



Automating Network (Regional?) Biosecurity

WHY IMPORTANT, The technology & THOUGHTS ON INNATE IMMUNITY

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Inaugural WABA Conference
Barcelona
5 June 2025

Movement
stopped.
Disease
contained.
Disaster
averted.

Omaha, Nebraska / Guelph, Ontario

www.farmhealthguardian.com

There's a very long sad history of dangerous things being inadvertently introduced to properties due to a lack of

clear thinking about

“ Potential Consequences ”

12th – 13th Century BCE



“LOOK WHAT THEY LEFT BEHIND! ...THE IDIOTS!”

“THAT'D LOOK GREAT NEXT TO THE TEMPLE”

“THE BOSS IS GOING TO LOVE IT!”

“IT'S JUST A GIANT WOODEN HORSE. WHAT CAN POSSIBLY GO WRONG?”

“PUSH MEN”

There is no accounting for human behaviour 😞

Fast forward to 2025

Modern Day Trojan Horses



“Sure did .
You know YOU
CAN TRUST
ME!”

Changed
your boots
mate?



Region vs. Network

Regional

Characteristics

- Bounded by geography
- Multiple disparate properties – different ownership
- Multiple vehicles visiting different sites
- Staff and Service People visiting different sites

Network

Characteristics

- Not bounded by geography
- Multiple properties - Single entity ownership or management
- Multiple vehicles visiting **same sites**
- Same staff and Service People visiting large numbers of **same sites.**
- **A Recipe for X-Contamination**

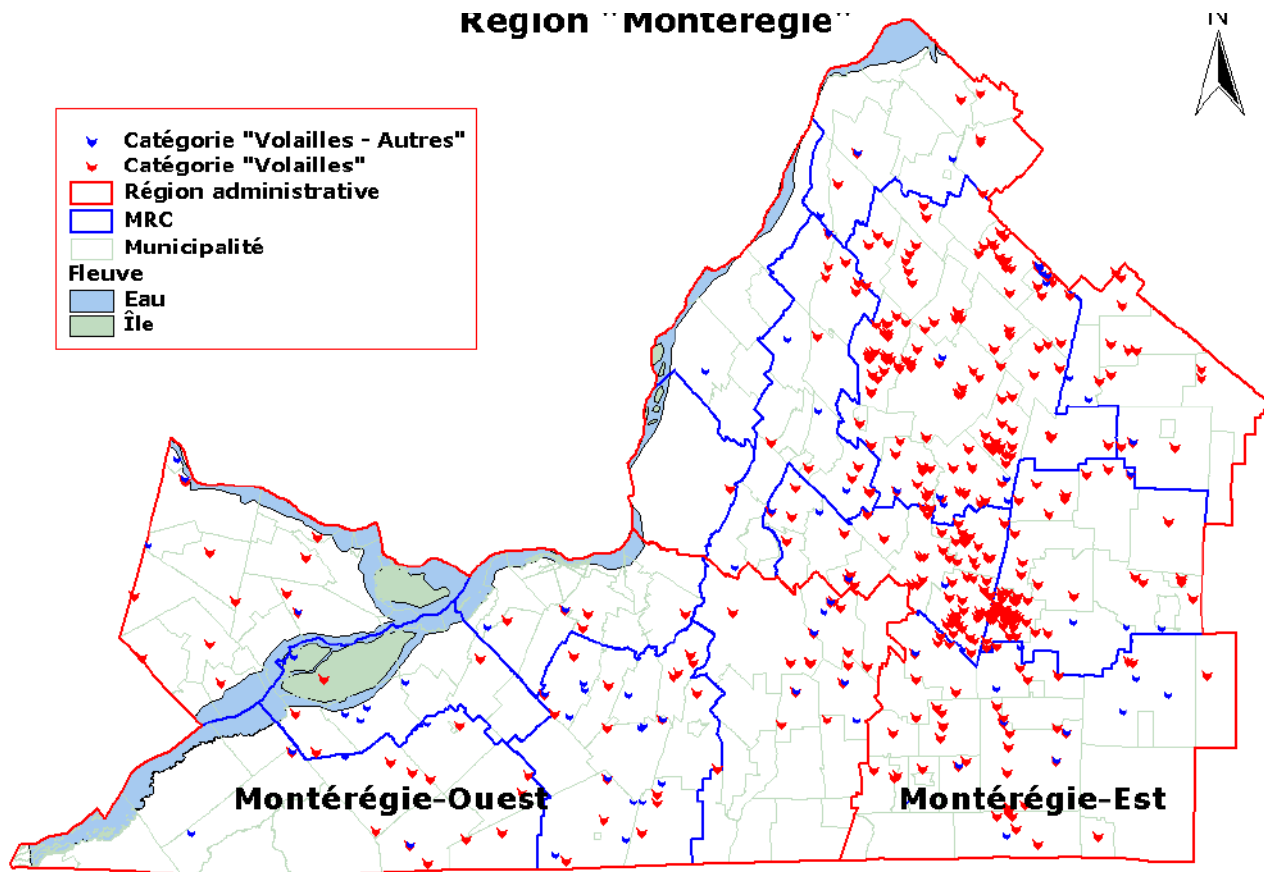
If networks are a recipe for cross contamination,
Why do we have Networks?

A collection of scattered, crumpled US one hundred dollar bills, some showing the portrait of Benjamin Franklin. The bills are arranged in a way that suggests they are falling or being tossed. A semi-transparent white rectangular box is centered over the bills, containing the word "MONEY" in large, bold, black capital letters.

MONEY

What defines a Network?

Density of poultry farms in a region?



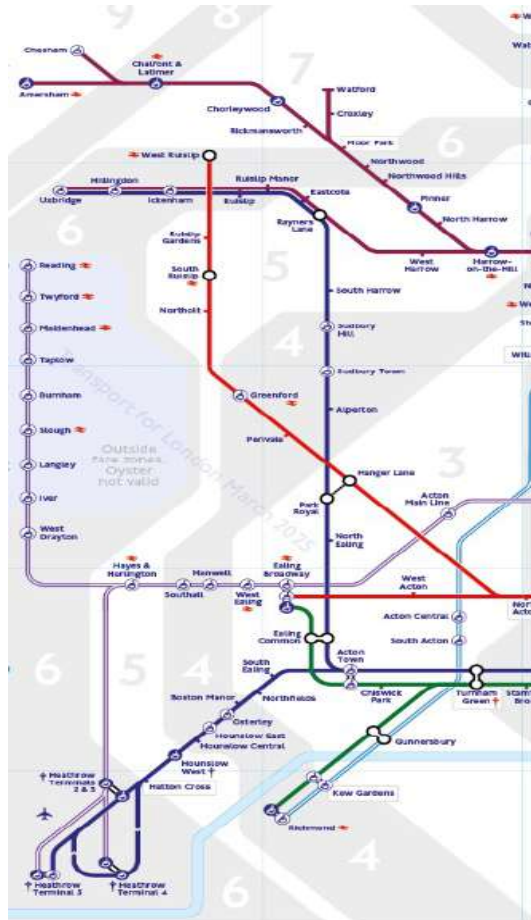
THIS IS
NOT A
NETWORK

THIS IS A NETWORK

- Network = joining/linking places & people together
- Same people every day
- Going between same locations
- Same Trains every day
- Going between same locations

The people's choice for transportation

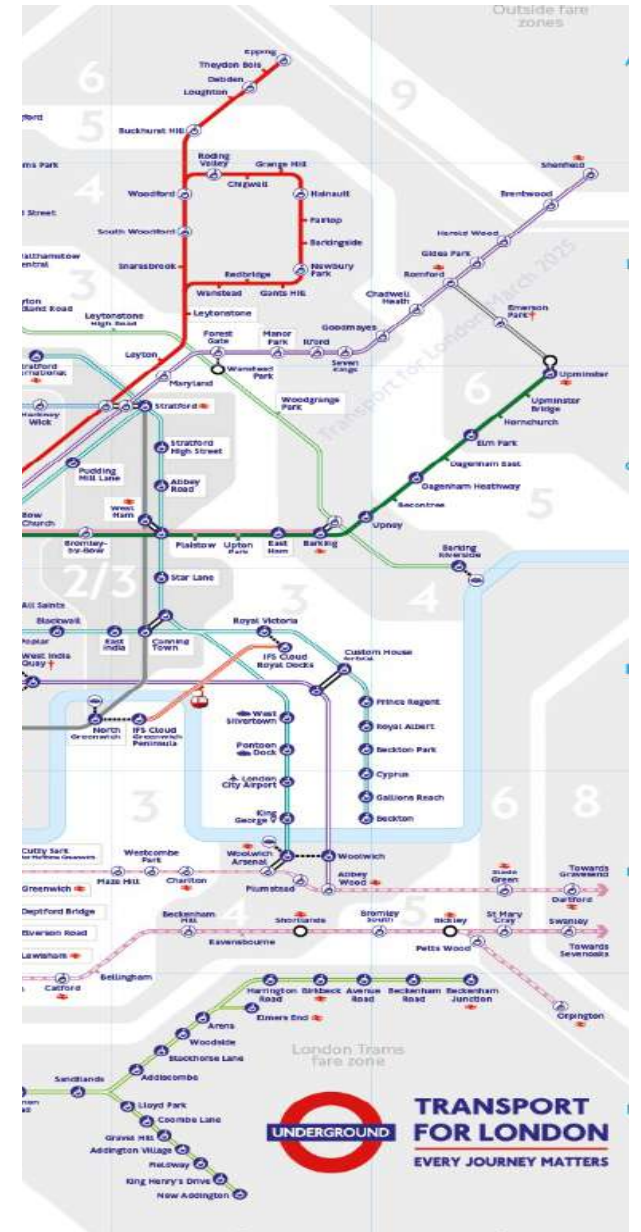
FAST & CONVENIENT



Key to symbols

- Interchange stations
- Internal interchange
- Under a 10 minute walk between stations
- Step-free access from street to train
- Step-free access from street to platform
- National Rail interchange
- ✈ Airport
- River services interchange
- Victoria Coach Station
- IFS Cloud Cable Car
- Outside fare zones, Oyster not valid
- Stations in both fare zones

© Transport for London Correct at time of going to print, March 2025

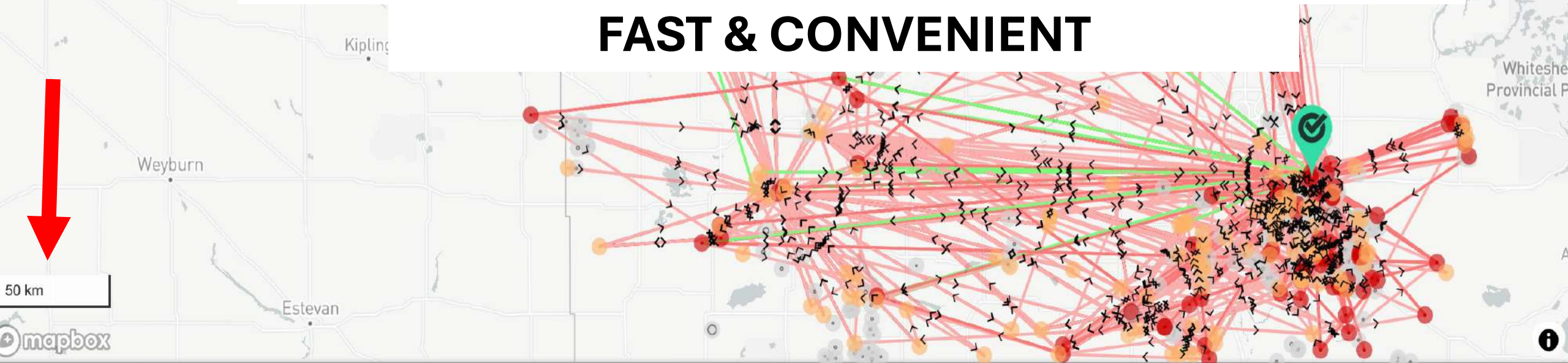


SAME NETWORK PEOPLE AND VEHICLE MOVEMENTS PHYSICALLY CONNECTED TO A SINGLE PROPERTY



THE NETWORK EXPRESS.....

**THE PATHOGENS CHOICE FOR TRANSPORTATION
FAST & CONVENIENT**



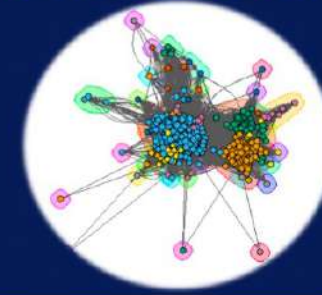
Presented at 2025 American
Association of Swine Veterinarians
Conference

10 year dynamic network analysis
of PEDv outbreaks across
Manitoba

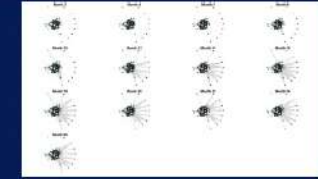
Shows Disease Clusters and
Disease clusters over time

Author Dr. Tara Prezioso
College of Veterinary Medicine
U. Illinois Urbana-Champaign
Funded by U. Illinois Research Board

DYNAMIC NETWORK ANALYSIS:

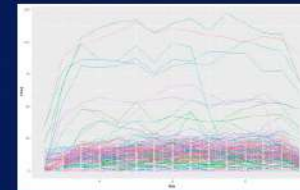


I. NETWORK DEVELOPMENT: MOVEMENT and DISEASE observation over years

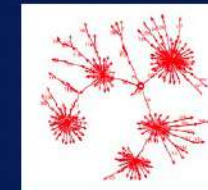


II. NETWORK STRUCTURE: RESULTS

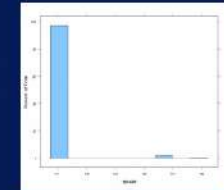
HIGH RISK PROPERTIES
shown by DEGREE
DISTRIBUTIONS



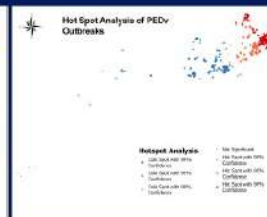
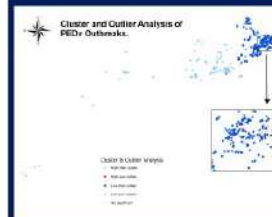
HIGHLY CONNECTED SWINE
SYSTEM shown by HUB
STRUCTURE



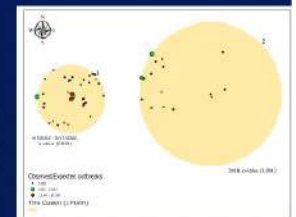
LARGE final EPIDEMIC SIZE
shown by simulations



III. SPATIAL ANALYSIS: PEDv over 10 years



← Spatial Analysis
shows areas of
Disease Clusters.
Space-Time
Permutations shows
Disease Clusters
over time →



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of Illinois Research Board.

A note about Scaleand 2 questions

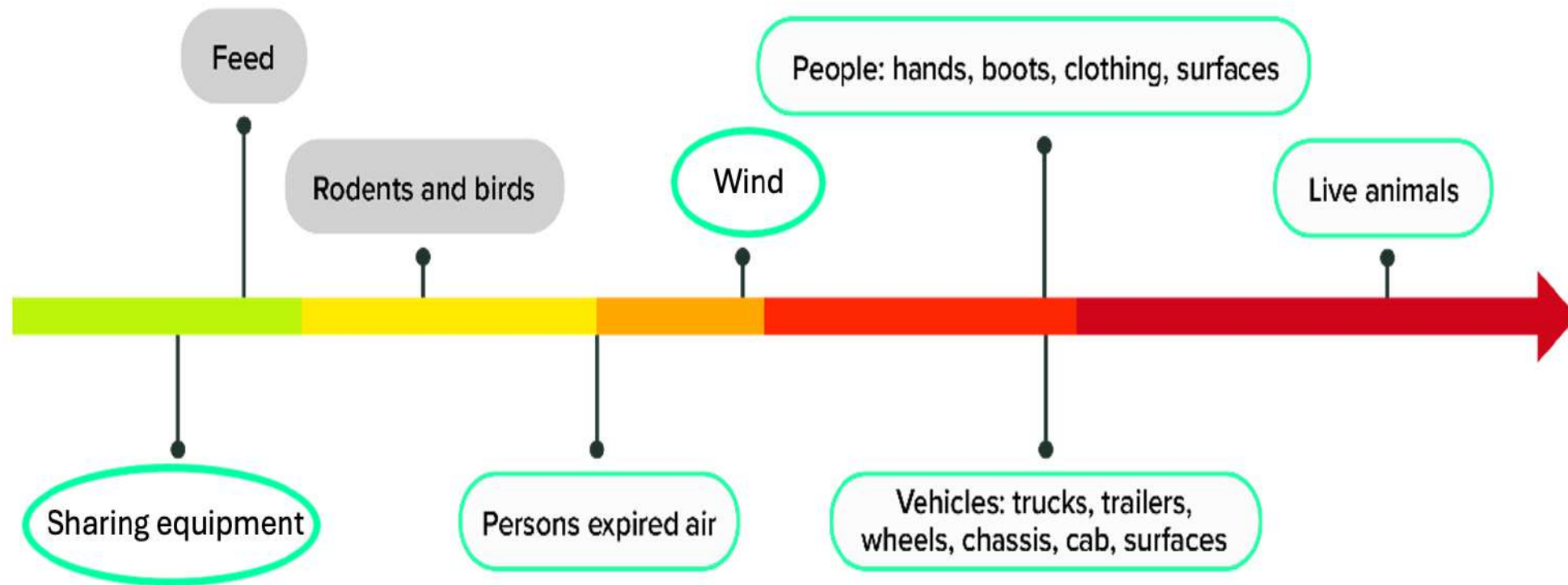
If a pathogen is either animal to animal or fomite transmitted

Why do we lock down 10km zones and;

Why do we implement a scorched earth policy for all like species in a 3km Zone?

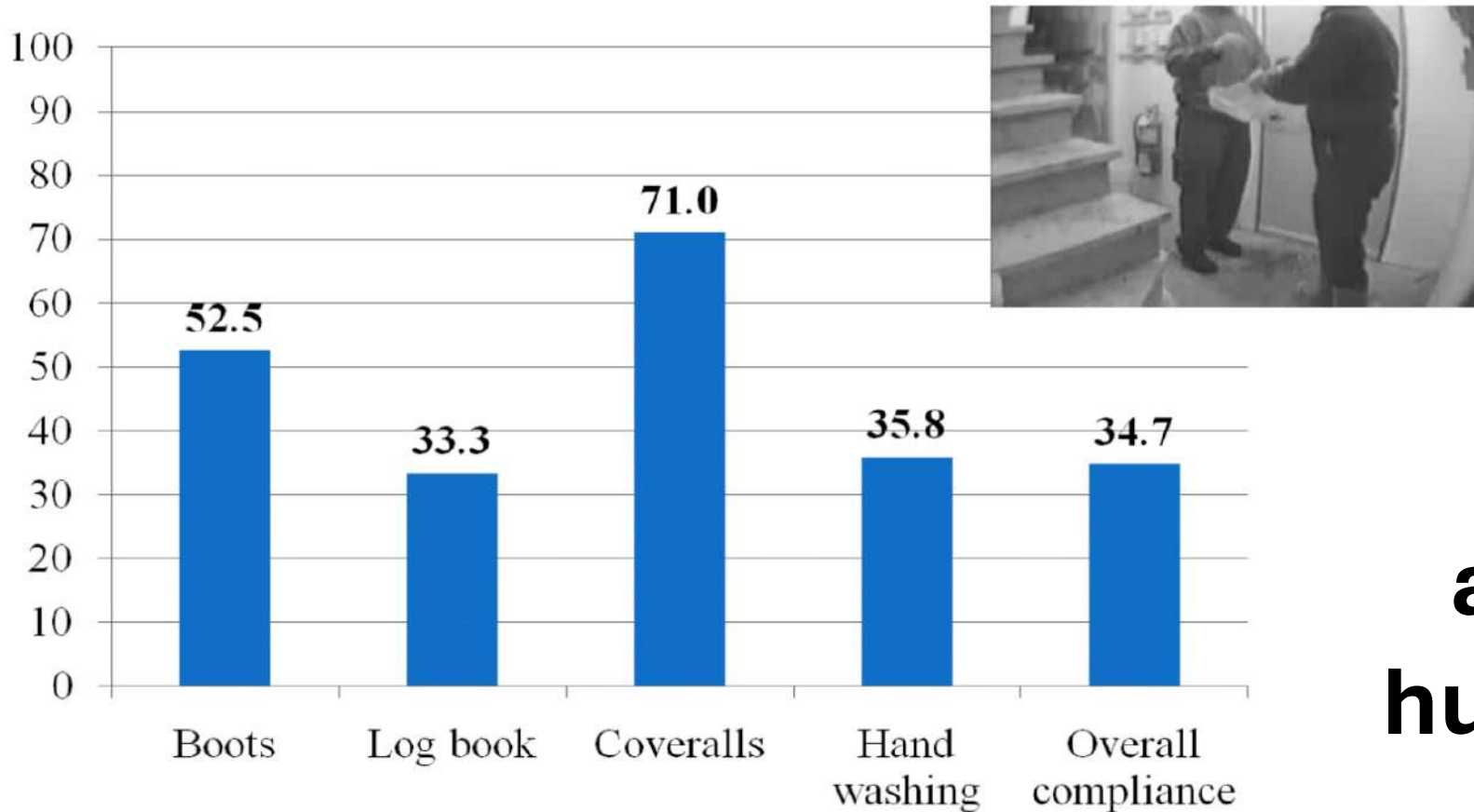
QUALITATIVE RANKING OF DISEASE TRANSMISSION ROUTES IN RELATION TO THE RISK OF PATHOGEN TRANSFER

Albans and Boklund 2008



Production Networks make this graph more relevant than ever!

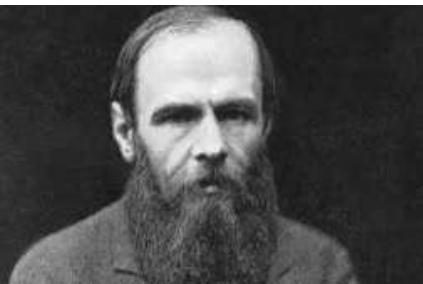
On Farm Biosecurity Compliance is LOW



**There is no
accounting for
human behaviour**



Dostoevsky put it much more eloquently



"He (a man) might act thus for the shallowest of reasons; for a reason which is not worth mentioning; for the reason that, always, and everywhere, and no matter what his station, man loves to act as he likes, and not necessarily as reason and self-interest would have him do."
F. Dostoevsky (1864)¹

When we act like humans we fail our livestock....



FMD 2001 UK



**PEDv 2013
N America**



**Avian Influenza
Ongoing**

WE need to
ACT
BEFORE
PATHOGENS
REACH the
FARM GATE
THIS IS NOT EASY

ITS OUR DUTY:

No. 3 on the list of five freedoms of welfare

Freedom from Pain, Injury, or Disease

ITS OUR JOB:

To ensure the animals in our care reach their genetic potential and produce product safe to consume - Ergo \$ value

ITS IN OUR BEST INTERESTS:

Removing dead animals, watching culling and cleaning up after an outbreak are all emotionally and financially draining

**AUTOMATION CAN
ACT AT A
NETWORK LEVEL
BEFORE
PATHOGENS
REACH the
FARM GATE**



HOW?

1. Automated the visitor log book (VLB) facilitates fast **TRACK & TRACE = FAST RESPONSE**

Enables targeted Alerts... As soon as first signs show.

- **Smartphones :**

- Automatic record of geofence entry,
- Manual registration at gate using FHG app,
- QR code **KioskGate** – with or without FHG app,
- Digital Facial Recognition
- Pre-authorization for entry (don't waste a trip)



- **Vehicle Devices:**

- GPS enabled tail light replacements for trailers
- GPS battery devices for trailers
- GPS link to logistics system for trucks
- OBDII devices for in-cab plug-in



**Response
time is
critical**

2. Automating application of Pre-set MOVEMENT protocols PREVENTION 1.

Automatically (instantly) apply rules for:

- Downtime
- Pyramid
- Truck wash rules– e.g. prior wash
- Digital Facial Recognition – no door handles

**IMMEDIATE
TARGETED
ALERT
TRIGGERED**

**FAST COMMUNICATION with
KEY PEOPLE IS VITAL**

3. Health Status – Dynamic Network System Management

PREVENTION 2.

- Colour denotes Property type and Health Status
- Health Status dictates downtime and route schedules
- **IF** Property breaks, Health Status is changed by administrator.

All staff are immediately notified of status change.

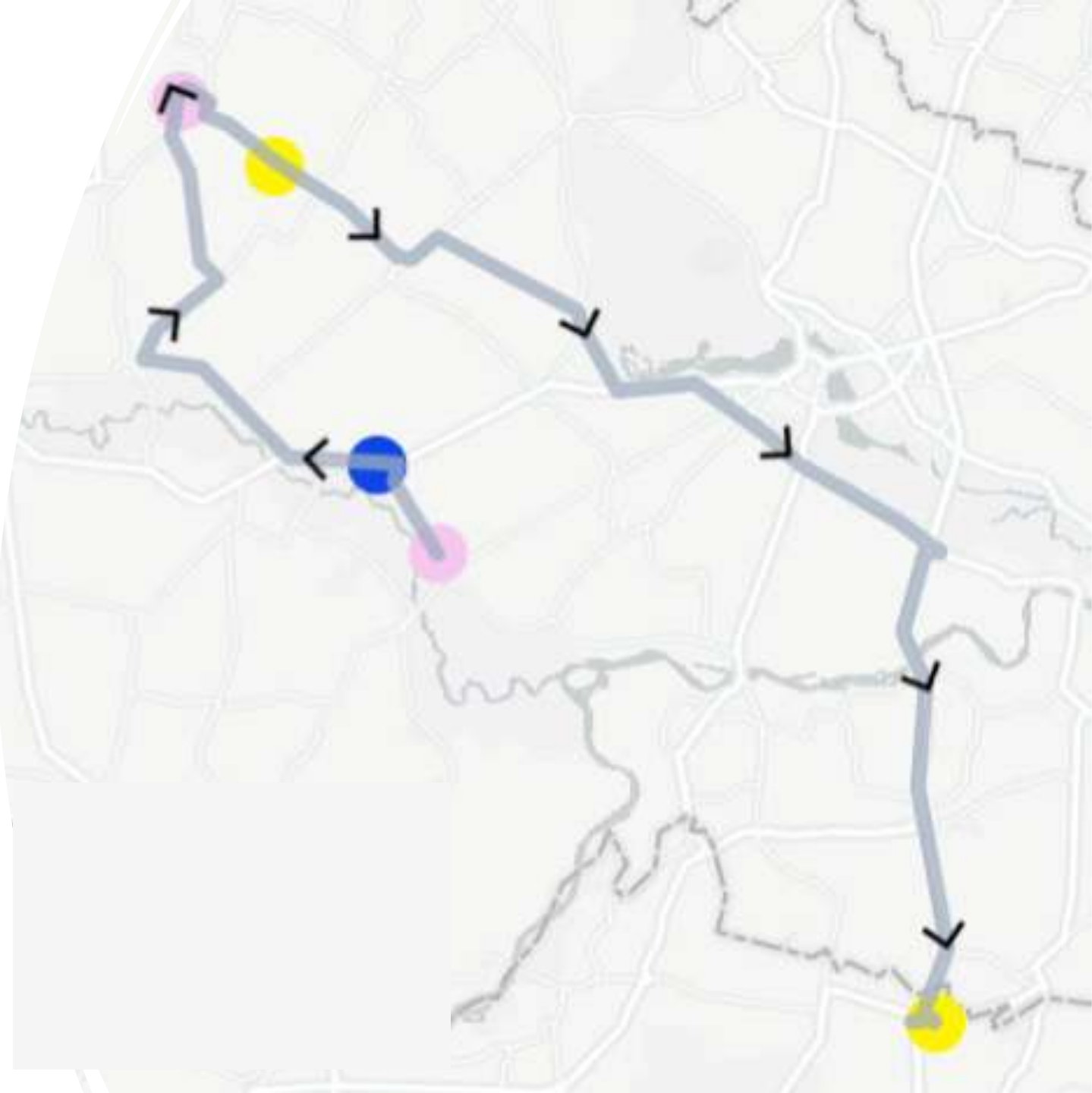
COMMUNICATION

The screenshot displays a web interface titled "Health Status" with the subtitle "Create and edit health statuses". A blue button in the top right corner is labeled "Add Health Status". The main area contains a grid of health status cards, each with a colored circle, a property type and status, and edit/delete icons.

Property Type	Health Status
5 - Nursery: PRRS+	5 - Nursery: PRRS+
2 - Nursery: PRRS-	2 - Nursery: PRRS-
5 - Suspected Outbreak	Suspected Outbreak
4 - Sow: PRRS+	4 - Sow: PRRS+
1 - Sow: PRRS-	1 - Sow: PRRS-
3 - Finisher: PRRS-	3 - Finisher: PRRS-
6 - Finisher: PRRS+	6 - Finisher: PRRS+
6 - Finisher: PED+	6 - Finisher: PED+
0 - Neutral	0. Neutral
Nested Test	

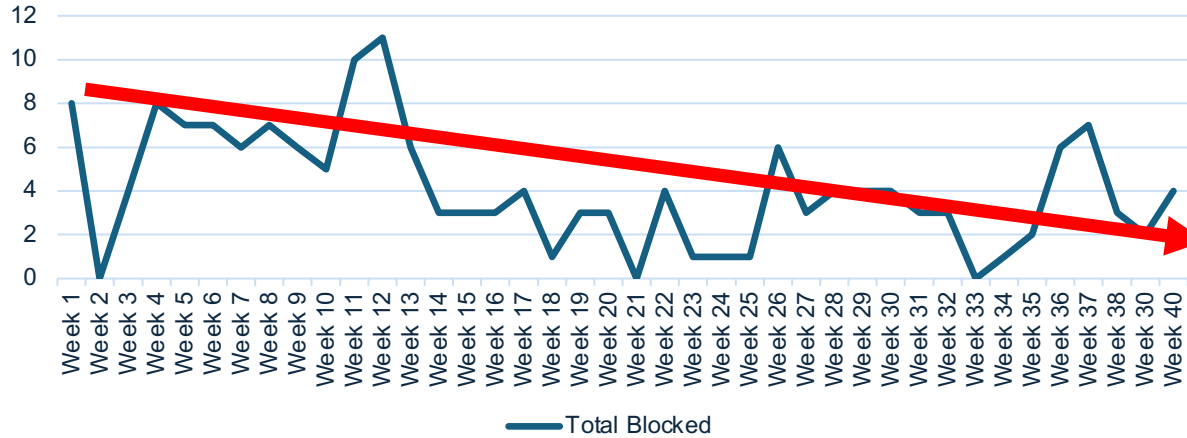
4. Automating Movement Planning PREVENTION 3

- Potential cross contamination
 - Example manure hauling
- Route Planning
- Pre-visit check route status
- Schedule adherence Improved

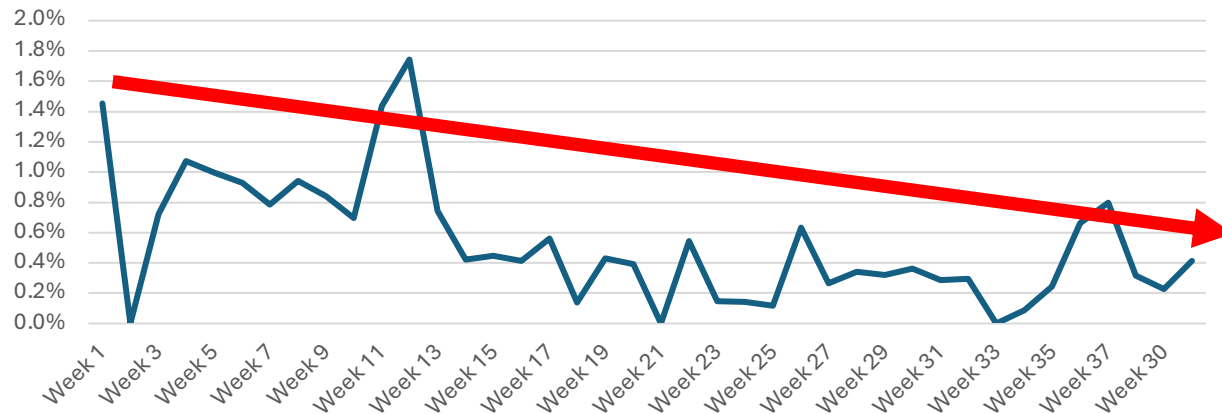


“Triple R” – Results, Review, Reward Prevention 4.

Total Breaches



% of Visits Breached



**ALWAYS
COMMUNICATE
SUCCESS**

WHAT VETERINARIANS THINK.

- **Dr. KARINE Talbot – Hylife Farms Canada**

“Farm Health Guardian has helped us make biosecurity more tangible and visible by providing complex data in a much simpler way, and GPS doesn’t lie on a schedule!” AASV and Lemman 2024

- **Dr. ERIN Kettlekamp – SHVC USA**

<https://www.wisenetix.com/blog/Transport-Biosecurity-in-Swine-Operations>

- **Dr. EGAN Brockhoff – Veterinary Counsellor Canadian Pork Council**

“Biosecurity remains the most powerful vaccine we have and the most advanced option we have today is FHG” Expert panel on tackling PRRS

- **Dr. CHRISTINE Mainquist-Wigham – Pillen Farms**

“The lengthiest and most onerous task in a disease outbreak is the calls, emails and paper logbook analysis to find out who went where and when. It takes days. FHG did it in minutes” AASV 2025

TAKEAWAY 1

Some things are inevitable

- **Networks will be more complex over time**
Culicoides flies, vermin, etc. – “deviant actors,”

- **We will see more “deviant actors”**
You, me, etc. – we exacerbate the problem, JP’s list etc. – we exacerbate

- **Problems are human too.**
Cleanliness of feed bins and sheds
Don’t encourage waterbirds

NEVER A ‘BLAME’ GAME

Takeaway 2

**WHY THE INNATE IMMUNE SYSTEM
IS SO RELEVANT**

The Innate Immune System

Key Characteristics:

- **Rapid Response:** Innate immunity reacts almost immediately to pathogens, often within minutes or hours.
- **Non-Specific:** It doesn't distinguish between different types of pathogens; it attacks any foreign substance it encounters.
- **First Line of Defense:** It's the initial layer of protection against infection, often acting before the adaptive immune system can get involved.
- **No Memory:** It doesn't "remember" past infections this provides faster or more effective responses in the future, unlike the adaptive immune system.

Effective Network Biosecurity must behave exactly like the Innate Immune System

- **Rapid Response:** react immediately to first sign of pathogens, *within minutes*.
- **Non-Specific:** Don't distinguish between different types of pathogens; *react immediately* to any suspect 'break'
- **First Line of Defense: *External Protection*** against infection, acts before on-farm biosecurity gets involved.
 - **No Memory: *All disease breaks are unique*** - For faster, more effective responses don't rely on what we did last time.

Just Do it!

(The Innate Immune system does!)

ALMOST THE END



“Don’t let it inand keep it out..... Why?”

**Because this is
Gold Standard
Network Biosecurity”**

THANKYOU

TNELSON@FARMHEALTHGUARDIAN.COM