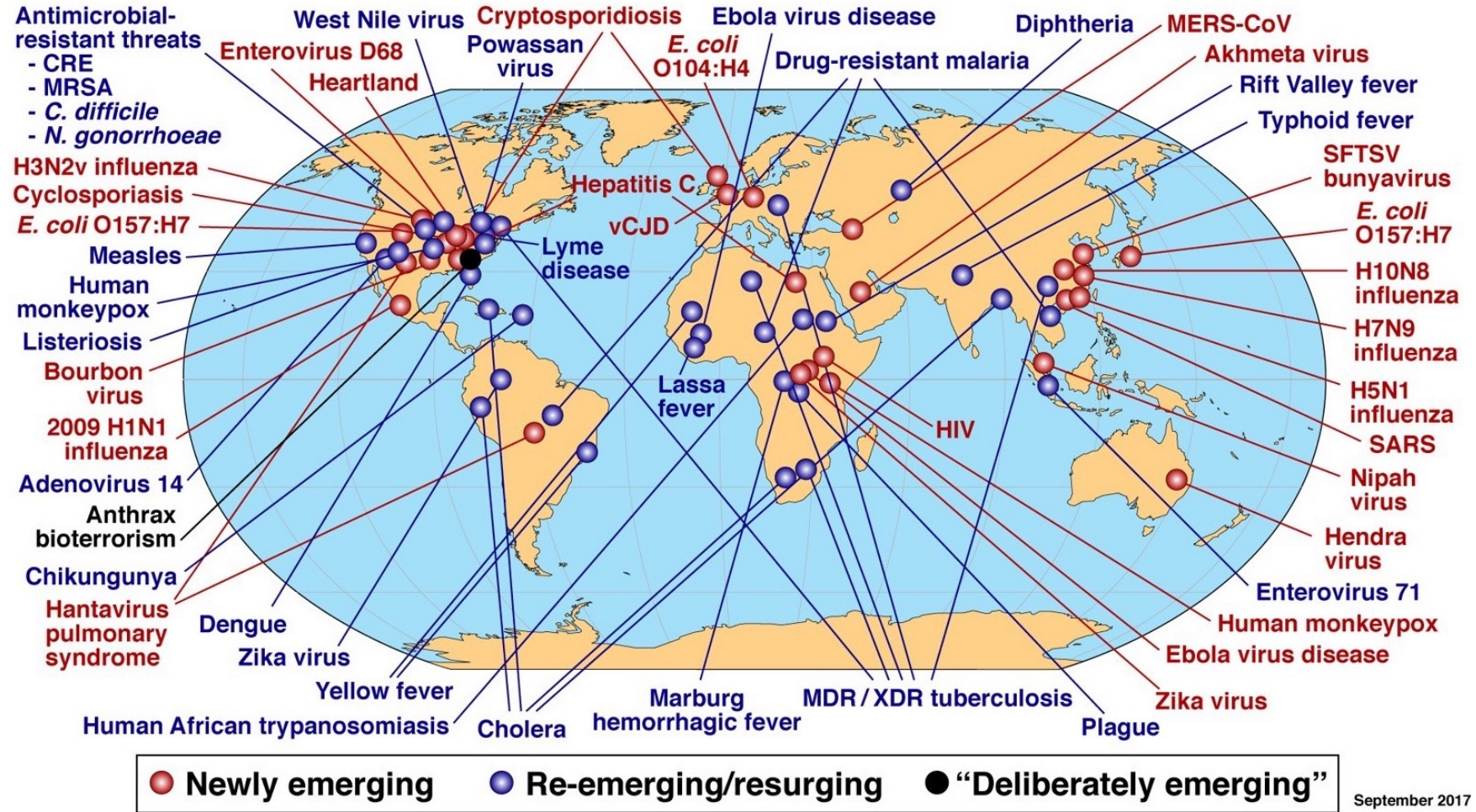
What is an EMERGING Infectious Disease?

Infectious diseases that have newly appeared in a population

or

Have existed but are rapidly increasing in incidence or geographic range

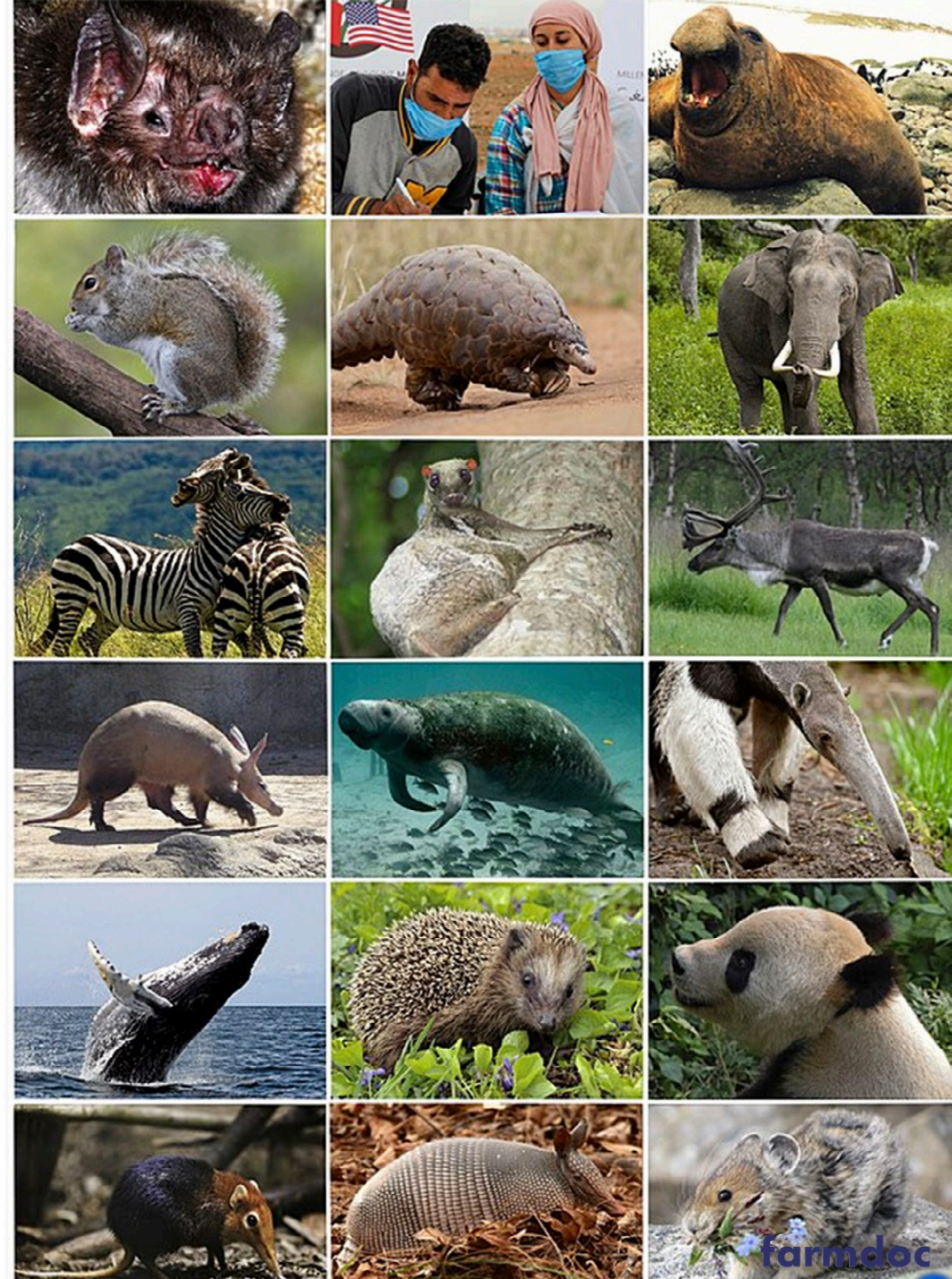
Global Examples of Emerging and Re-Emerging Infectious Diseases



September 2017

Up to 70% of human emerging pathogens come from animals

Most of the pathogens are viruses, but new pathogens can also be bacteria and fungi.



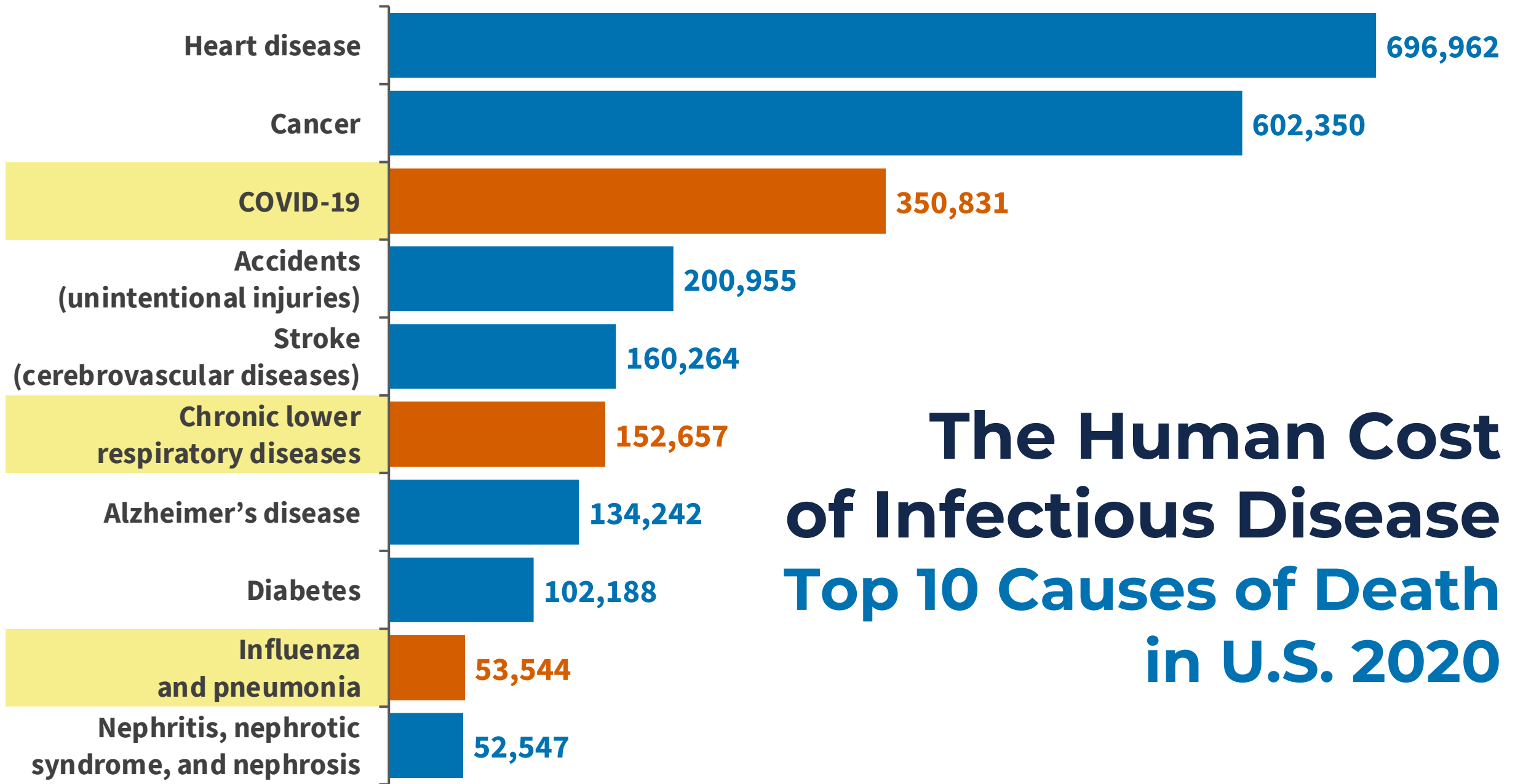
Influenza costs U.S. businesses how much each year because of lost time, productivity, and health care costs?

- \$21 Million
- \$500 Million
- \$21 Billion



Why discuss emerging infectious disease in Ag?





The Human Cost of Infectious Disease

Top 10 Causes of Death in U.S. 2020

The Economic Cost of Influenza

2017-2018 Productivity Loss Estimate – Influenza



25 MILLION
workers sickened



\$26.74
average hourly wage
Bureau of Labor Statistics



\$855.68
average wages lost due to
missing four 8-hour shifts

Estimated Losses
\$21.39 BILLION Dollars



The Economic Cost of COVID-19

In 2021-2022,

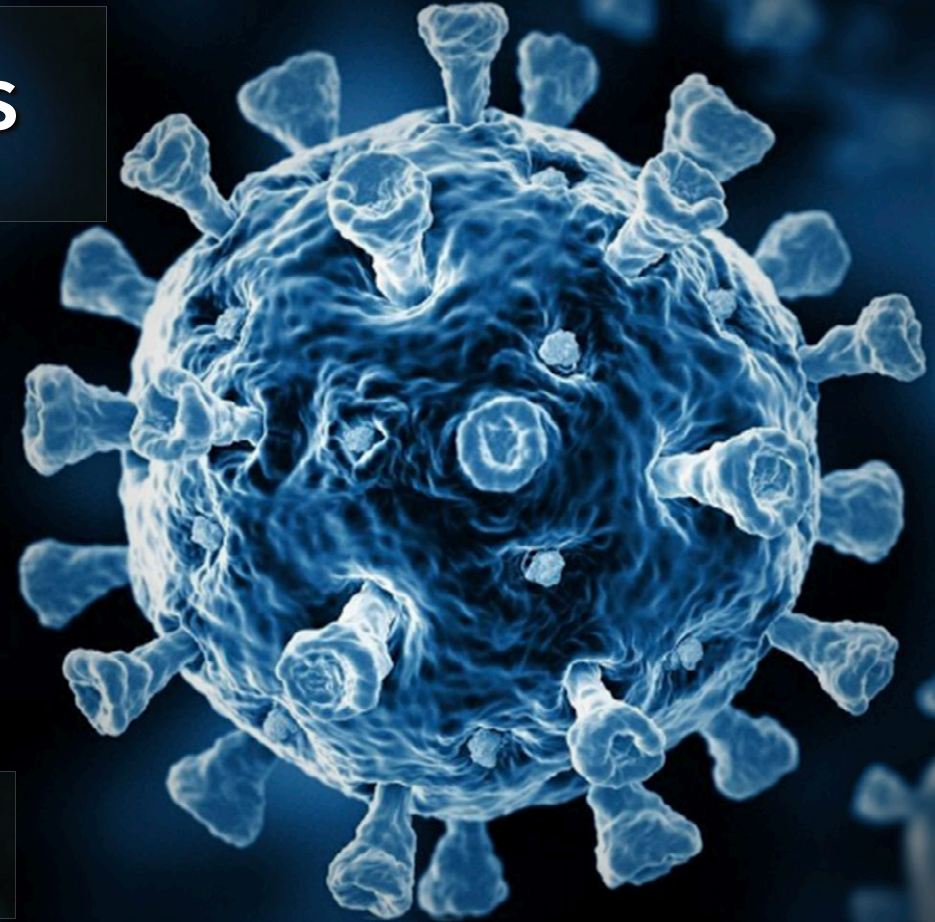
workers' pandemic-related absences
cost employers more than

\$78.4 billion

nearly \$1 billion each week

Calculated from
disability wage payments, state disability insurance,
sick leave wages and employee benefits

Integrated Benefits Institute



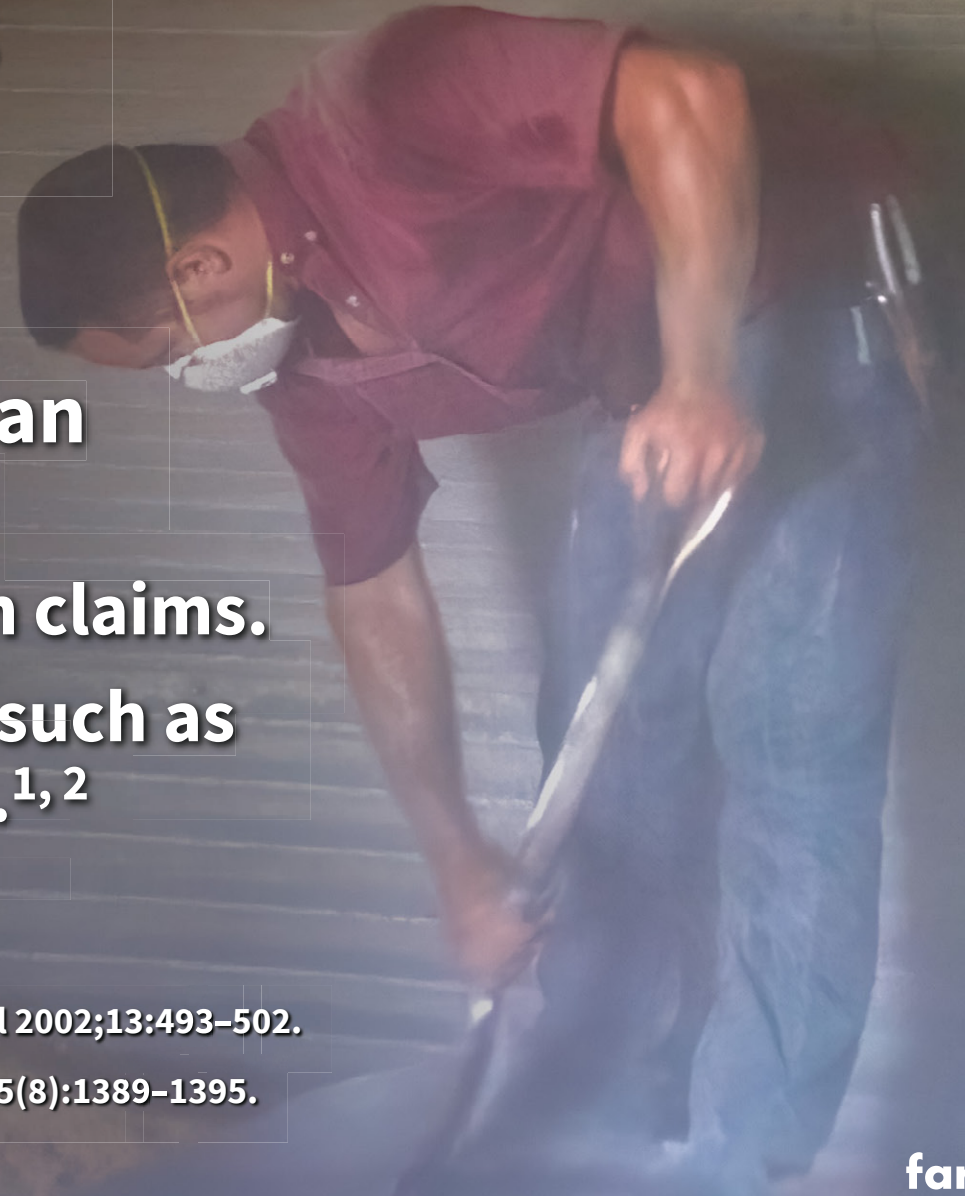
Healthy Workers = Healthy Communities = Healthy Industries

Maintaining a healthier workforce can

- lower direct costs such as insurance premiums and worker's compensation claims.
- positively impact many indirect costs such as absenteeism and worker productivity.^{1, 2}

1. Sorensen G, Stoddard A, LaMontagne A, Emmons K, Hunt M, Youngstrom R, et al 2002;13:493-502.

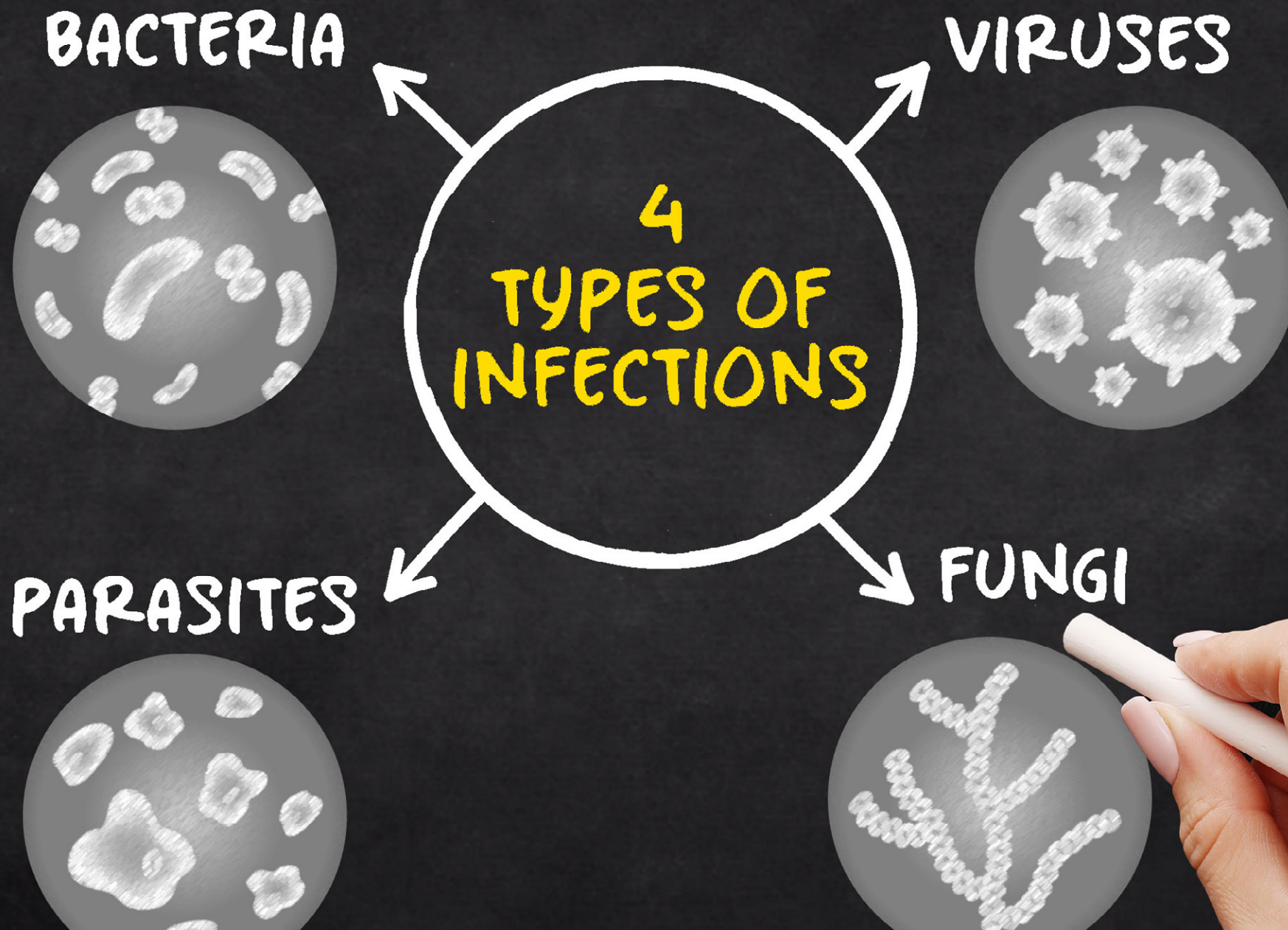
2. Sorensen G, Barbeau EM, Stoddard AM, Hunt MK, Kaphingst K, Wallace L 2005;95(8):1389-1395.



Influenza costs U.S. businesses how much each year because of lost time, productivity, and health care costs?

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Bacteria

Found throughout nature.

Usually, single cell organism

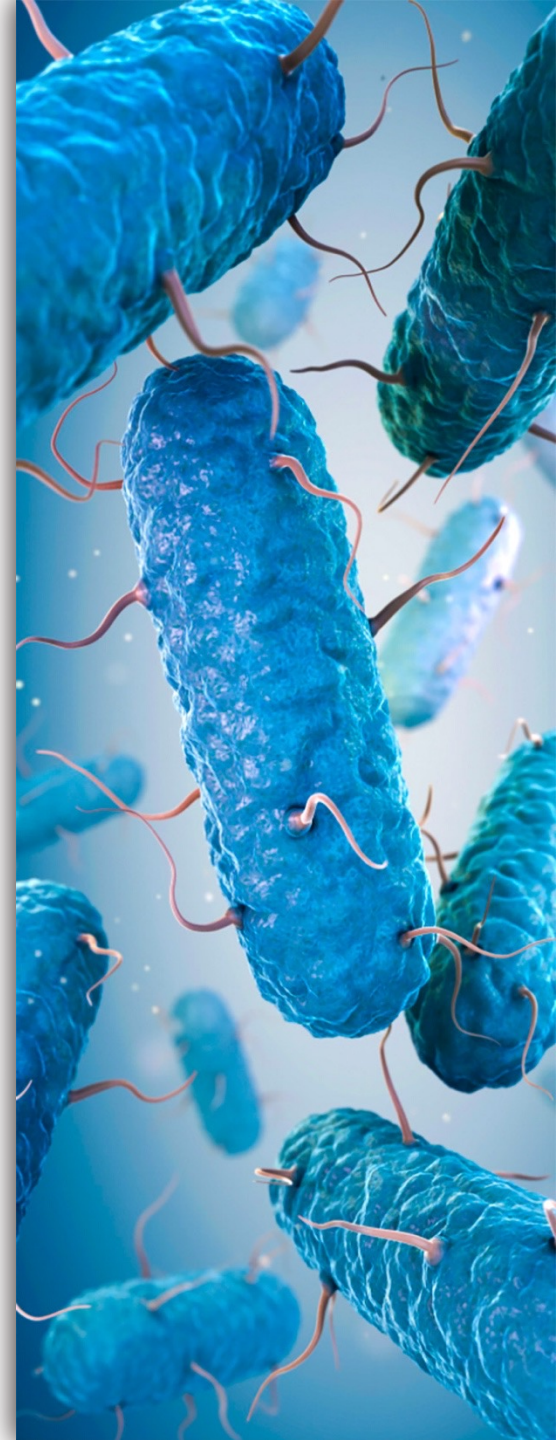
People & animals carry millions

in gut, on skin

Most are harmless and many beneficial

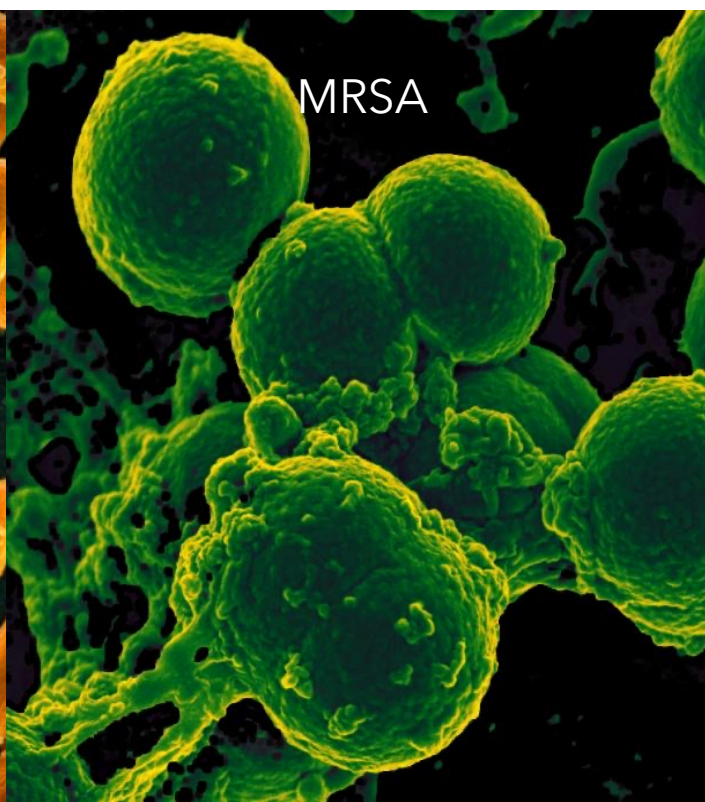
1% are pathogenic

and cause infectious diseases

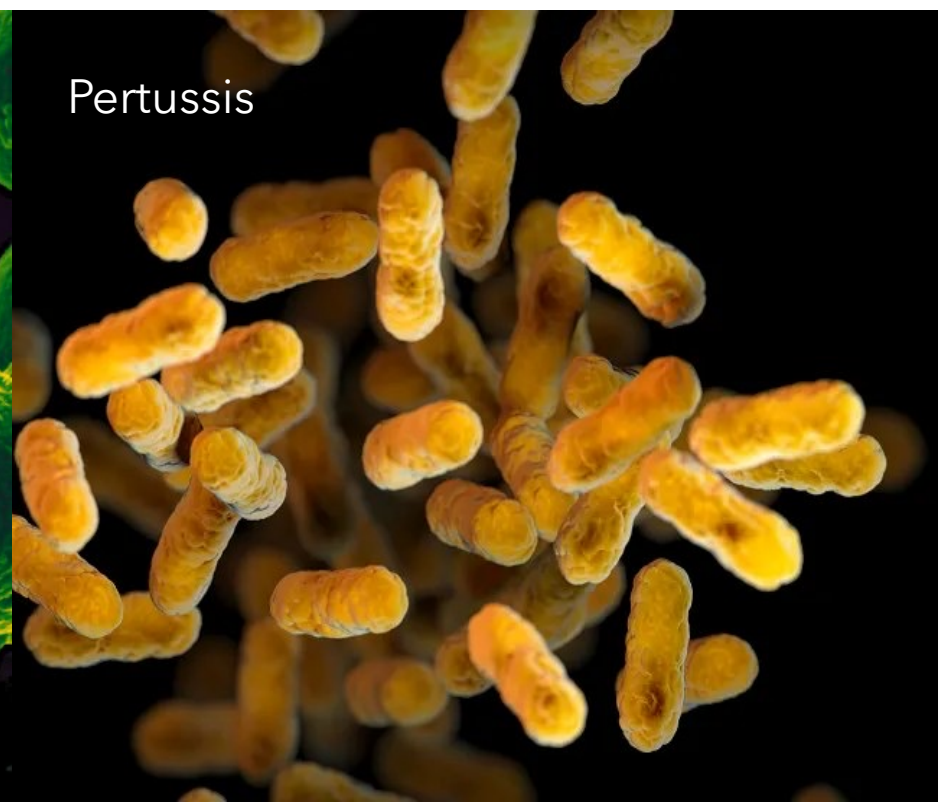




E. Coli



MRSA



Pertussis

Bacterial Infections

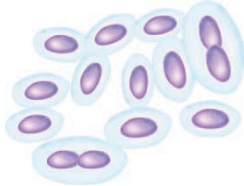
- May be treatable with antibiotics
- Some bacteria are controlled by vaccines
- Some contagious
- Respiratory Infections – are the most commonly fatal bacterial disease

Bacteria Found in Agricultural Settings



Anthrax

In soil. Vaccinate cattle.
Not contagious.



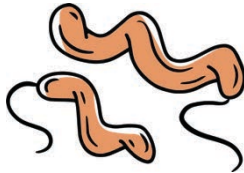
Bordetella

Whooping cough, kennel cough atrophic rhinitis



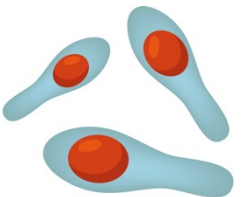
Lyme Disease

Bite of deer tick



Campylobacter

Food poisoning; poultry



Clostridium

Common food poisoning -
raw meat, poultry



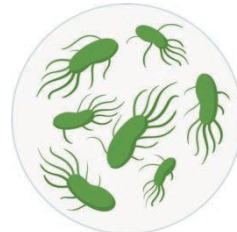
E. Coli

Food poisoning -
food/water, cows



Mycobacterium

Tuberculosis



Salmonella

Food poisoning -
food/water, animals



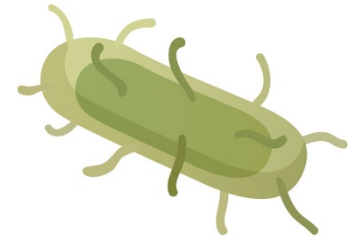
Shigella

Contaminated drinking
/recreational water; feces



Vibrio

Raw/undercooked
shellfish esp. oysters



Yersinia Pestis

Plague;
bite from
rodent flea



Bacteria Found in Agricultural Settings

Spread to humans by:

- **Soil, Dust**
- **Rodents**
- **Livestock**
- **Humans**
- **Water, Food**



Emerging infectious diseases in agriculture include?

- E. Coli (bacteria)
- Aflatoxin (from mold)
- Heartland Virus (ticks)
- All of the above

Emerging Bacterial Diseases

E. coli O157 (Enterohaemorrhagic)

Undercooked ground beef or raw milk, can be passed directly to people from the stool of young calves and adult cattle.

E. coli O157 also can be spread from person to person.



Emerging Bacterial Diseases

MRSA

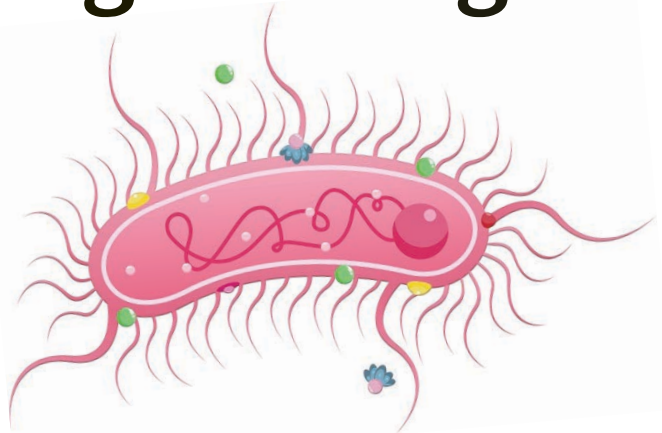
Methicillin-Resistant Staphylococcus Aureus is a highly antibiotic-resistant strain of staph that arose in pigs and has infected humans (2022)



Emerging Bacterial Diseases

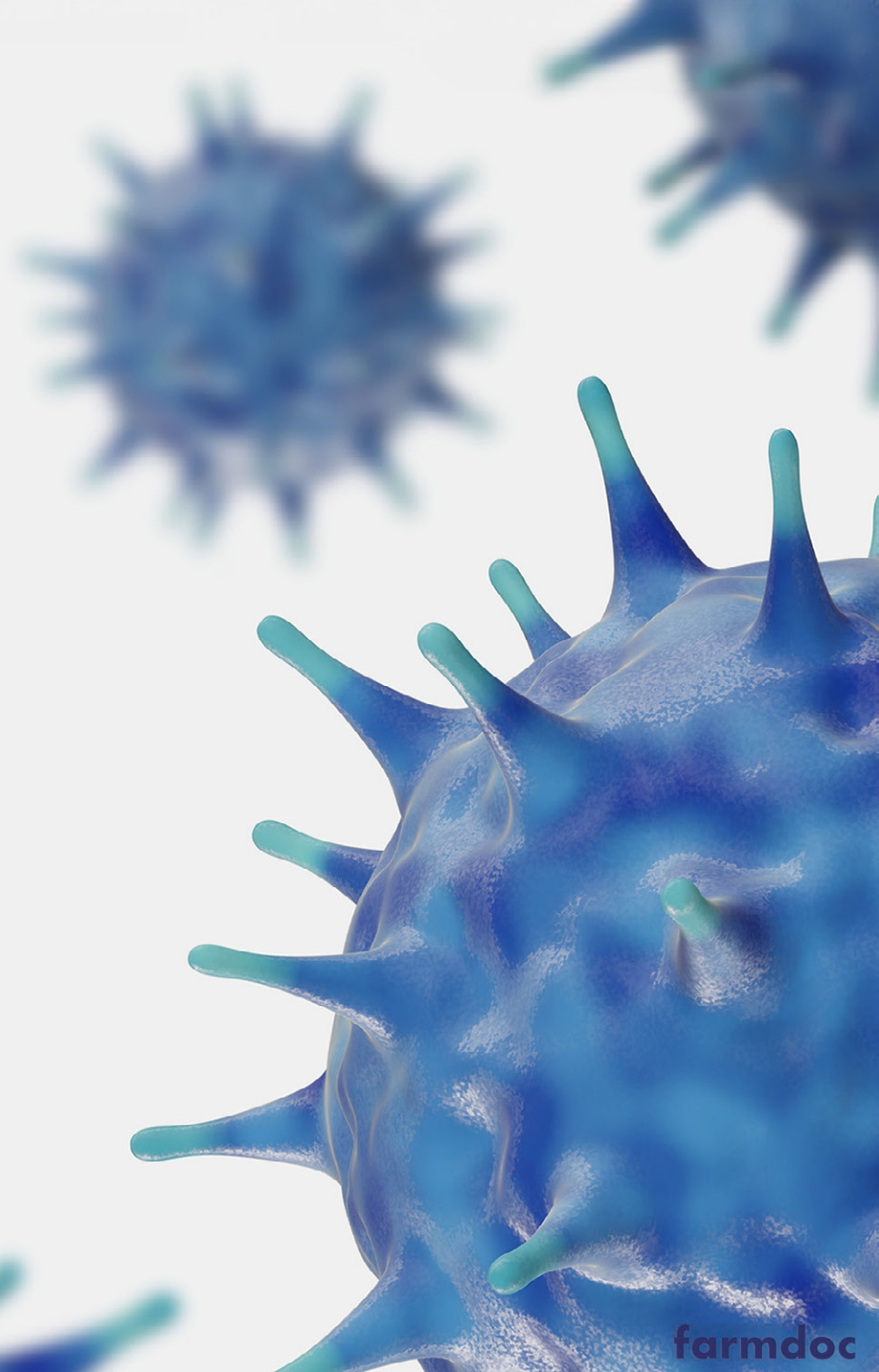
Pertussis - Whooping cough

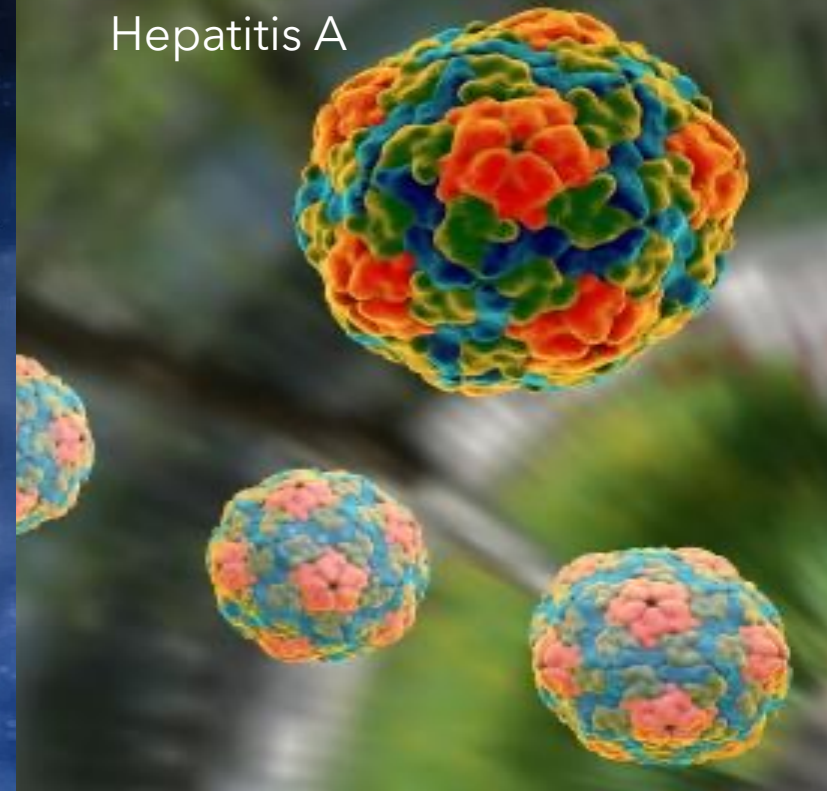
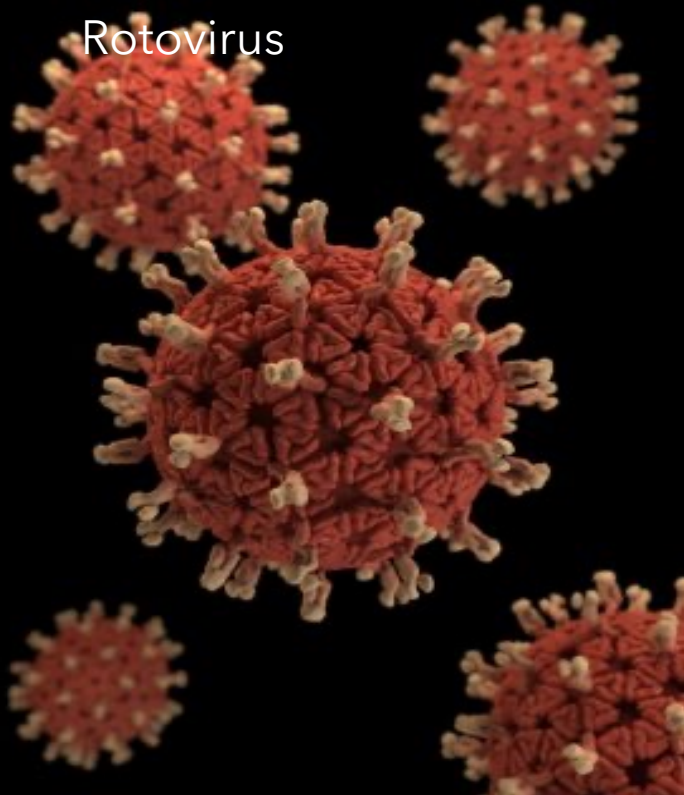
Over the past 25 years pertussis has again become increasingly common due to incomplete vaccine coverage and people choosing not to get vaccinated.



Viruses

- Submicroscopic infectious agent
- Invade living cells and use the cells to multiply
- Infects all life forms; found in most ecosystems





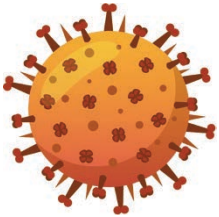
Viral Infections

- Common symptoms – flu-like (fever, chills, body ache, weakness, fatigue)
- Anti-viral agents used to treat. Not antibiotics.
- **Vaccines for some viral infections**

Viruses Found in Agricultural Settings



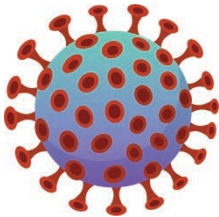
Hantavirus
rodents



Influenza
poultry, swine, cattle,
other workers



West Nile Virus
mosquitos



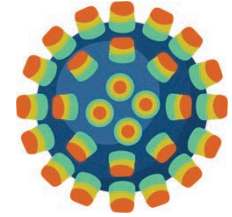
Corona Virus
COVID-19, other Workers



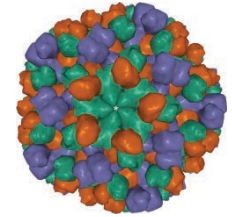
Heartland Virus
ticks



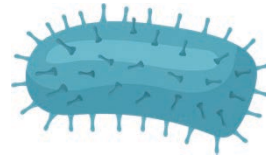
Flavivirus
insects



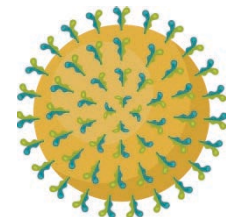
Norovirus
pigs, cattle,
other workers



Hepatitis E
meat products



Rabies
mammals



Rotavirus
water

Spread to humans by:

- **Insects**
- **Rodents**
- **Birds**
- **Livestock**
- **Humans**
- **Water**





Avian Influenza

2022-2023 outbreak of avian influenza, or bird flu, affected domestic poultry, waterfowl, raptors, and some shorebirds in the U.S. and Canada. Endemic?

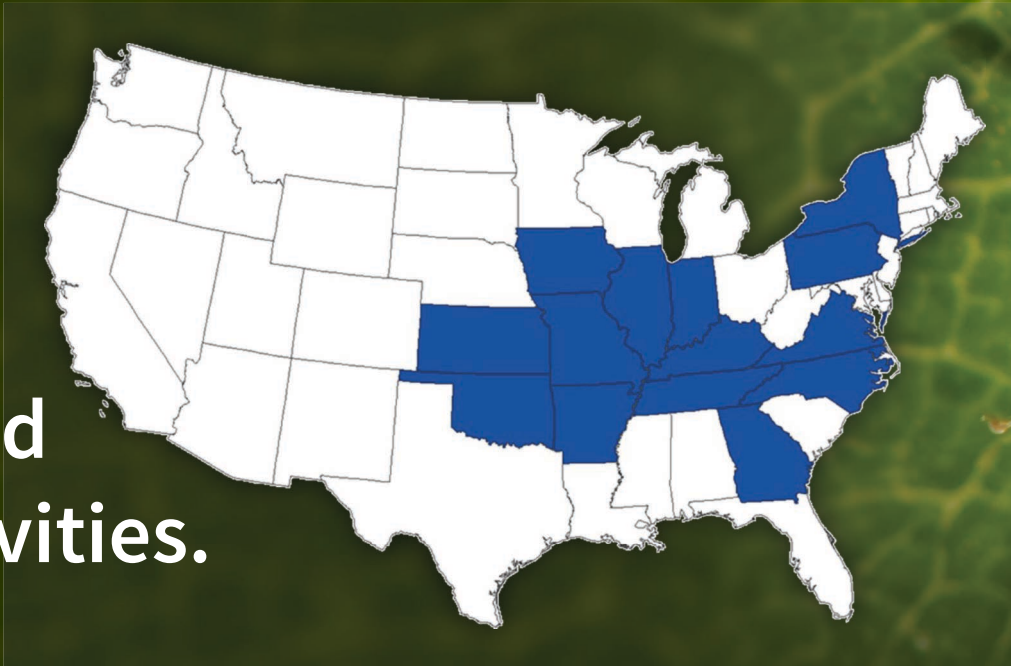
Because the current strain (H5N1) causes heavy losses to poultry, it is referred to as highly pathogenic avian influenza, or HPAI.

Over 52 million birds were euthanized in 2022.

Heartland Virus – Lone Star Tick

As of November 2022, more than 60 cases of Heartland virus disease have been reported. Most people diagnosed with the disease became sick from May through September.

Most people diagnosed were involved in outdoor work and recreational activities.



Influenza D

Found in cattle and their handlers

A new flu is spilling over from cows to people in the U.S. How worried should we be?

March 29, 2023 · 5:14 AM ET

Heard on [Morning Edition](#)



Michaela Doucleff



6-Minute Listen

+ PLAYLIST



Recent News

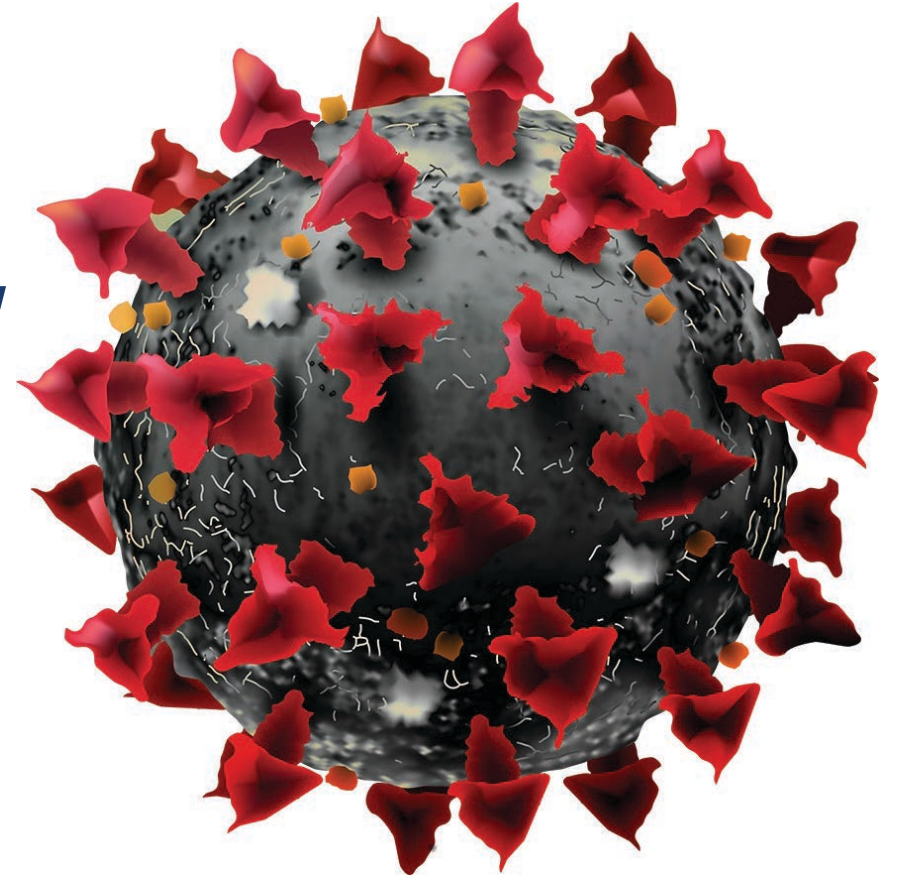
“No one knows yet if influenza D causes any symptoms in people.”

“But studies indicate influenza D is likely what's called an emerging virus.”

It's jumping into people who work with animals, such as dairy farmers, but it's not likely spreading much beyond that. Yet.

COVID-19 - What We Know

- Spreads rapidly; droplets spray.
- Symptoms – range none to severe.
 - Appear 2-14 days after exposure
 - Can be contagious BEFORE symptoms show
 - Most contagious when most symptomatic
- Higher risk of severe illness for elderly and those with health conditions.
 - Heart disease, lung disease (asthma, etc.), diabetes, suppressed immune system
- Known "best practices" reduces transmission

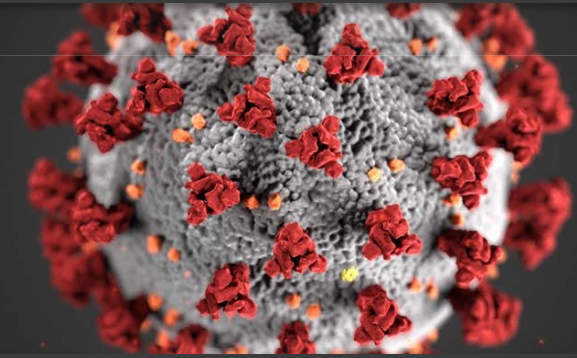


Flu vs COVID-19

SARS CoV-2 (virus) that causes COVID 19

- MUCH more infectious
- Spreads faster than flu
- COVID-19 (disease) causes more deaths & hospitalizations
- COVID symptoms can be **MUCH** more severe than flu

Two different Viruses:



SARS CoV-2 Notice the crowns



Influenza (Flu) – No crowns

Did you know?

Flu vaccines are changed each year
as the flu virus mutates quickly.

Parasites

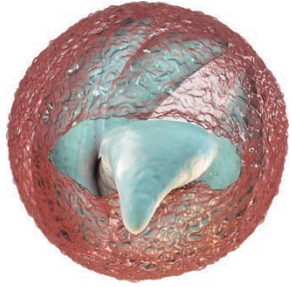
Use other living things - like your body - for food and a place to live.

Range in size from tiny, one-celled organisms to worms that can be seen with the naked eye.



3d rendered illustration of a tape worm

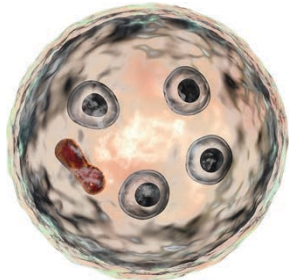
Parasites Found in Agricultural Settings



Cryptosporidium parvum
Crypto



Cyclospora
Cyclosporiasis



Entamoeba histolytica
Amoebiasis or amoebic dysentery



Giardia lamblia
Most common parasite in US



Leishmania spp.
Leishmaniasis



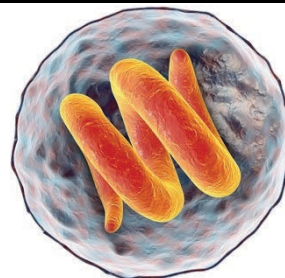
Plasmodium spp.
Malaria



Schistosoma spp.
Blood flukes



Taenia spp.
Tapeworm



Trichinella spiralis
Trichinosis

Spread to humans by:

- Soil
- Livestock
- Animals
- Insects
- Water
- Food
- Blood

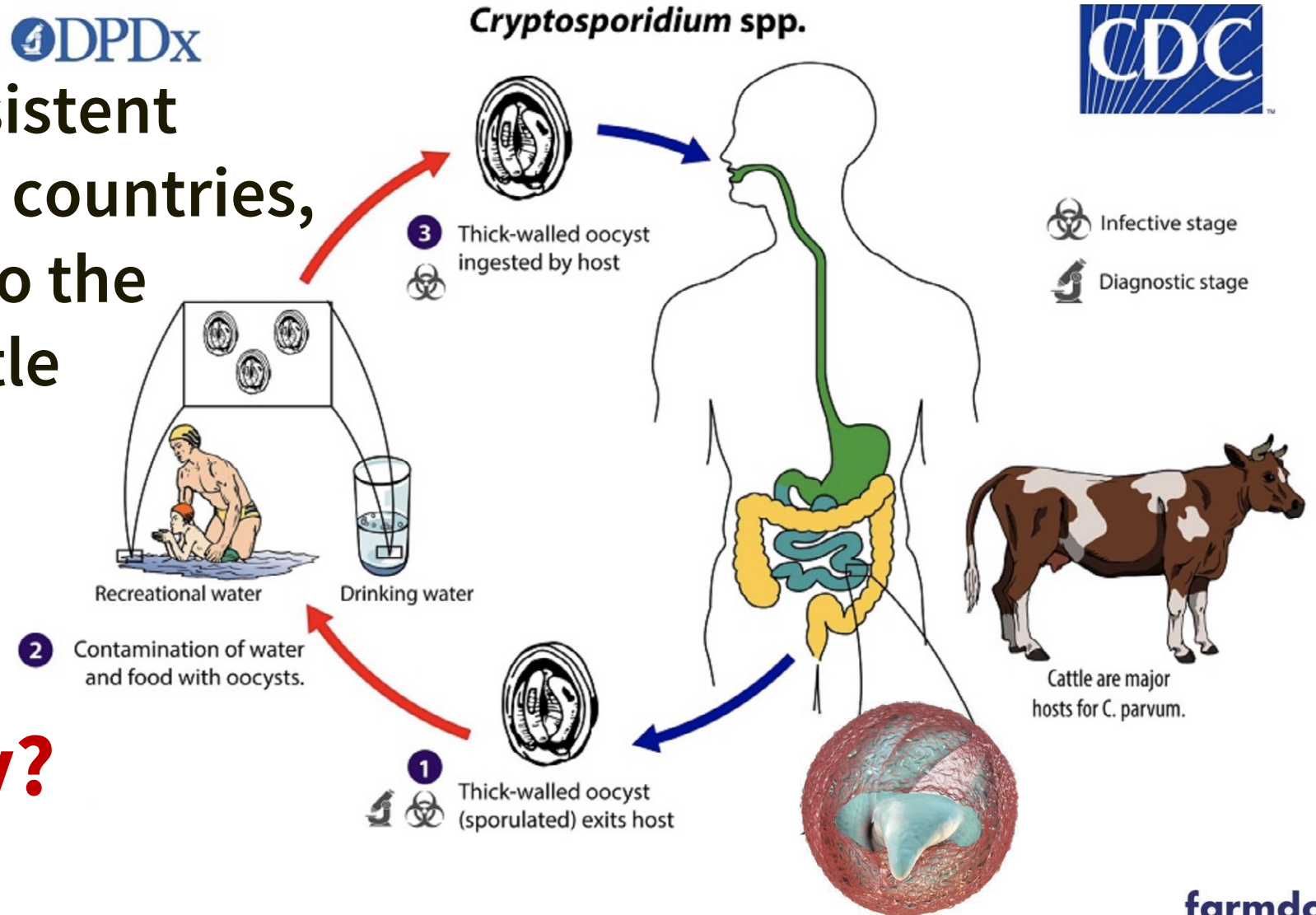
Emerging Parasitic Diseases

Cryptosporidium parvum



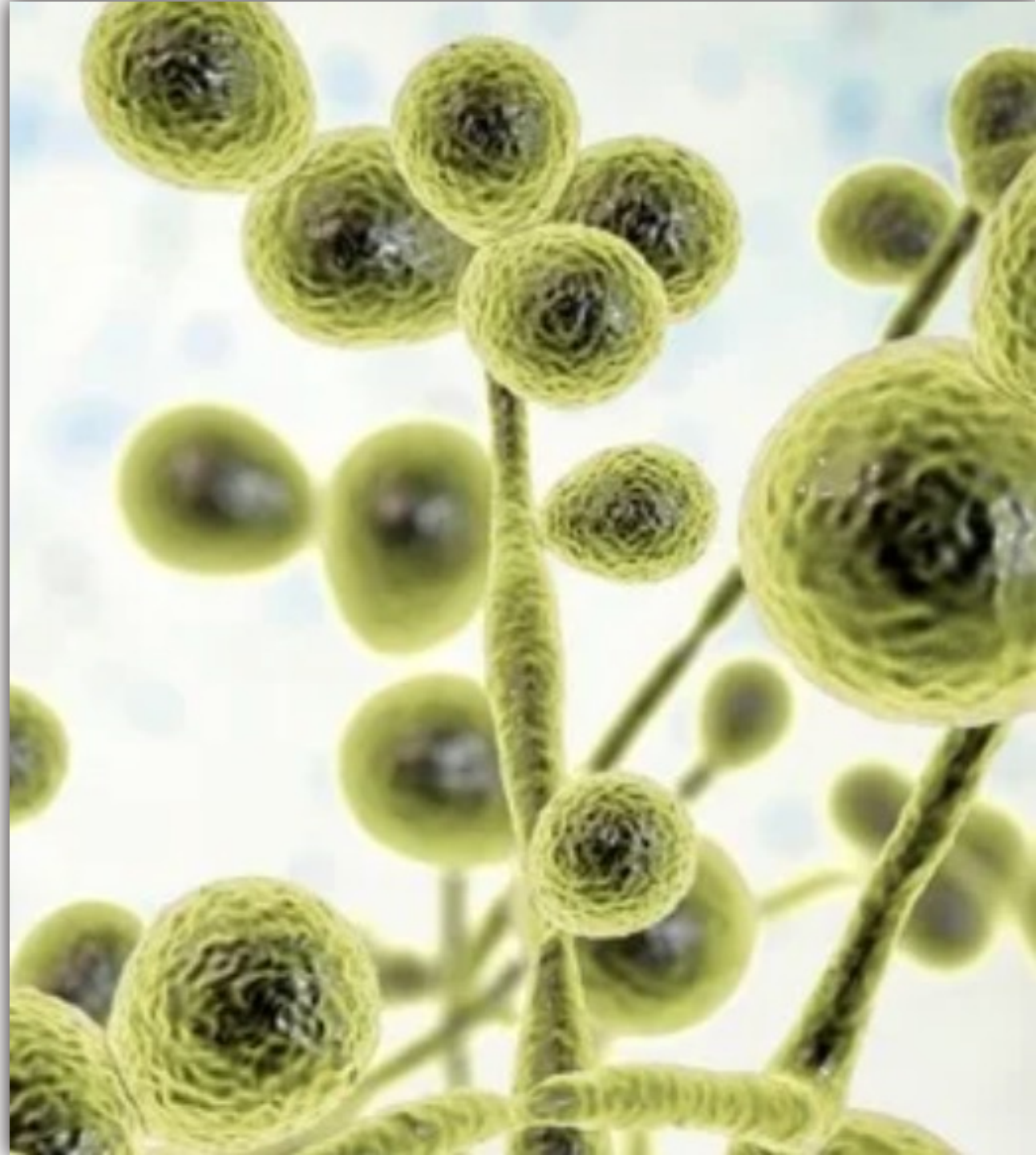
A leading cause of persistent diarrhea in developing countries, is now a major threat to the U.S. water supply. Cattle serve as a major host.

Have you tested your well recently?



Fungus

- There are millions of fungal species
- Only a few hundred of them can make people sick.
- Molds, yeasts, and mushrooms are all types of fungi.



Diseases caused by Fungus in Ag Settings

- Aspergillus
- The mold that causes aspergillosis, is very common in agriculture grains, grasses and hay.
- Breathing Aspergillus spores can cause an infection in the lungs or sinuses which can spread to other parts of the body.



Ringworm

Ringworm is a common skin infection that is caused by a fungus.

Anyone can get ringworm. The fungi that cause this infection can live on skin, surfaces, and on household items such as clothing, towels, and bedding.

Cattle, horses, sheep and hogs can be all transfer ringworm to handlers.



Histoplasmosis

An infection caused by a fungus called *Histoplasma*.

The fungus lives in the environment, particularly in soil that contains large amounts of bird or bat droppings.

Barns, bins and other enclosed settings.

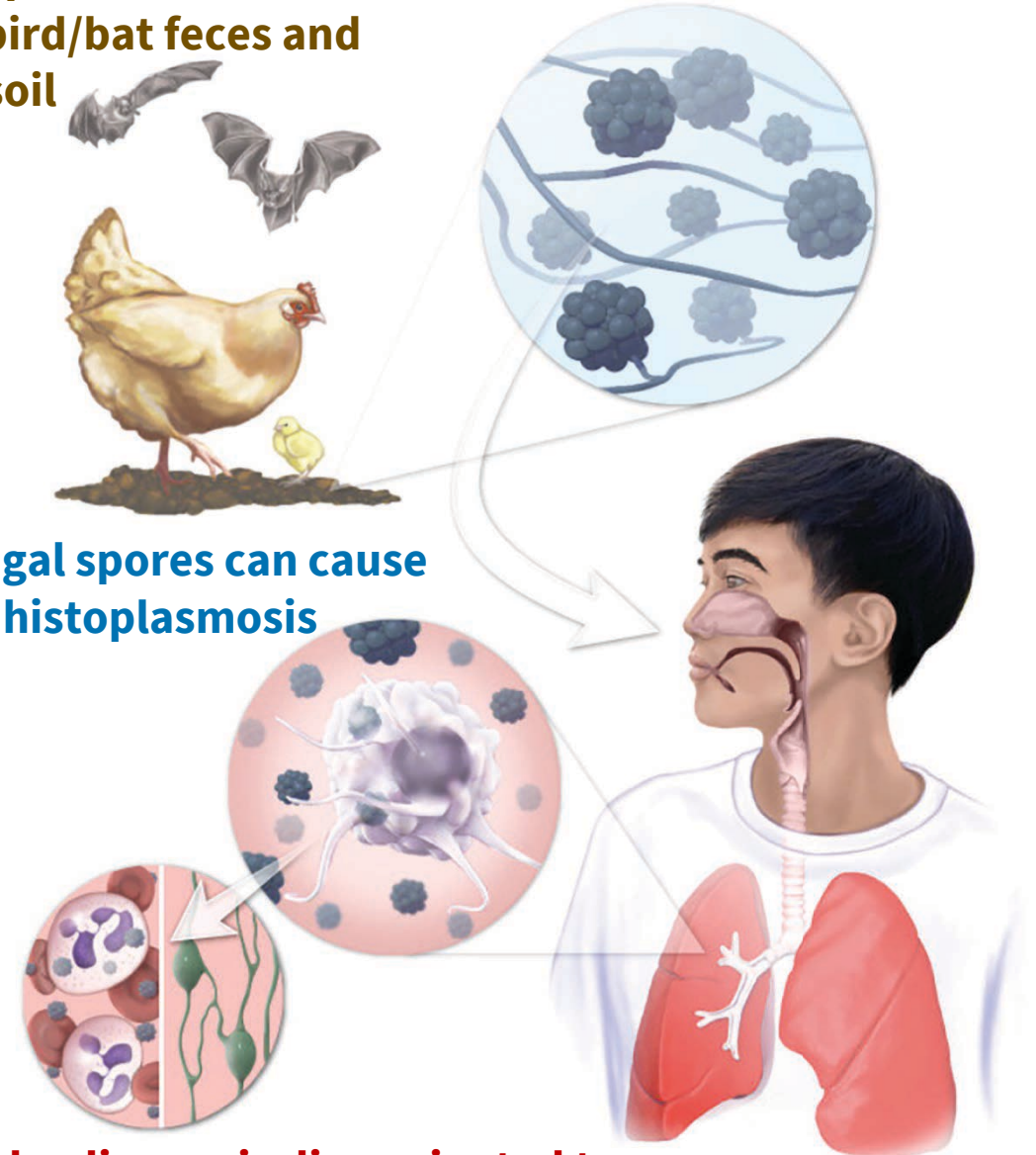
Affects, lungs, eyes, blood, lymph.

Pathogenesis of histoplasmosis

H. capsulatum spores become airborne from bird/bat feces and contaminated soil



Inhaled fungal spores can cause pulmonary histoplasmosis



Rarely, disease is disseminated to other organs via blood/lymphatics

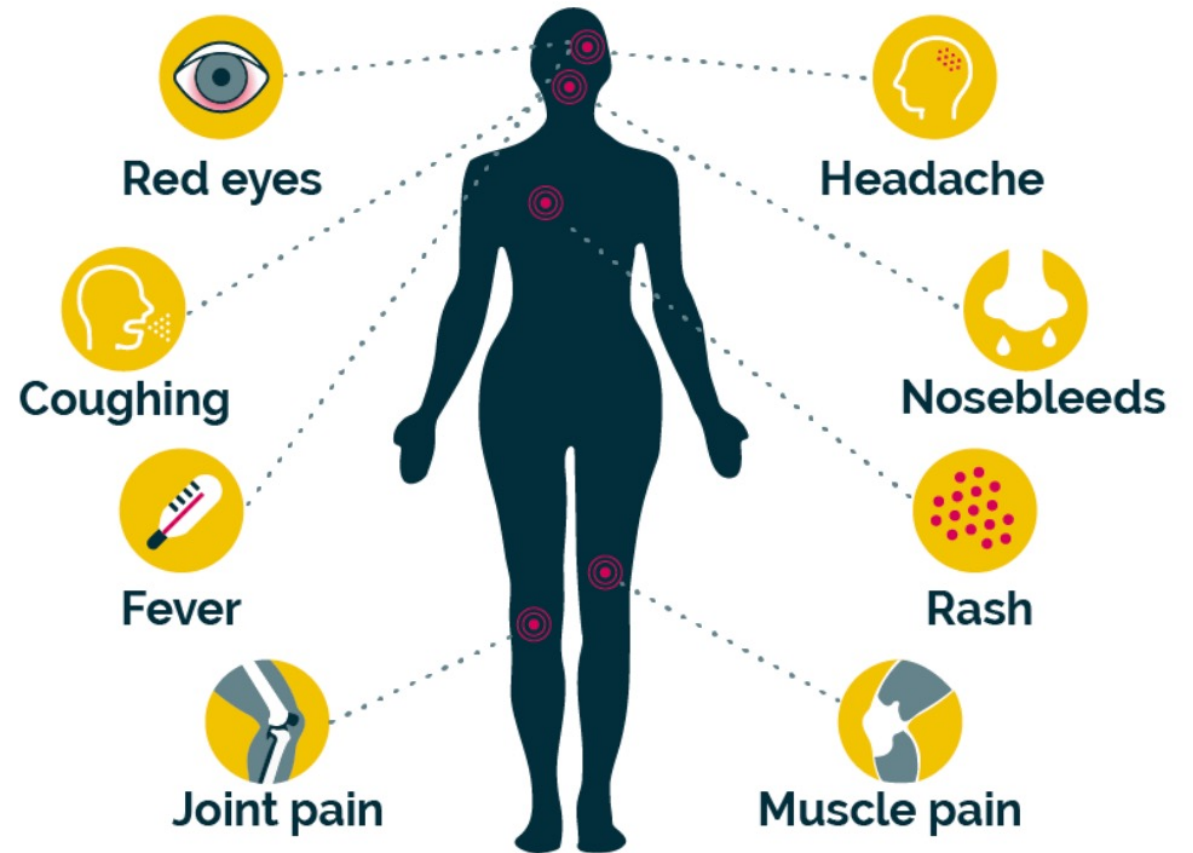
Mycotoxins

Mycotoxins are toxic compounds that are naturally produced by certain types of molds (fungi).

Aflatoxin – is a known carcinogen



Mycotoxin Induced Problems



Emerging infectious diseases in agriculture include?

- E. Coli (bacteria)
- Aflatoxin (from mold)
- Heartland Virus (ticks)
- All of the above

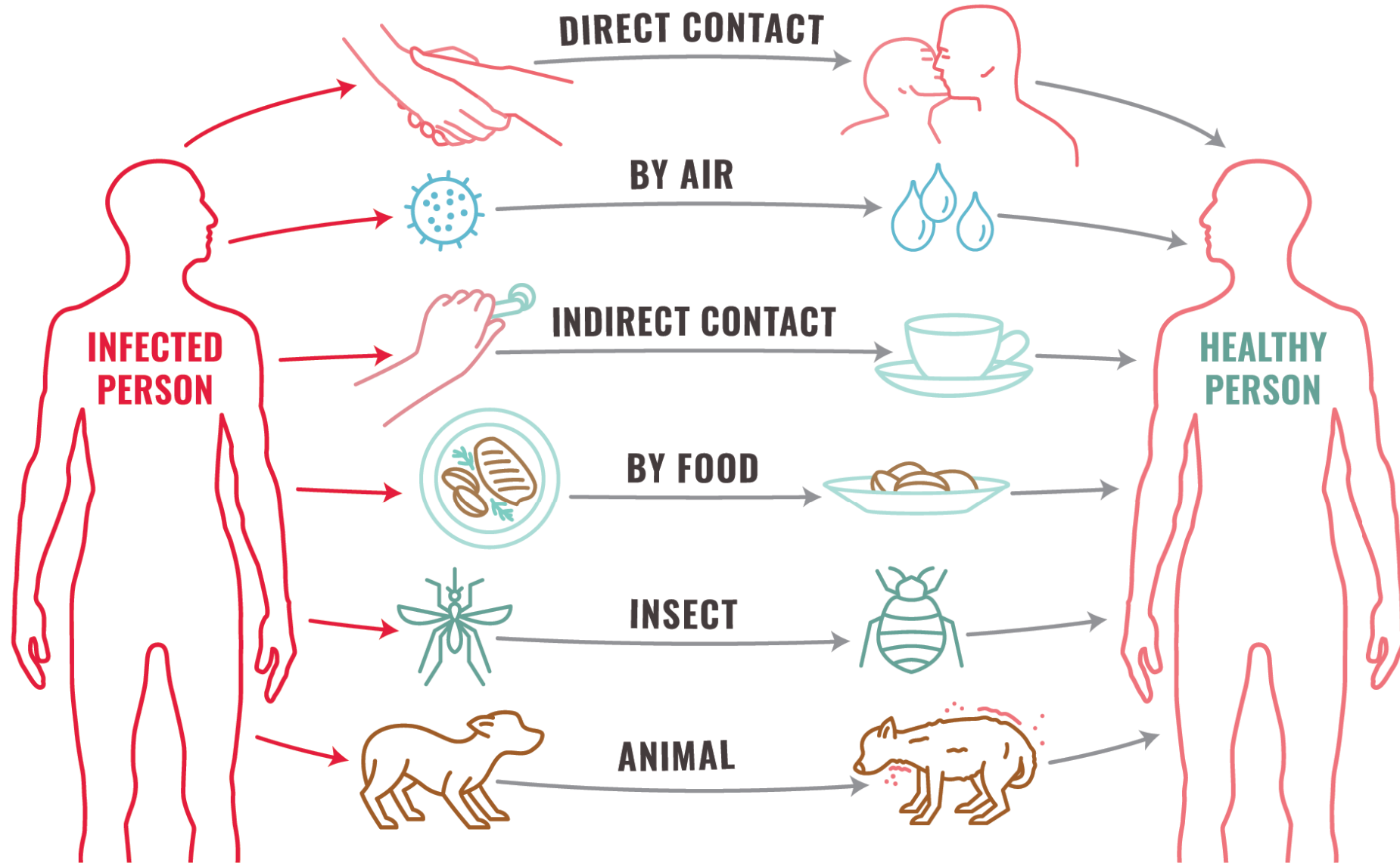
How We Get Infectious Diseases



Routes of Transmission

How We Get Infectious Diseases

Routes of Transmission



Airborne Transmission

- Droplet spread - the secretions from mouth & nose projected when a person sneezes or coughs
- Droplets travel up to 3 feet
- Transmission – infected droplets
 - Inhaled by other people
 - Get in other peoples' eyes
 - Land on surfaces people touch
- Examples: Influenza, COVID-19



Bite Transmission

Bite penetrates skin

- Animals
- Insects

Infectious organisms in saliva transmitted directly into bloodstream.

Examples:

- Rabies – animal bites
- West Nile & Zika – mosquito bites
- Heartland virus - ticks



Contaminated Water Transmission

Contaminated wells, stock tanks, and farm ponds can be infected with virus, bacteria & parasites.

Examples:

- E. Coli
- Rotavirus
- Giardia lamblia



Animal Feces Transmission

Ingesting dust or water containing feces from rodents or livestock can cause viral or bacterial disease.

Examples:

- Respiratory Disease
- Hantavirus in
 - Rodent urine
 - Droppings
 - Saliva

HANTAVIRUS

Pulmonary Syndrome

SYMPTOMS

Stage 1

1. Fever and chills.
2. Headaches and muscle aches.
3. Vomiting, diarrhea or abdominal pain.

Stage 2

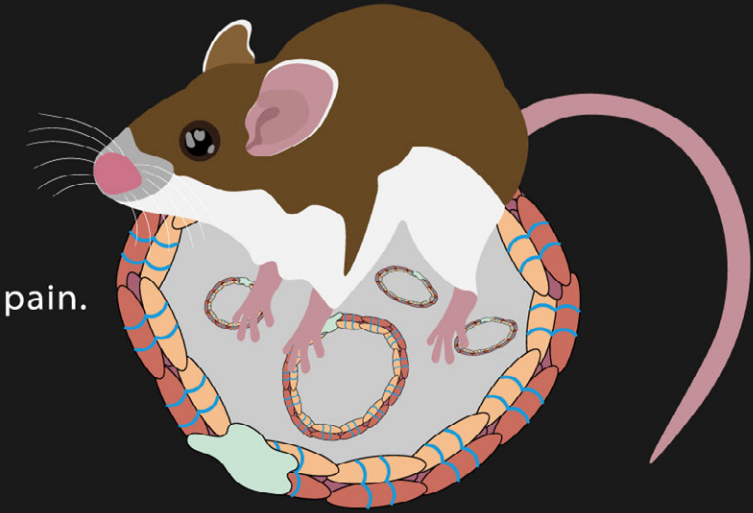
4. Cough.
5. Shortness of breath.
6. Low blood pressure.
7. Malaise.

SUPPLEMENTS

1. Garlic.
2. Vitamin A.
3. Curcumin.

PREVENTION

1. STOP rodents from coming indoors.
2. When Hiking/Camping, avoid setting campsite where rodents may be burrowing.
3. Be careful while cleaning barns, sheds and places where they nest.



AVOID RODENTS and their habitats.

Vector Transmission

Examples: Ticks, Mosquitos, Lice, and Fleas

Vectors - living organisms

Transmit infectious pathogens

- Between humans
- Animals to humans

Usually, bloodsucking insects

- Ticks, Mosquitoes, Lice, Fleas
- Ingest disease-producing microorganisms from infected host (human or animal) and transmit it into a new host.



Contaminated Surfaces Transmission

- Touching your eyes, nose or face after contact with a contaminated surface often leads to infection.
- Surface contamination:
 - Droplet spread
 - Infected person or animal
 - Bodily fluids

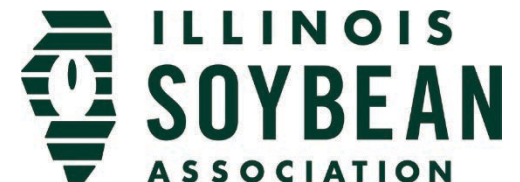
Mucus, blood, urine, feces

Frequently touched



What is the number one way of preventing the spread of infectious disease?

- Wear a mask
- Avoid your co-workers
- Cover your cough
- Wash your hands



**Prevent
Infectious
Disease
Spread**



**Proven
Low-Cost
Protection
Measures**

Handwashing

Most effective way to prevent spread of infectious disease

- ✓ Before starting work
- ✓ Before & after eating
- ✓ After sneezing or coughing
- ✓ After using the restroom
- ✓ After touching surfaces others have touched
- ✓ After using tools, equipment or vehicles
- ✓ After handling crops or animal products
- ✓ After handling livestock
- ✓ Before going home



**Wash hands for
at least 20 seconds**

The friction between your hands will help to remove virus and bacteria.

If soap & water are not available, use hand sanitizer with at least **60% ethanol**.



Handwashing Stand for use in the field \$80

Handwashing Poster(s) for your workplace

Email me:

ellen.duysen@unmc.edu

Provide

- Name
- Mailing address
- Number of laminated posters you would like

STOP THE SPREAD OF GERMS WASH YOUR HANDS!

Use water and soap and count slowly to 20 to reduce the risk of infection caused by bacteria and harmful germs!



For additional hygiene, use a hand sanitiser containing not less than 60% alcohol

Wear a Mask

Protect your lungs and wear a **NIOSH approved two-strap N95 mask** when:

- Agricultural dust is present
 - May contain livestock or rodent feces
- You, co-worker, or family member is showing signs of a respiratory infection



Keep a supply of N95 – two strap respirators on hand for voluntary use by employees during flu season and for dust exposures.



Immunization

- Influenza (Flu) – yearly
- Tetanus – every 10 years
- Hepatitis B
- Shingles
- COVID-19 (follow CDC)
- Shingles
- Others – depending on area, travel, etc.

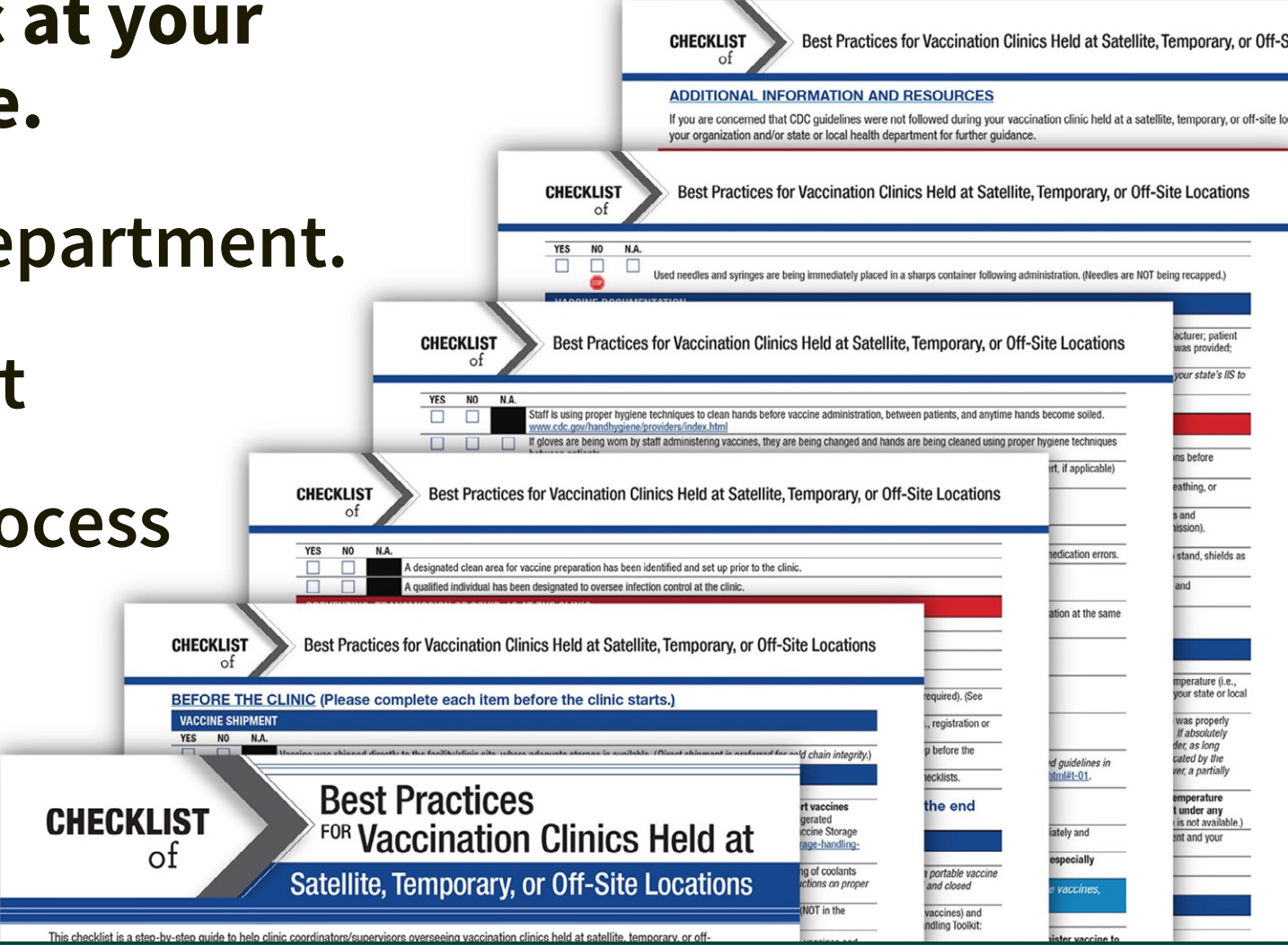


**Stay current on
immunizations (vaccines)**

Workplace Vaccination Clinic

Sponsor a vaccination clinic at your workplace on company time.

- Engage your local health department.
- Invite your local pharmacist
- Make it an easy optional process
- **Make it a a simple decision**



www.izsummitpartners.org/content/uploads/2019/02/off-site-vaccination-clinic-checklist.pdf

Check Drinking Water Supplies

Check wells yearly

Bacteria

E.coli, Enterobacter, Giardia & others

Nitrates

*not an infectious disease,
but important to check for*

Follow local Public Health Department suggestions if your well is contaminated with bacteria or has high nitrate levels.



Properly Dispose of Sharps

- Provide for a method of disposing of sharps
- Needlesticks after injection can lead to infectious disease.
- Do not recap needles.

Email me if you need an approved sharps container
Ellen.duysen@unmc.edu



Dispose of Infectious Waste

Provide a place for disposal of medical waste:

- Items with body fluids
- Animal Waste, bedding carcasses, etc.
- Personal Use Products
- Tissues, band-aids, etc.
- PPE: disposable masks, gloves, etc.
- Feminine hygiene



Prevent Vector Transmission

- Vector born disease
 - Ticks, mosquitoes, fleas, etc.
- Check for ticks & remove
- If embedded – after removal place tick in a sealed baggie and mark with the date and location from where it was removed
- Provide repellent for workers in the field



WEAR
LONG SLEEVES & PANTS



APPLY
REPELLENT WITH DEET



REMOVE
STANDING WATER

Personal Protective Equipment (PPE) at Work

- Use of PPE reduces infection spread
- Employers should
 - Assess PPE needs for each employee
 - Provide PPE, appropriate to hazards
 - Train employees how to put on/take off PPE
 - Train employees to maintain, store, replace PPE
 - Provide medical evaluation & fit testing

Personal Protective Equipment (PPE)

Types of PPE

Gloves

Protect against germs on surfaces



Respiratory

Protect spreading or inhaling droplet spray

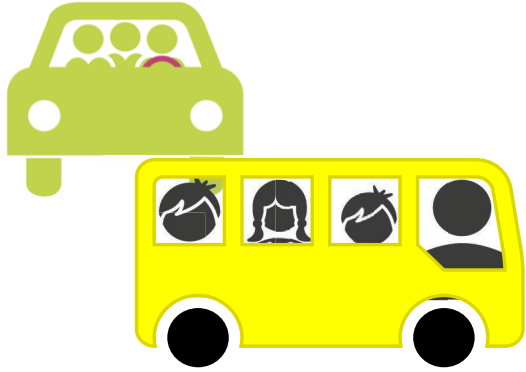


Glasses or shield

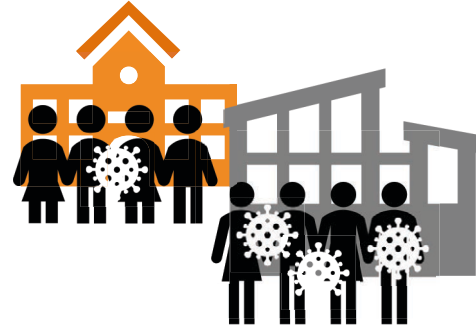
Prevent infectious particles entering the body through the eyes



How Disease Spreads in the Community



Contact during
Carpooling/school bus



Contact at school



Contact at work or
while socializing



Contact during worship



THE DISEASE COMES HOME

What is the number one way of preventing the spread of infectious disease?

- Wear a mask
- Avoid your co-workers
- Cover your cough
- Wash your hands



Break Cycle of Infectious Disease Illness affects

- Families
- Schools
- Workplaces
- Many in the community may become sick
from a single event
- Reduce the spread of infection
don't share germs!

Break Cycle of Infectious Disease

At the first sign of illness encourage

- **Sick workers stay home!**
- **The use of masks when in contact with others**
- **Frequent hand washing or use hand sanitizer**
- **Avoiding close contact with coworkers & customers**
- **Cleaning/disinfecting high touch areas frequently**
- **Avoiding shaking hand**

**Thank YOU
for protecting
our most
valuable asset.**

Our Workers!



Training produced in collaboration with the Grain Handling Safety Coalition and the University of Illinois – Urbana Champaign

Contact me for information, resources or training on prevention of disease in the workplace.

Ellen.duysen@unmc.edu



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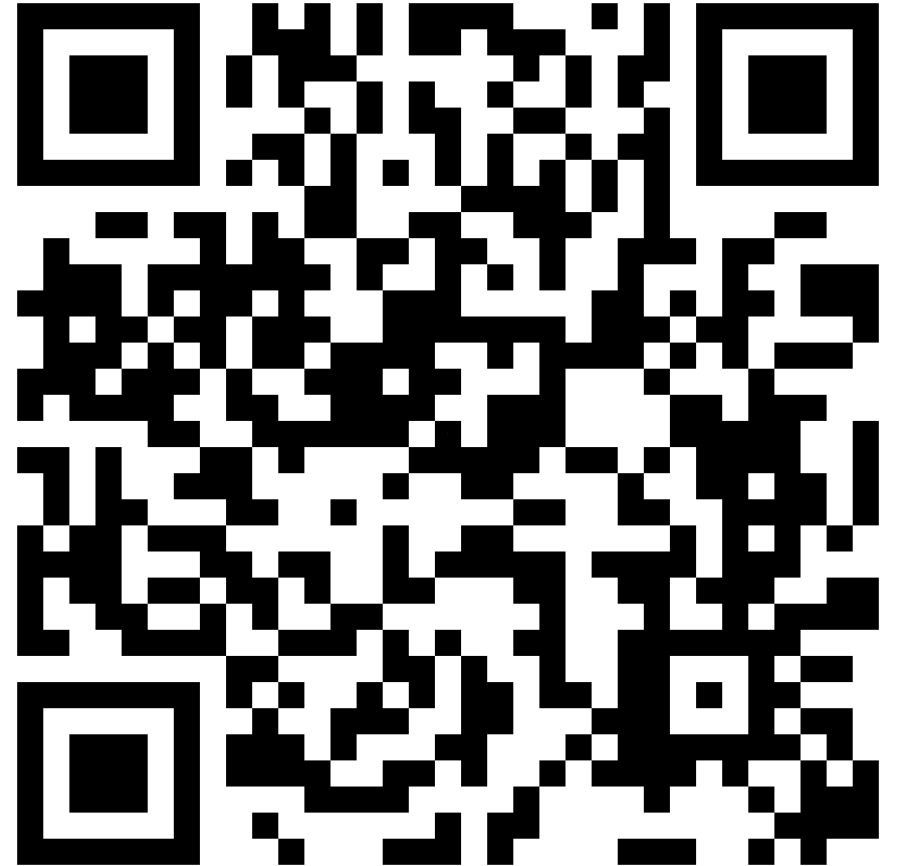
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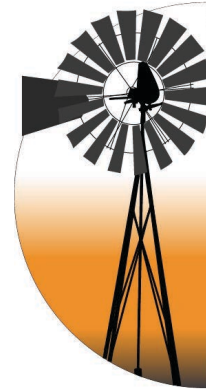
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