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FARMRISK

A new tool for risk-based biosecurity advice

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We know that biosecurity is crucial, but there are still many challenges to its implementation...



My farm is too small for such complicated measures



I am not sure if these measures will be effective



We've always done things this way and never had problems

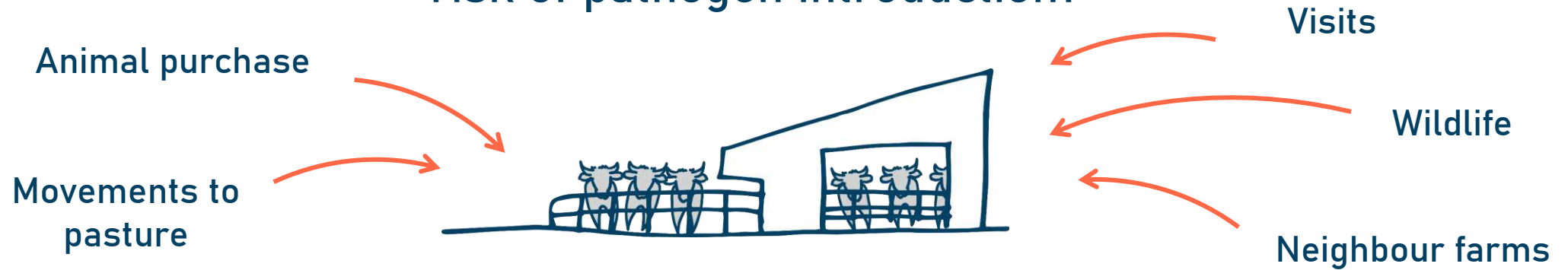


There are many recommendations, but they don't fit my farm needs



Quantitative risk analysis model to provide tailored farm recommendations

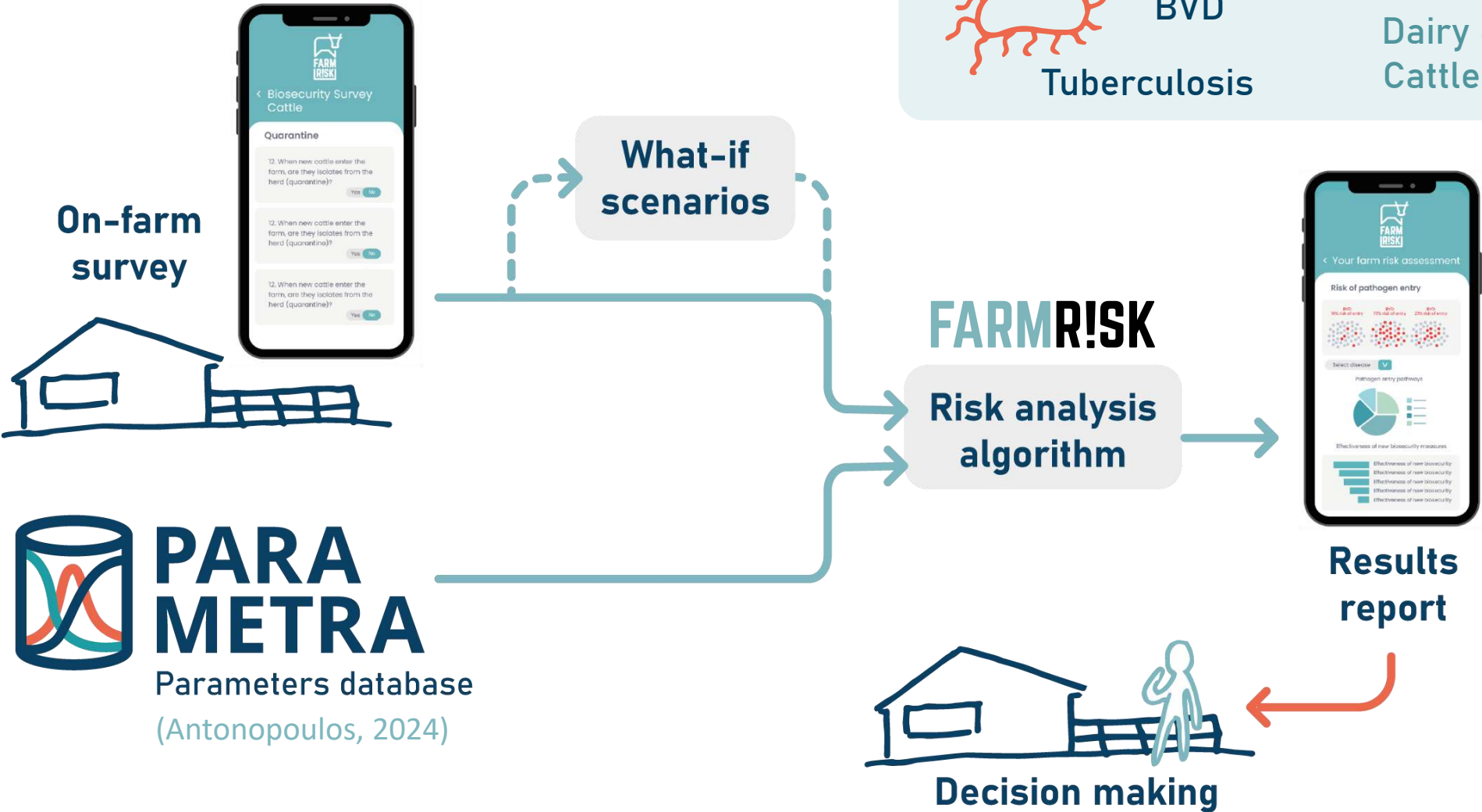
How do different pathways contribute to overall risk of pathogen introduction?



Which biosecurity measures should be prioritized to reduce risk?



Methodology



Risk pathways for

IBR

Tuberculosis

BVD

Dairy & Beef Cattle farms

On-farm survey

What-if scenarios

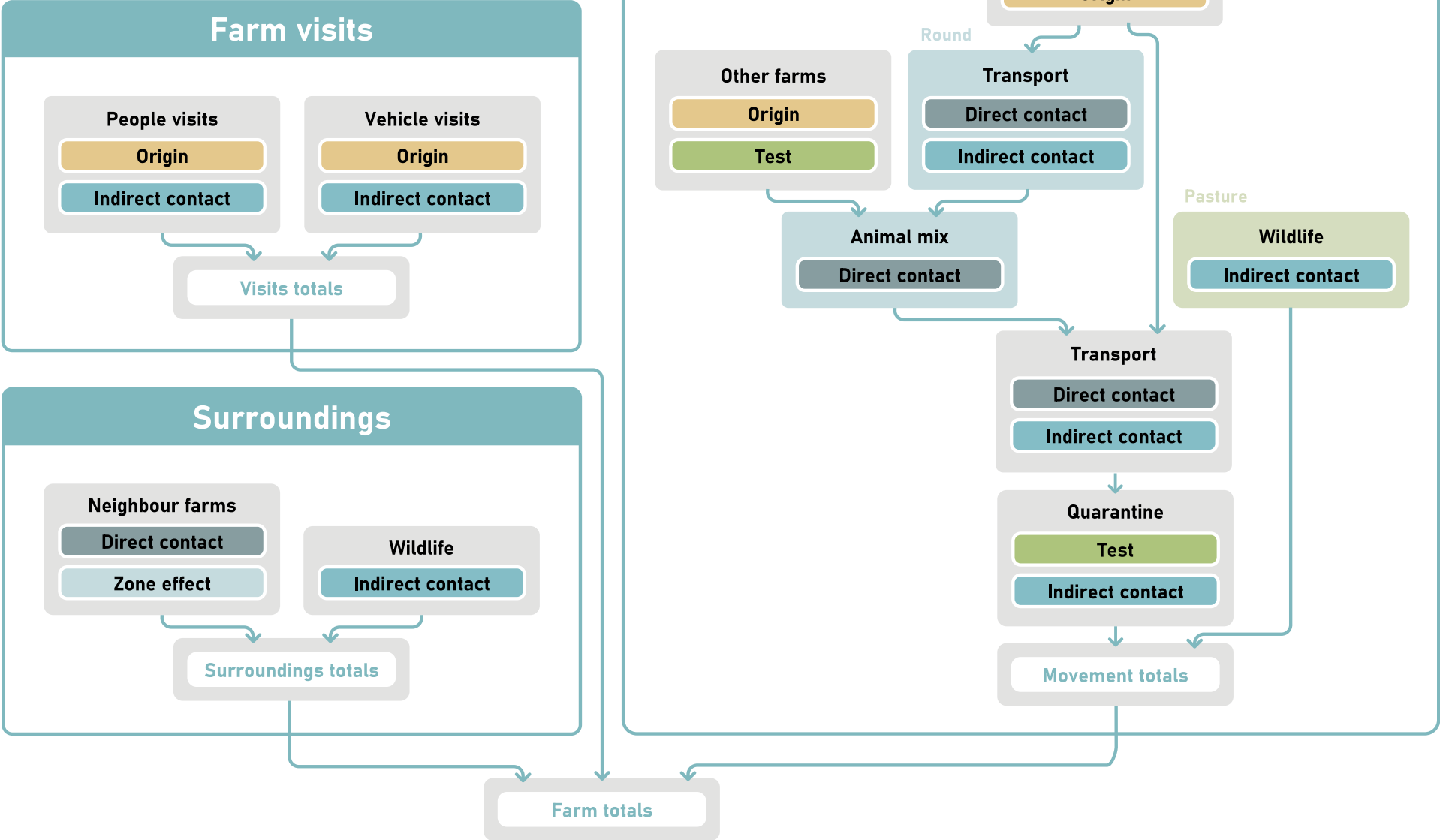
FARMRISK
Risk analysis algorithm

Results report

PARAMETRA
Parameters database
(Antonopoulos, 2024)

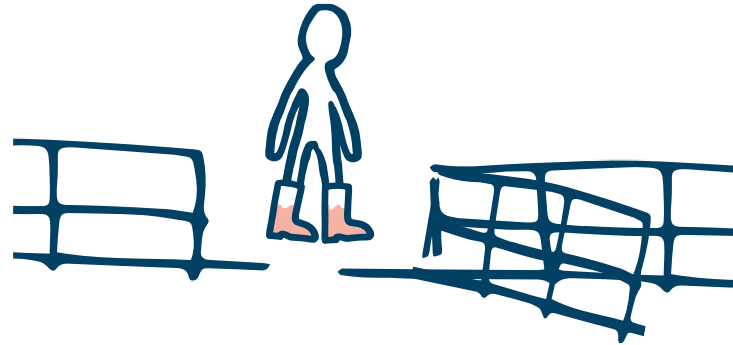
Decision making

Model diagram



People Visits

What is the risk of a visitor introducing a pathogen into the farm?



People Visits

People visits

1. Farm visitors
People entering the barn or having direct contact with the animals

Visitor
Open field to clarify which visitor you are referring to

Type of visitor

Annual frequency (times/year)
i.e. each two days = 180, weekly = 52, monthly = 12, each two years = 0.5

When they enter the barn or come in contact with your animals...

Do they wear boots that are only used on this farm?

When they enter the barn or come in contact with your animals...

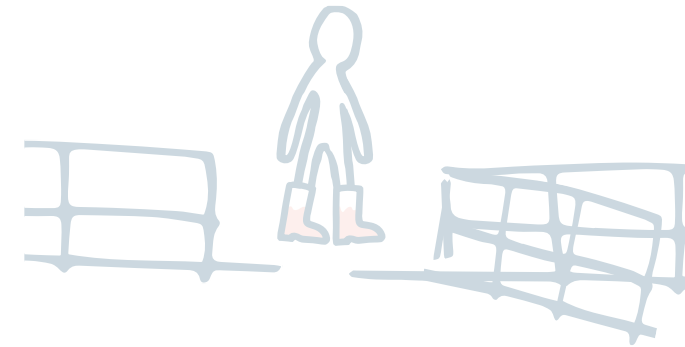
Do they wear boots that are only used on this farm?

Always
 Sometimes
 Never

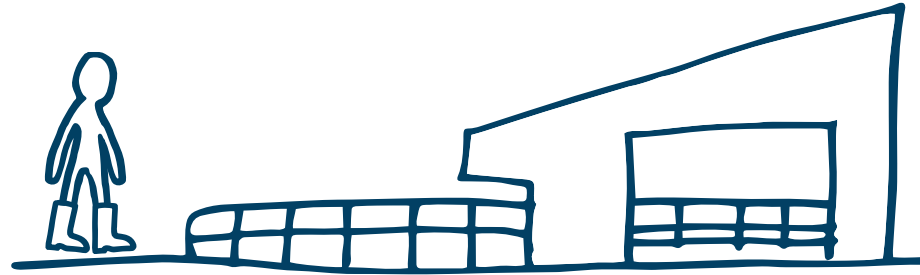
If they wear boots used on other farms, are they clean and disinfected when they enter the farm?

Always
 Sometimes
 Never
 Don't know

Do they use equipment that is only used on this farm?



People Visits

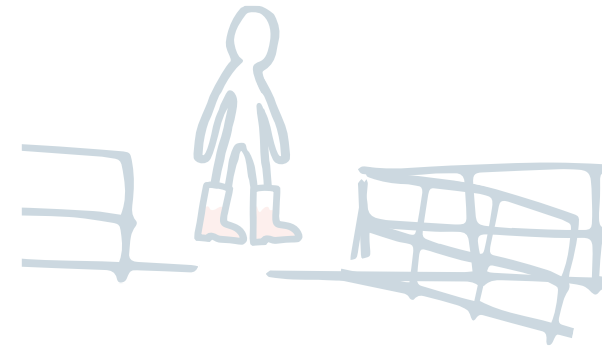


Use of boots/equipment
in other farm

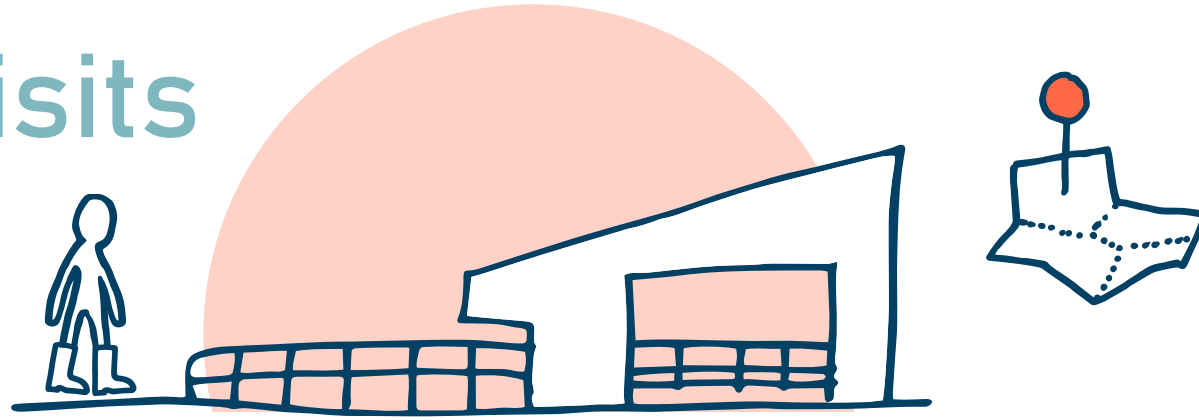
No Yes

100%

Type of visitor
External veterinarians
Do they wear boots that are only used on this farm?
<input checked="" type="radio"/> Always
<input type="radio"/> Sometimes
<input type="radio"/> Never



People Visits



Use of boots/equipment
in other farm

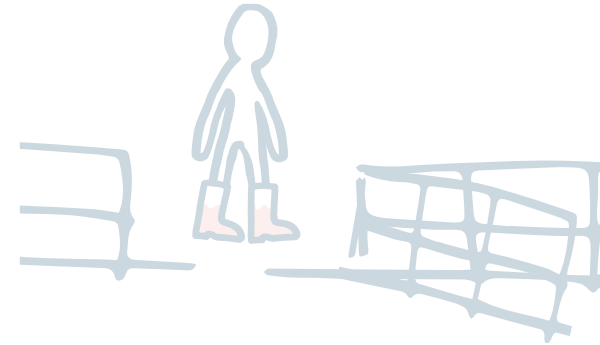
No Yes

Infected
farm

Regional prevalence (28-32%)

No Yes

30%



People Visits



Use of boots/equipment
in other farm

No

Yes

Infected
farm

No

Yes

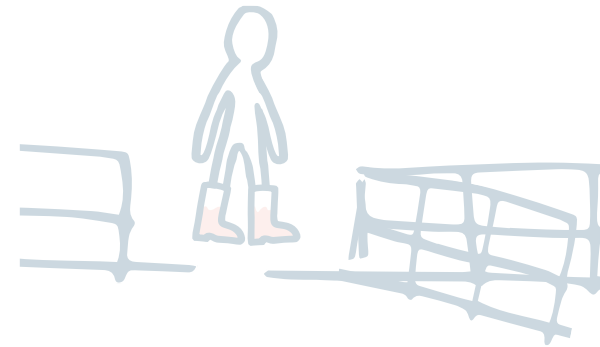
Infected
animal

Within-herd prevalence (45-55%)

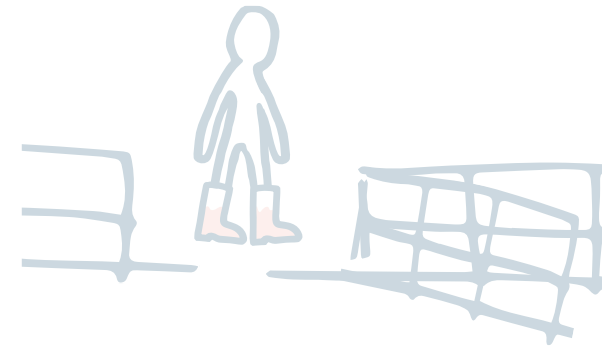
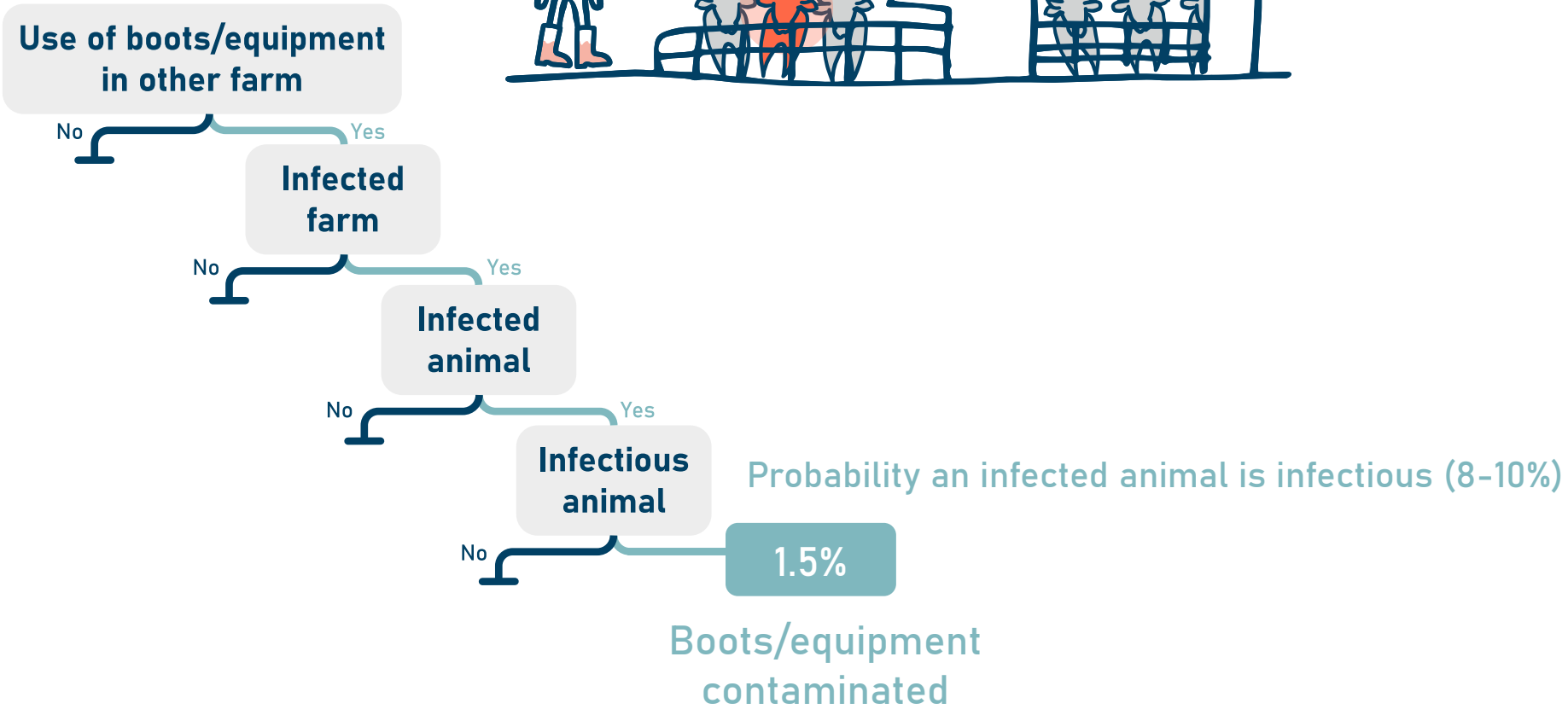
No

Yes

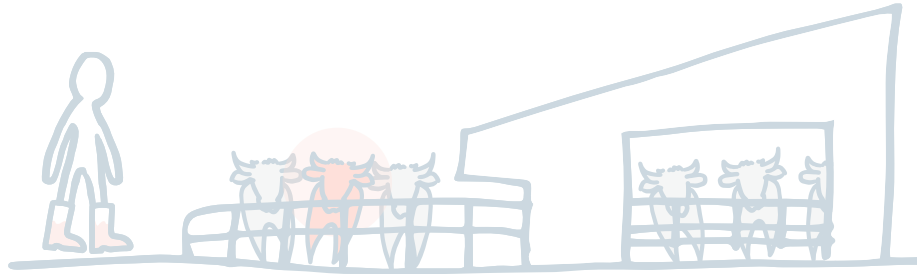
15 %



People Visits



People Visits



Use of boots/equipment in other farm

No Yes

Infected farm

No Yes

Infected animal

No Yes

Infectious animal

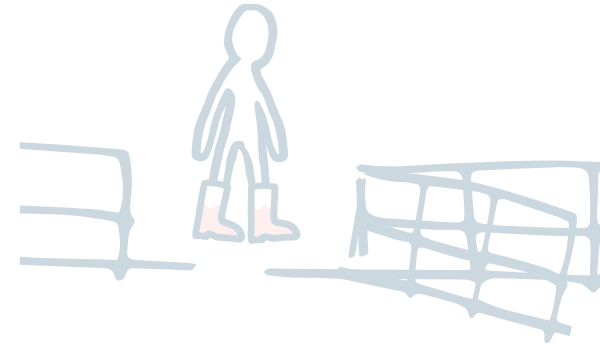
No Yes

Survival after cleaning & disinfection

No Yes

0.8%

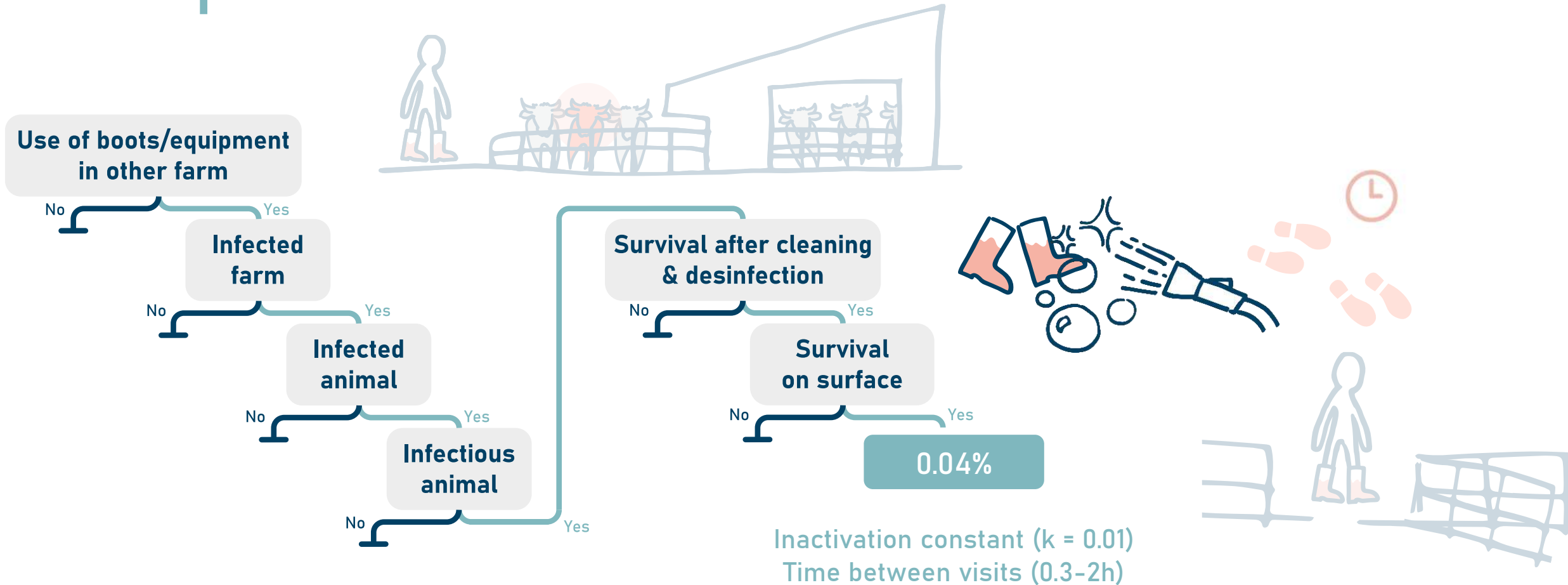
Probability boots are cleaned (20-38%)
Cleaning efficacy (40-90%)



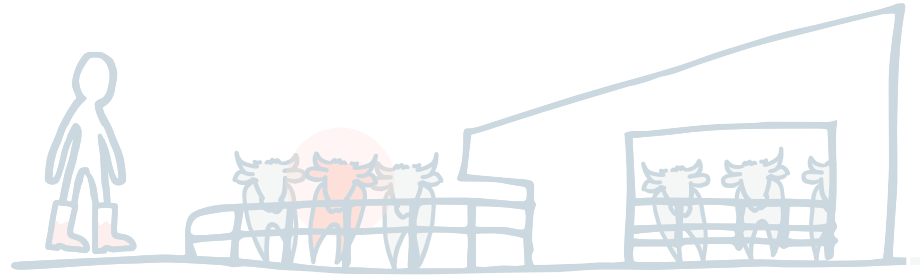
If they wear boots used on other farms, are they clean and disinfected when they enter the farm?

- Always
- Sometimes
- Never
- Don't know

People Visits



People Visits



Use of boots/equipment in other farm

No Yes

Infected farm

No Yes

Infected animal

No Yes

Infectious animal

No Yes

Survival after cleaning & disinfection

No Yes

Survival on surface

No Yes

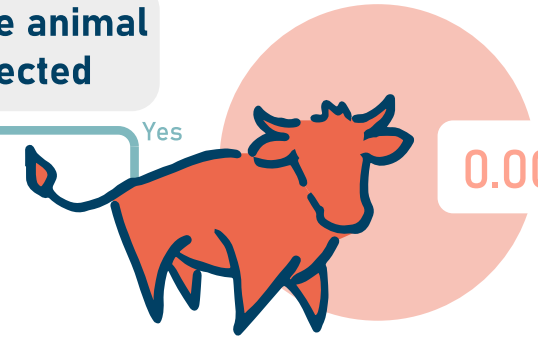
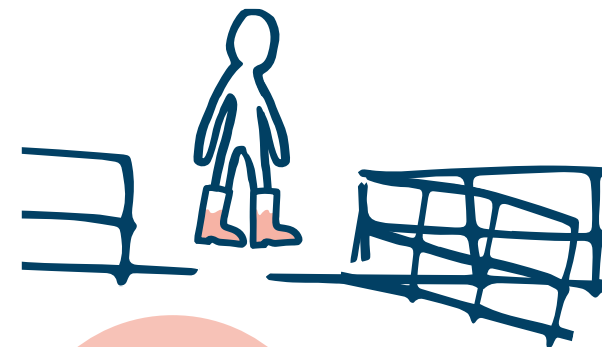
Contact with susceptible animal

No Yes

Susceptible animal gets infected

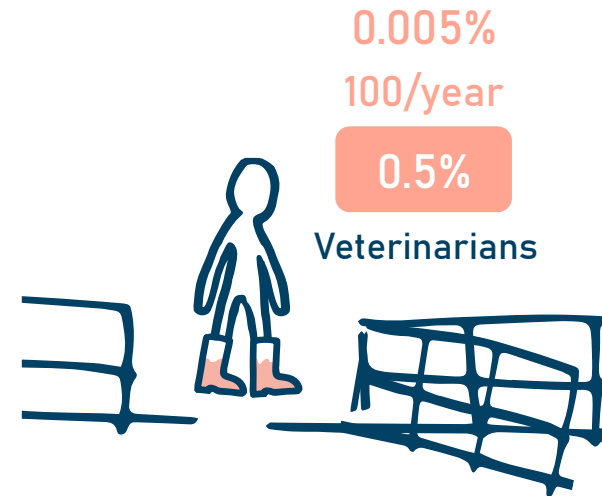
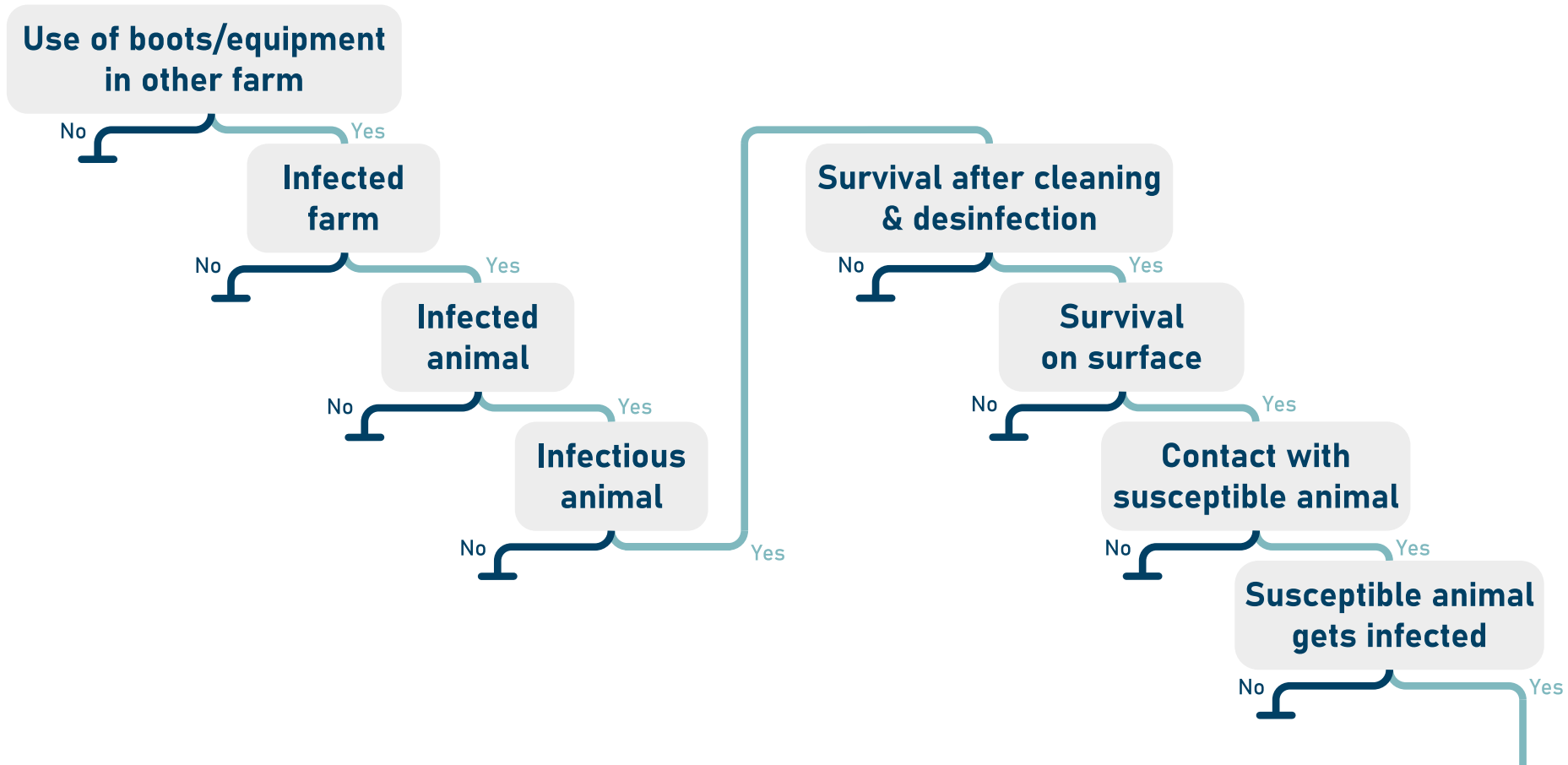
No Yes

Probability transmission via indirect contact (10-15%)

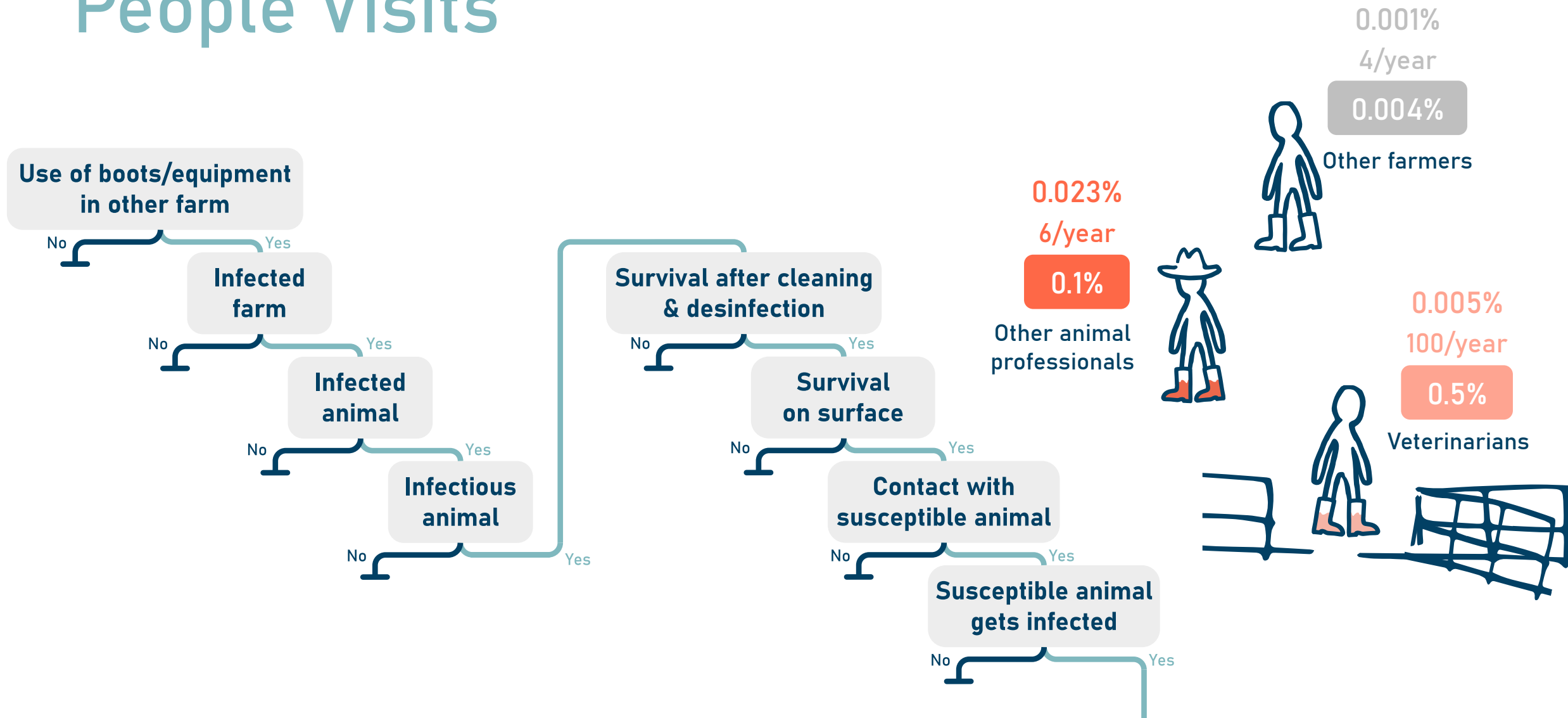


0.005%

People Visits

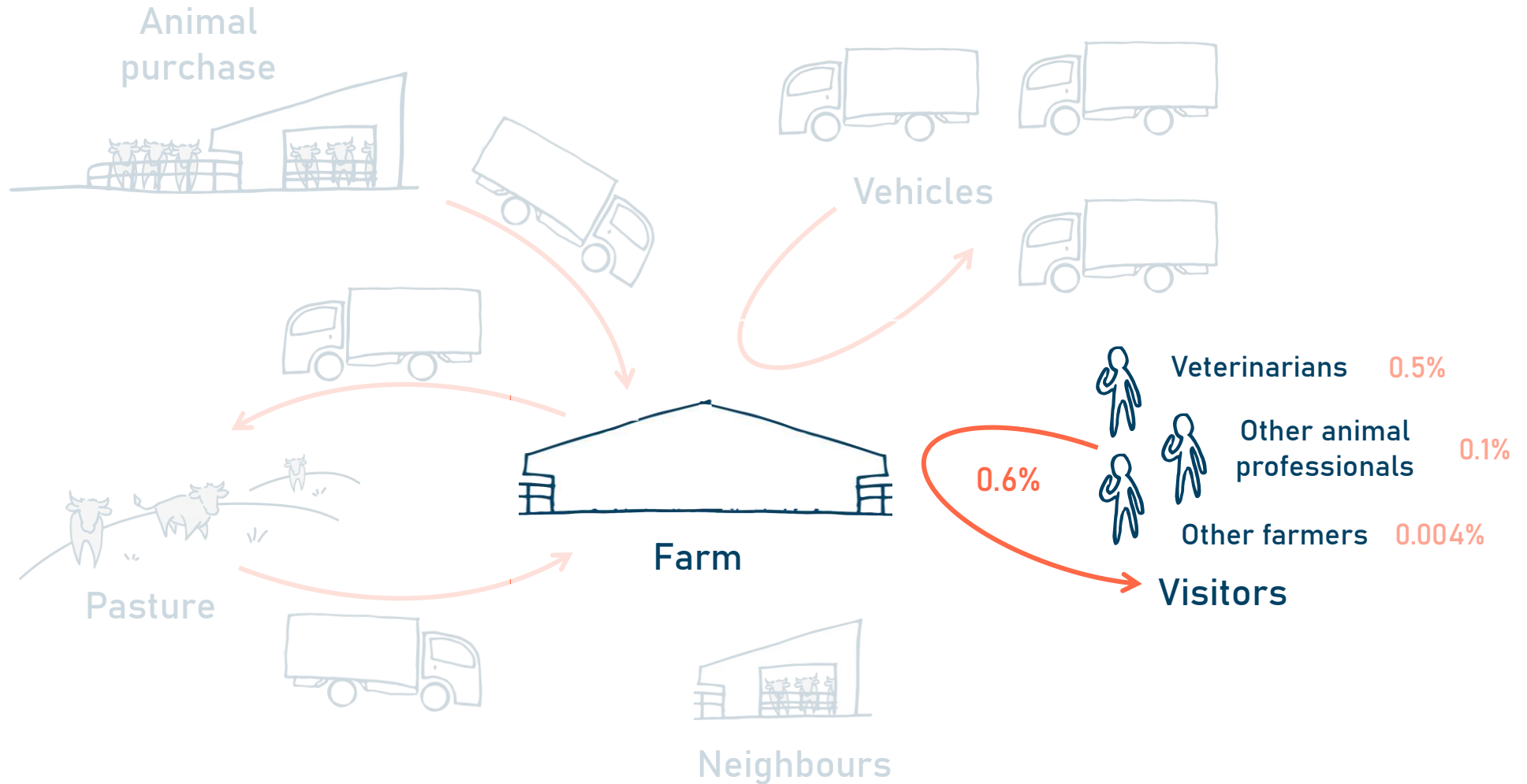


People Visits



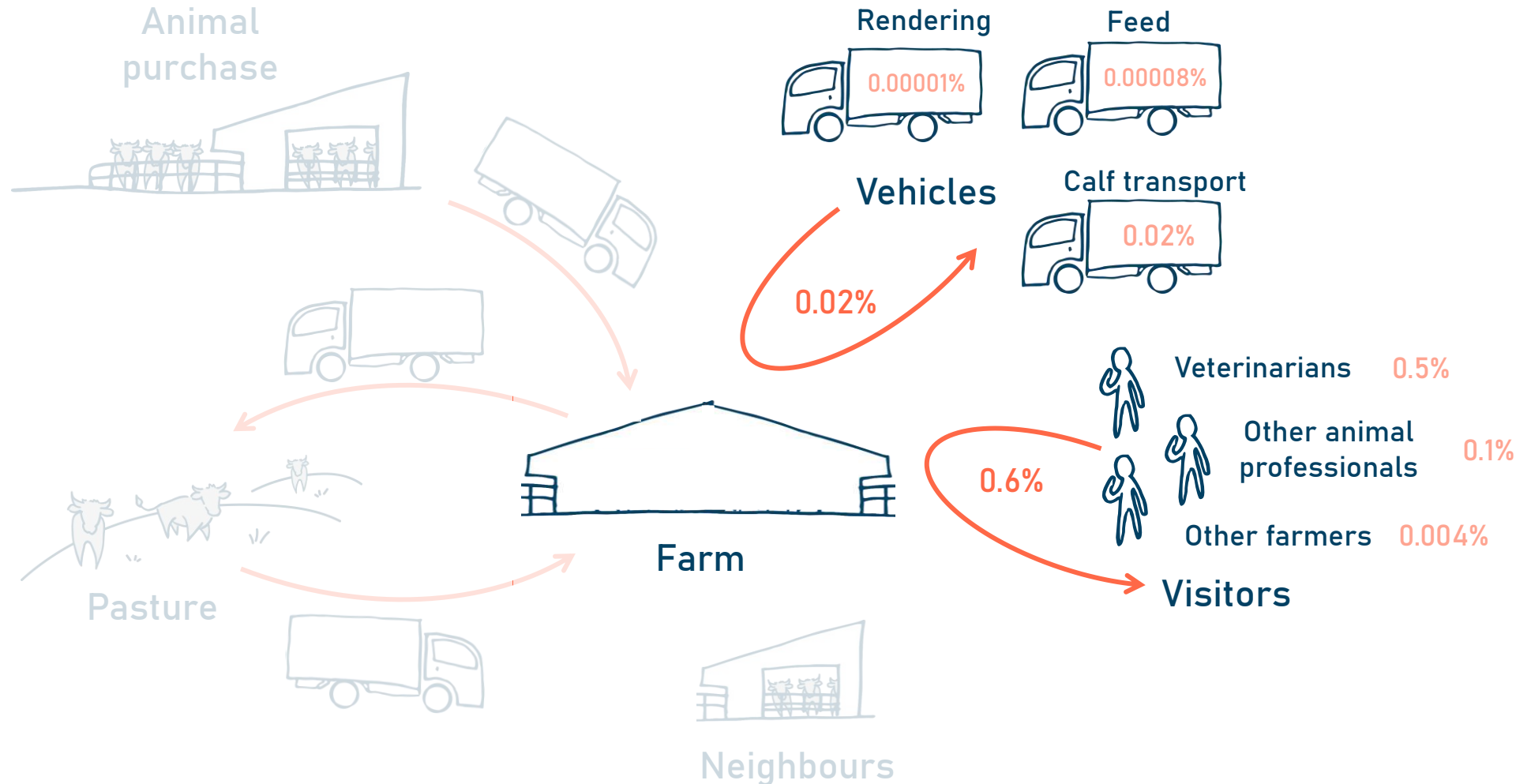
What is the probability of pathogen entry?

% Annual Risk of IBR entry



What is the probability of pathogen entry?

% Annual Risk of IBR entry



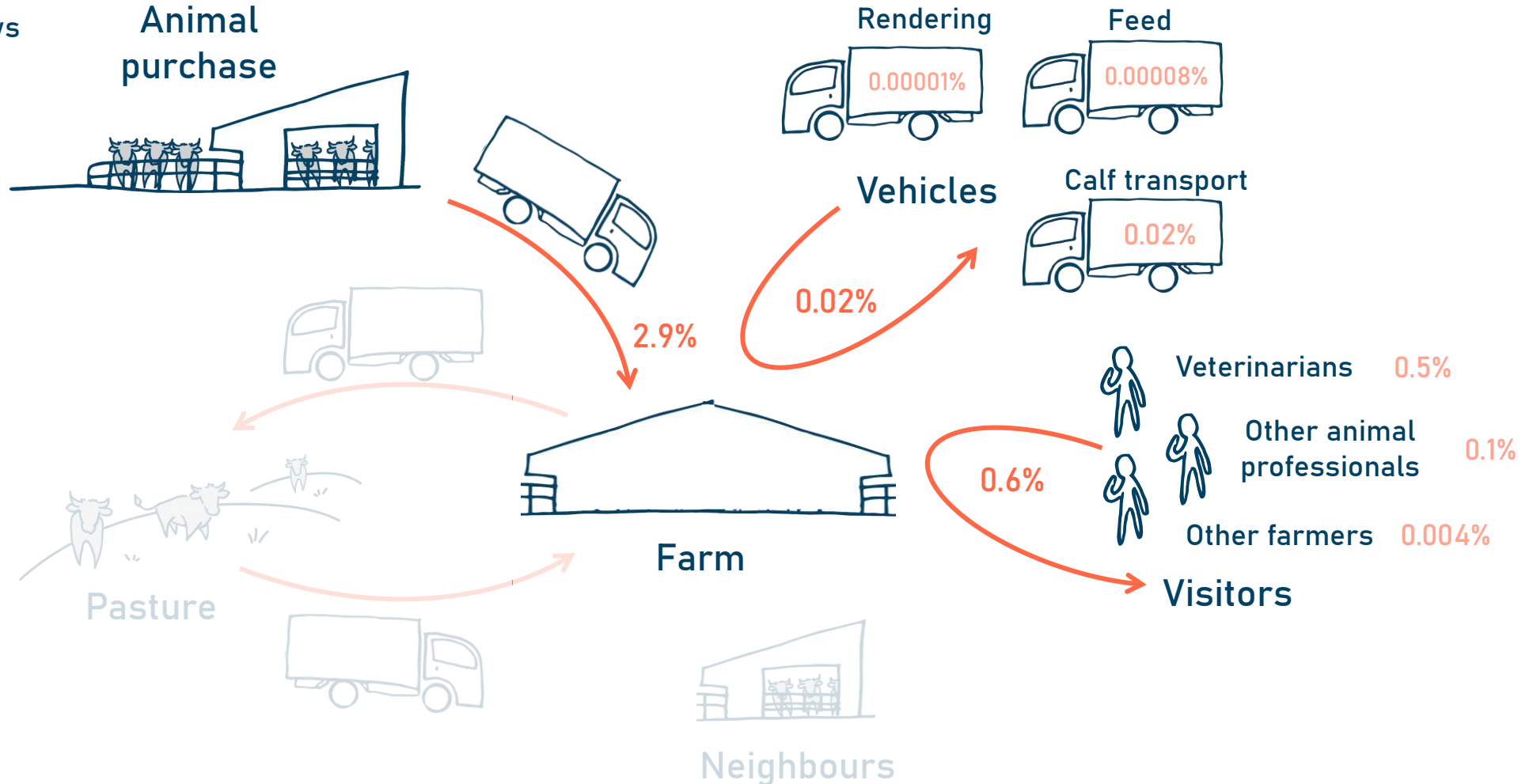
What is the probability of pathogen entry?

% Annual Risk of IBR entry

1.7% 2 Adult Cows

0.7% 4 Heifers

0.5% 1 Bull



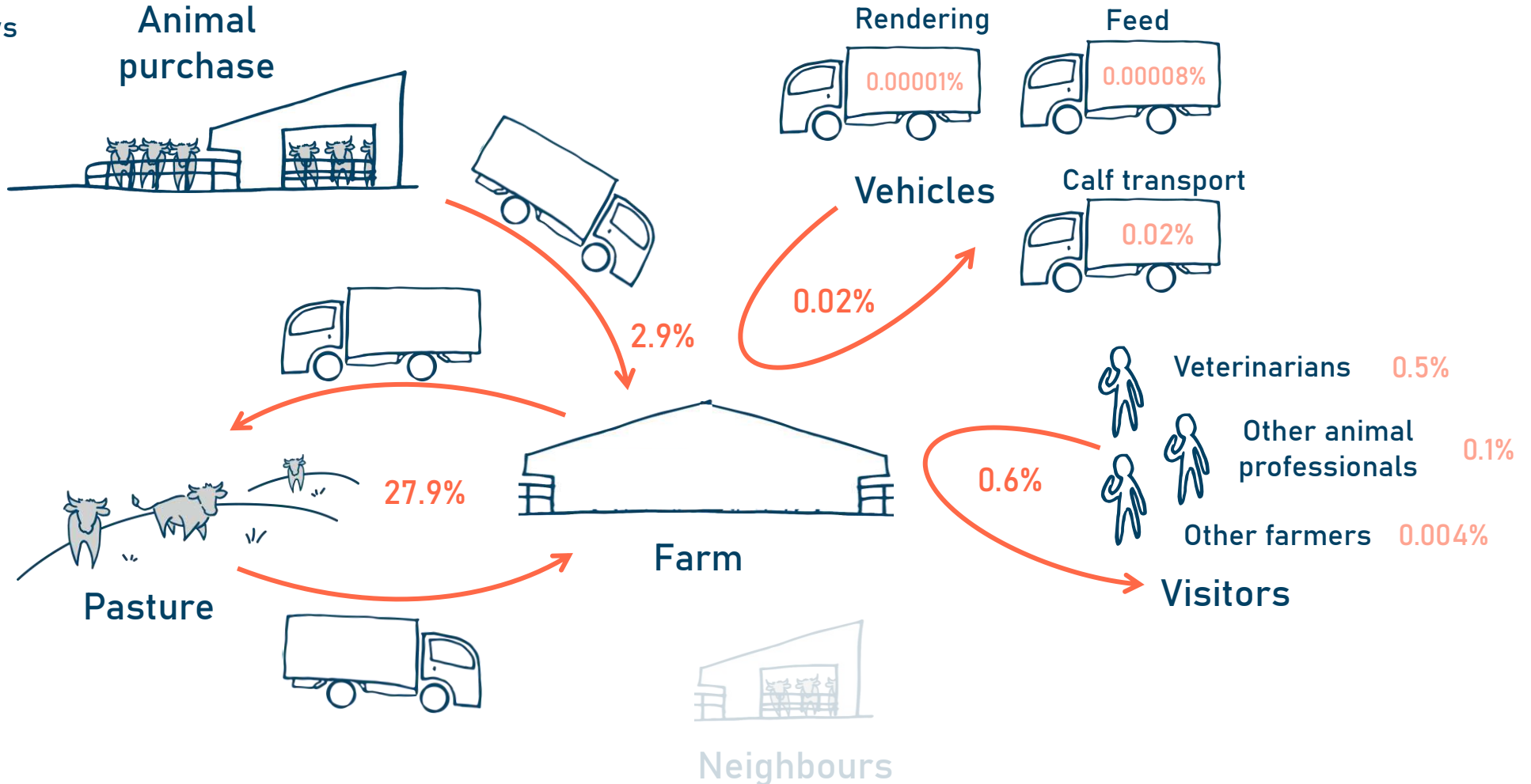
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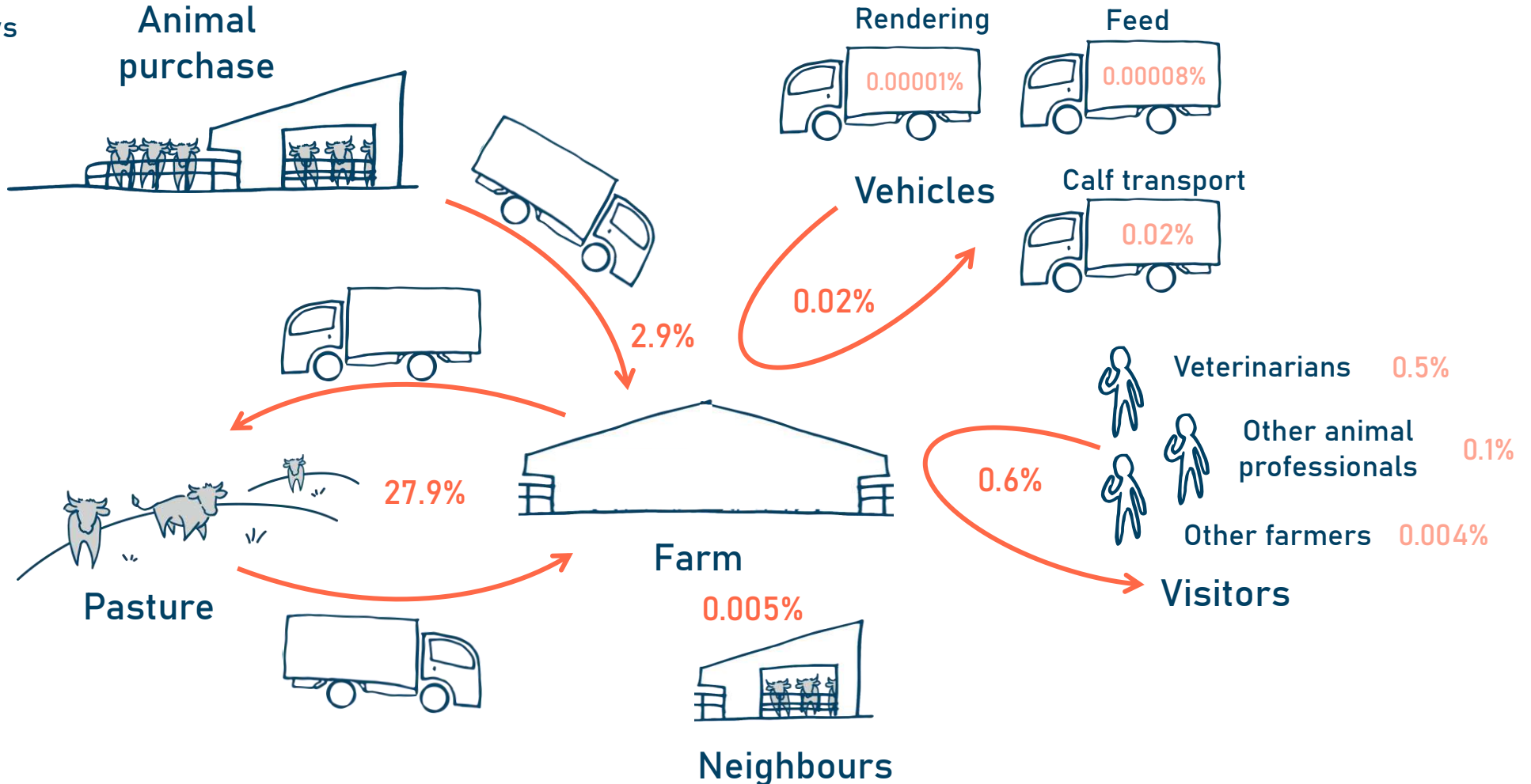
What is the probability of pathogen entry?

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0.7% 4 Heifers

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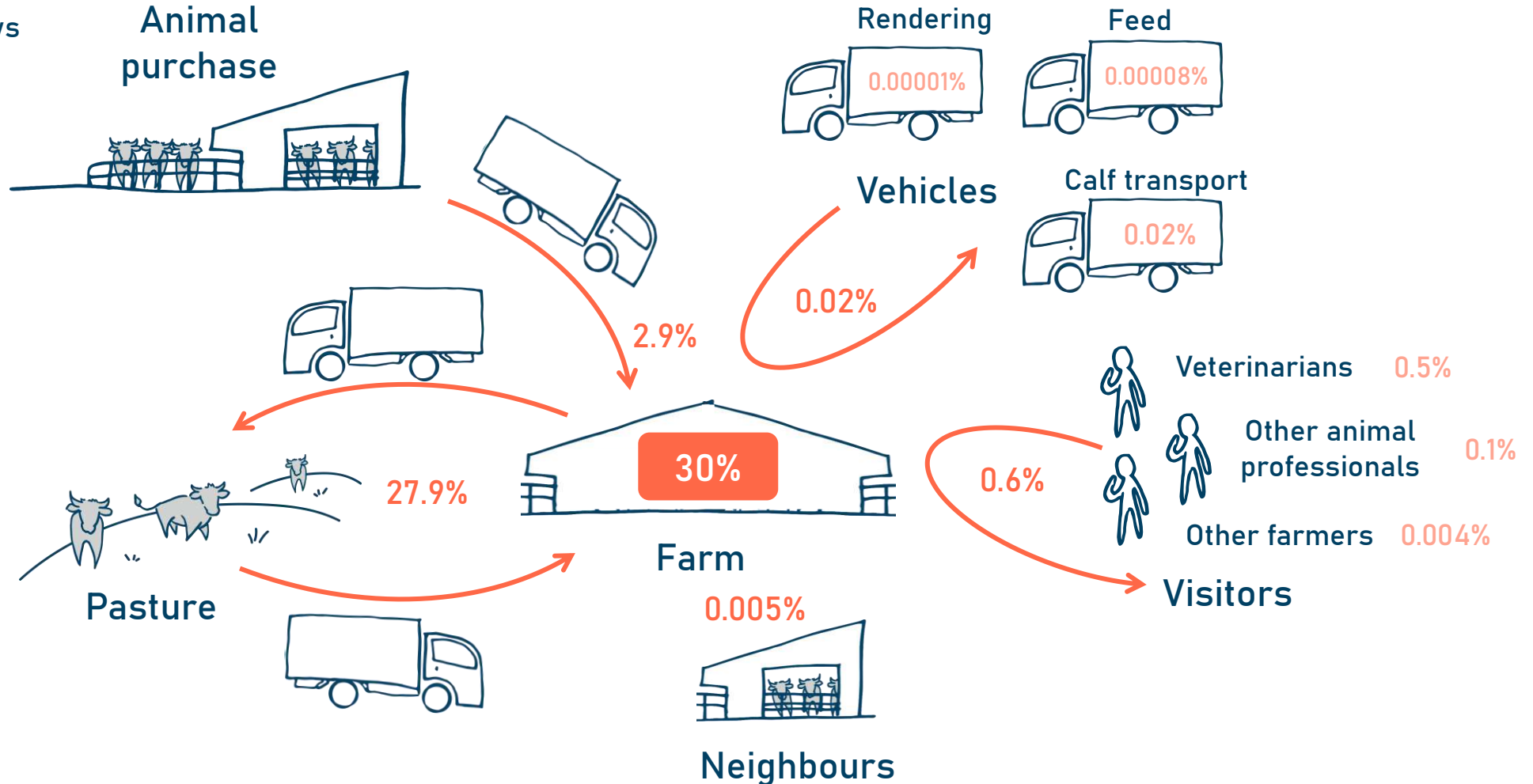
What is the probability of pathogen entry?

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0.5% 1 Bull



What is the probability of pathogen entry?

% Annual Risk of IBR entry

1.7% 2 Adult Cows

0.7% 4 Heifers

0.5% 1 Bull

Animal purchase



Rendering



Feed



Vehicles

Calf transport



What-if new biosecurity measures were implemented...



27.9%

30%



Pasture

Farm



Neighbours



0.5%

Other animal professionals

0.1%

Other farmers

0.004%

0.6%



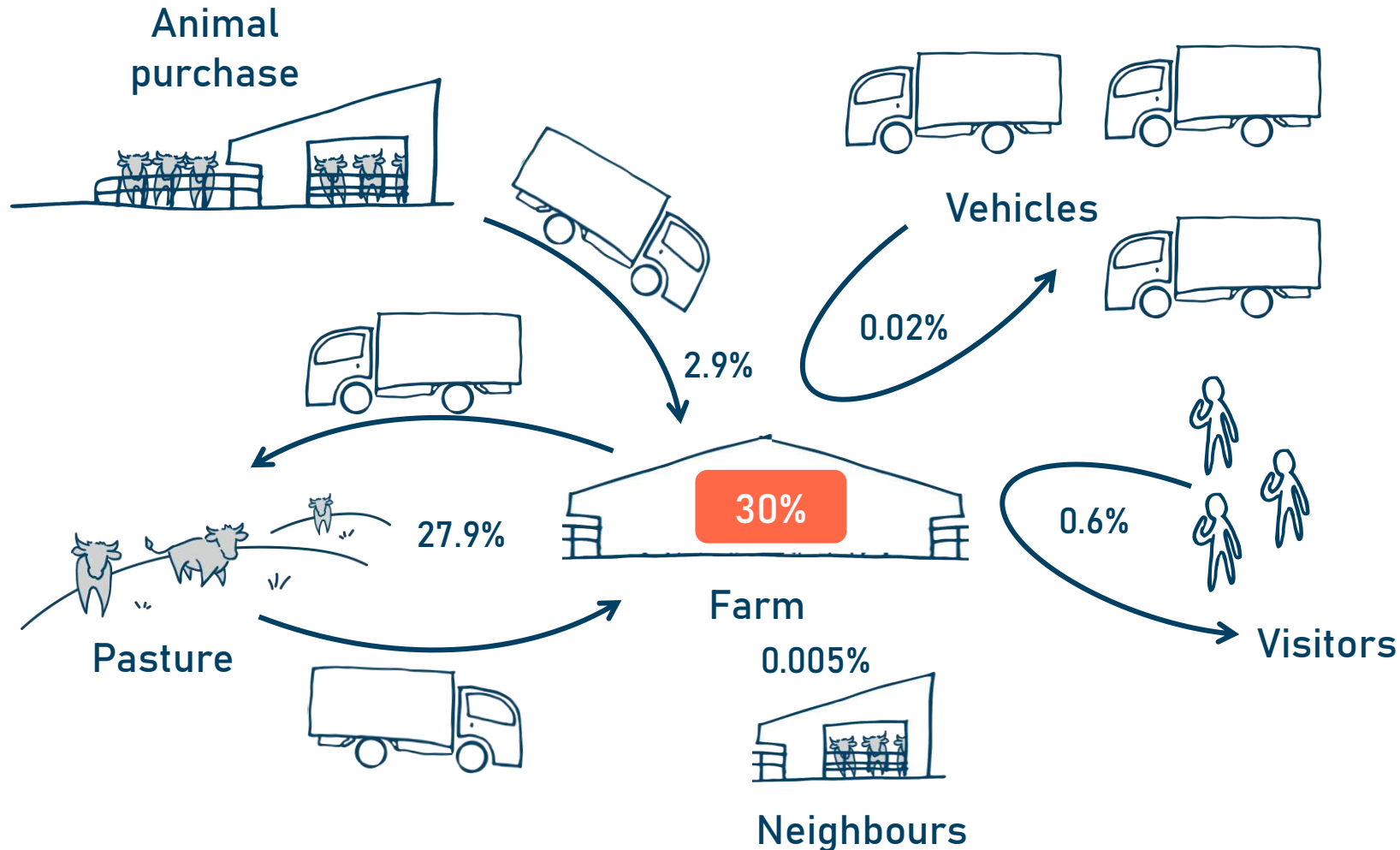
Visitors

What-if new biosecurity measures were implemented

% Annual Risk of IBR entry

Current Risk

30%



What-if...

Test before purchase

Quarantine and test new animals

Screening all herds before pasture

Do not share pastures

No vehicles entering the farm perimeter

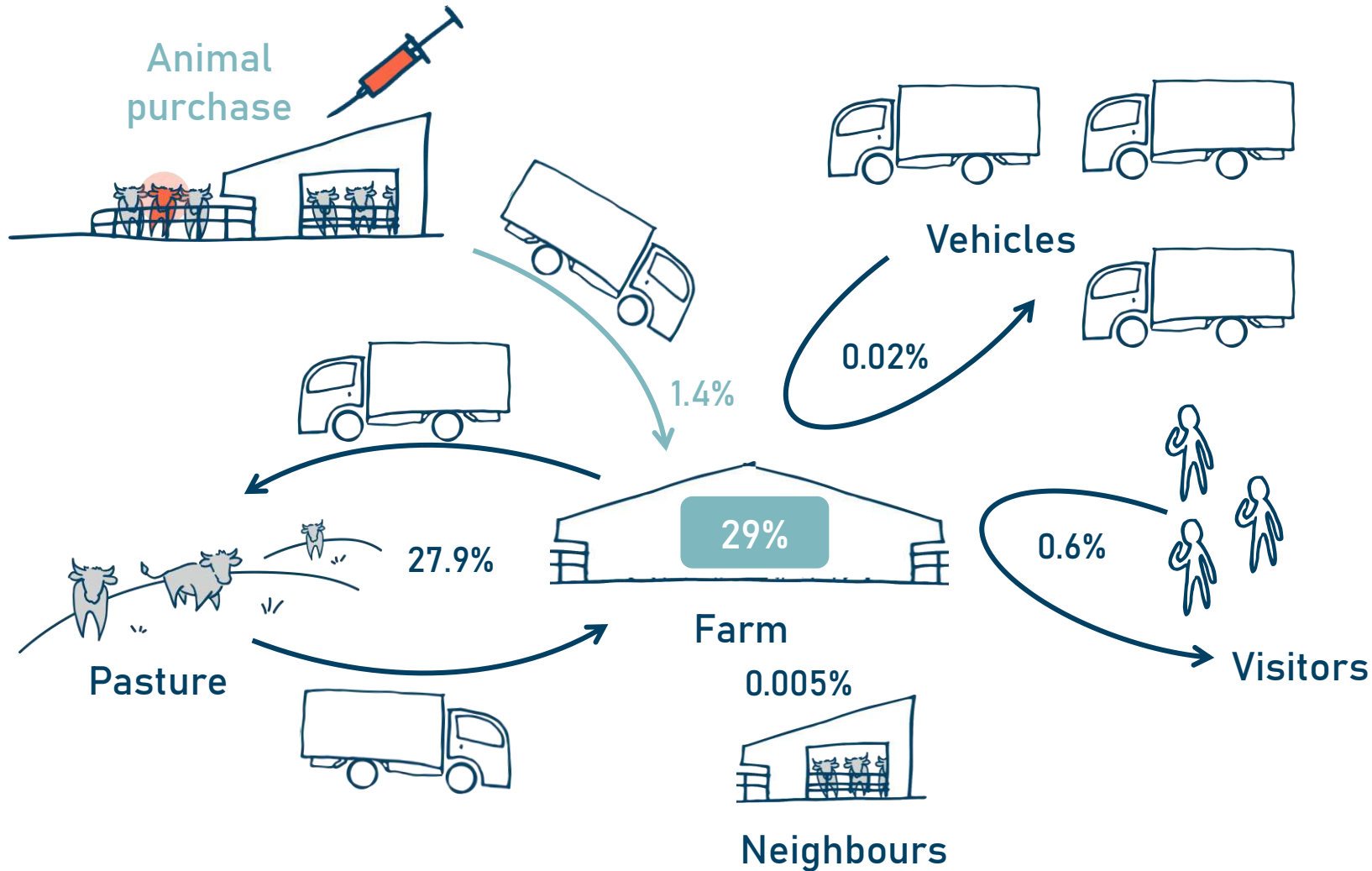
Provide boots to all visitors

What-if new biosecurity measures were implemented

% Annual Risk of IBR entry

Current Risk

30%



What-if...



Test before purchase

29%

Quarantine and test new animals

Screening all herds before pasture

Do not share pastures

No vehicles entering the farm perimeter

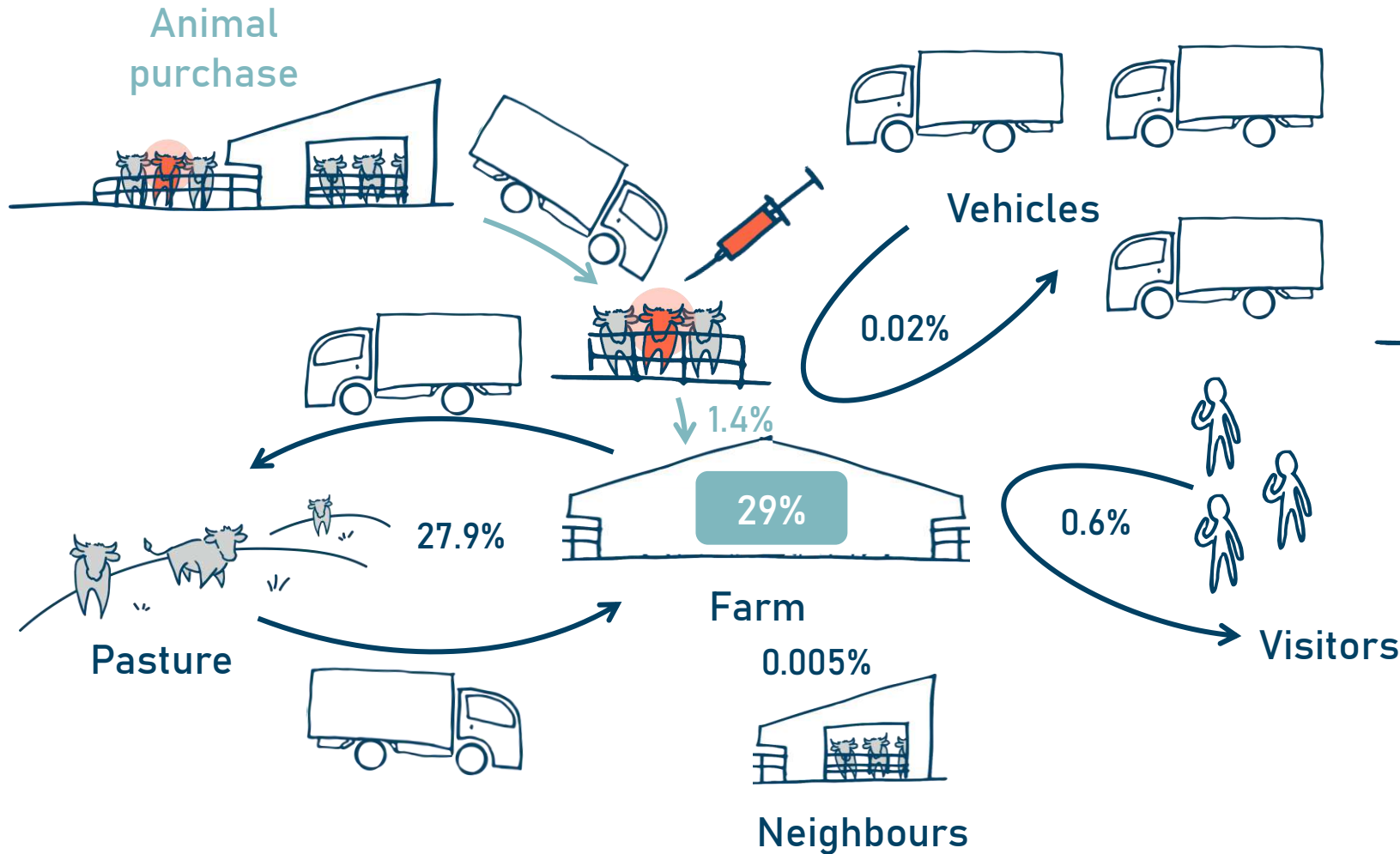
Provide boots to all visitors

What-if new biosecurity measures were implemented

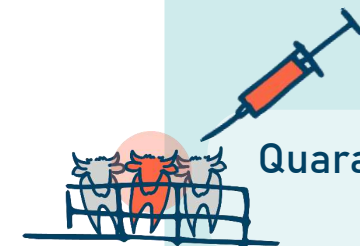
% Annual Risk of IBR entry

Current Risk

30%



What-if...



Test before purchase

29%

Quarantine and test new animals

29%

Screening all herds before pasture

Do not share pastures

No vehicles entering the farm perimeter

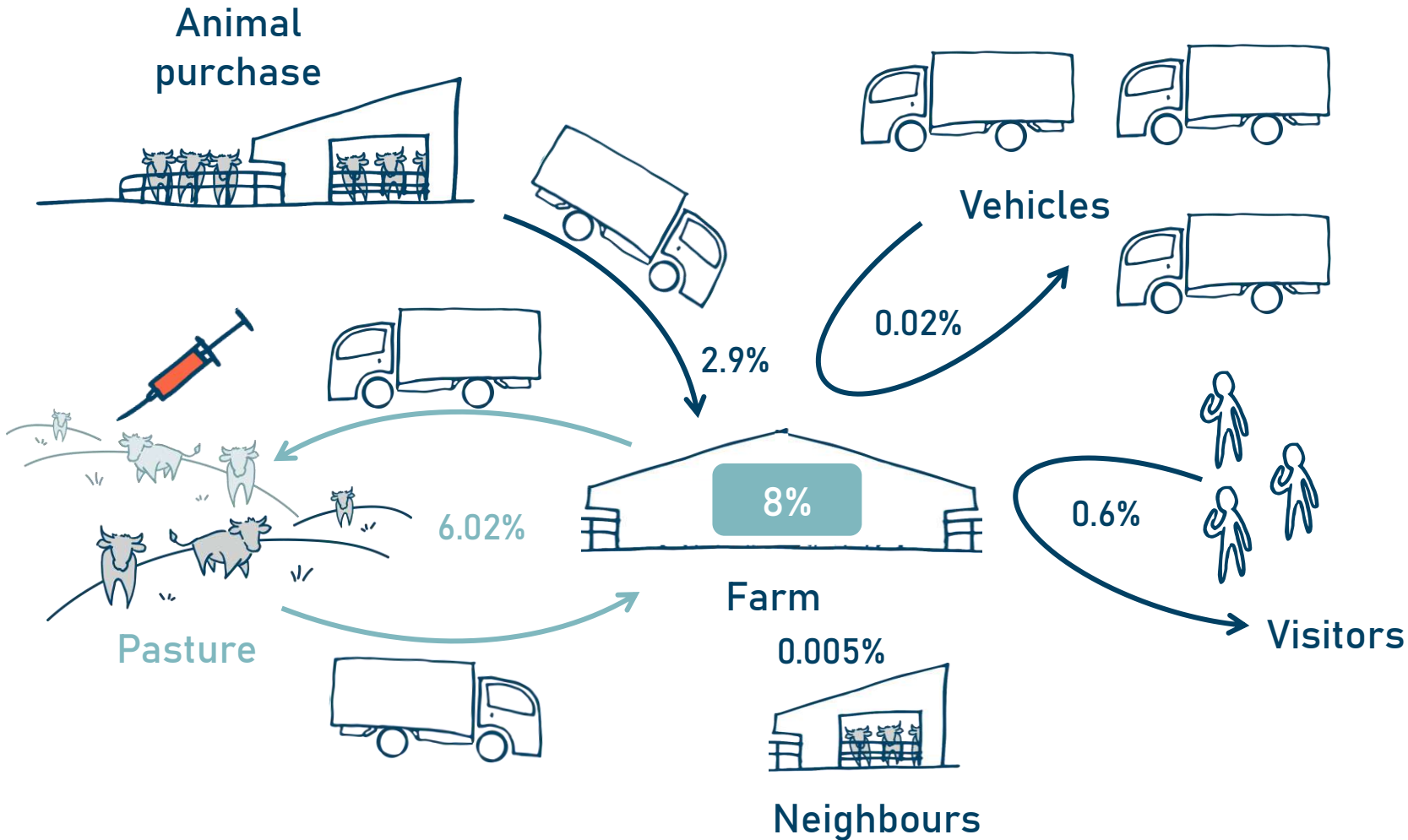
Provide boots to all visitors

What-if new biosecurity measures were implemented

% Annual Risk of IBR entry

Current Risk

30%



What-if...

Test before purchase

29%

Quarantine and test new animals

29%

Screening all herds before pasture

8%

Do not share pastures

No vehicles entering the farm perimeter

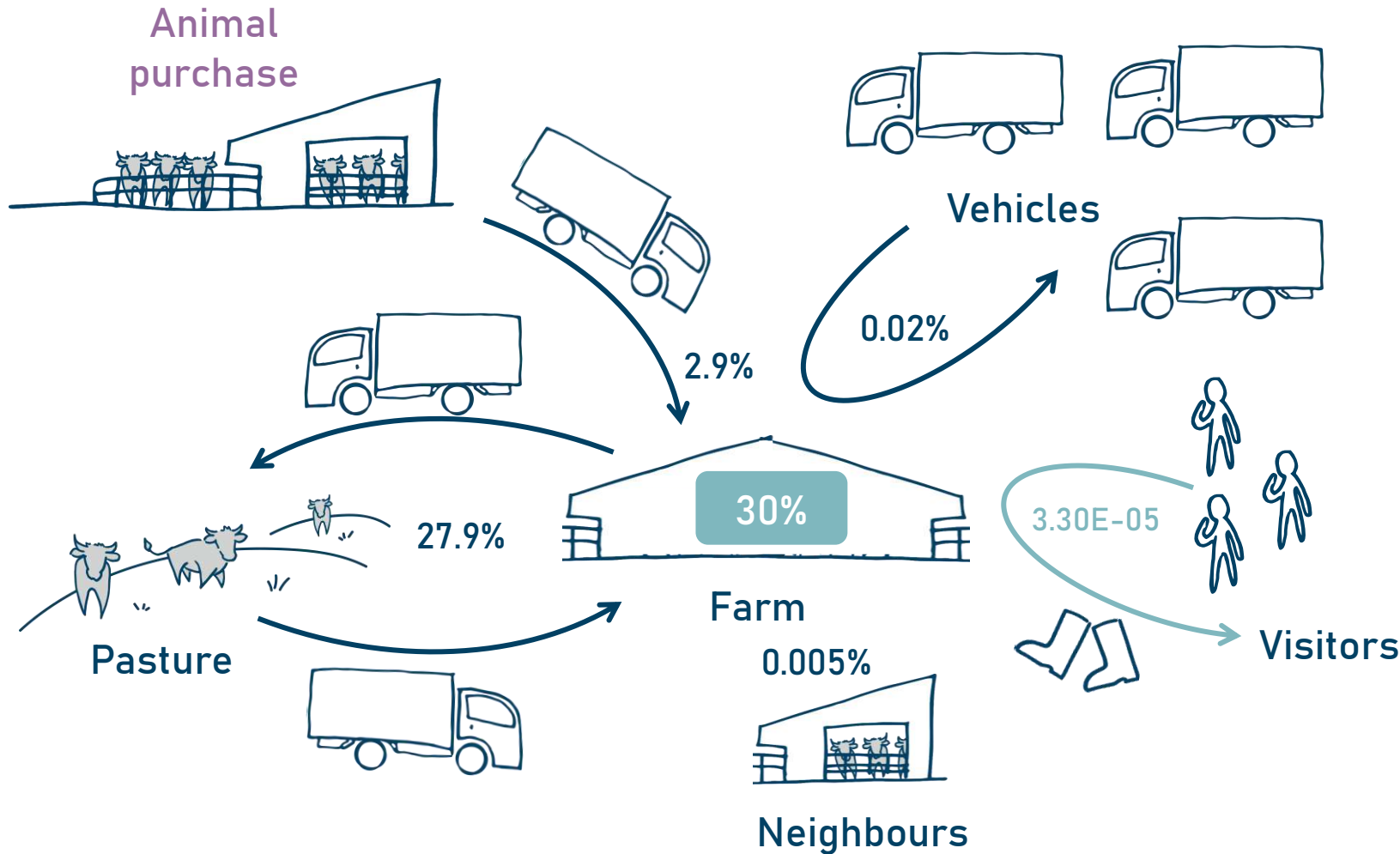
Provide boots to all visitors

What-if new biosecurity measures were implemented

% Annual Risk of IBR entry

Current Risk

30%



What-if...

Test before purchase

29%

Quarantine and test new animals

29%

Screening all herds before pasture

8%

Do not share pastures

3%

No vehicles entering the farm perimeter

30%

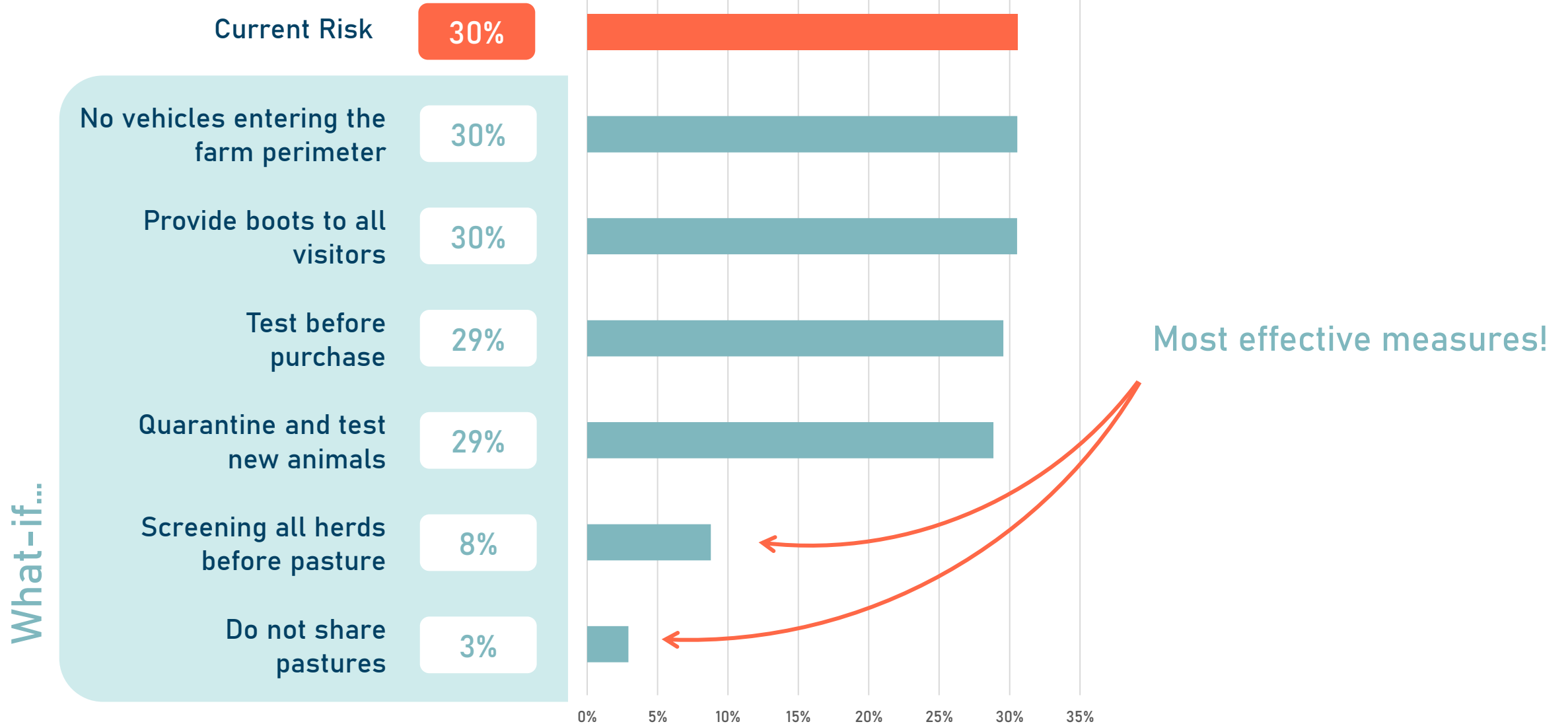
Provide boots to all visitors

30%



What-if new biosecurity measures were implemented

% Annual Risk of IBR entry



What-if new biosecurity measures were implemented

% Annual Risk of IBR entry

What-if...

Current Risk

30%

No vehicles entering the farm perimeter

30%

Provide boots to all visitors

30%

Test before purchase

29%

Quarantine and test new animals

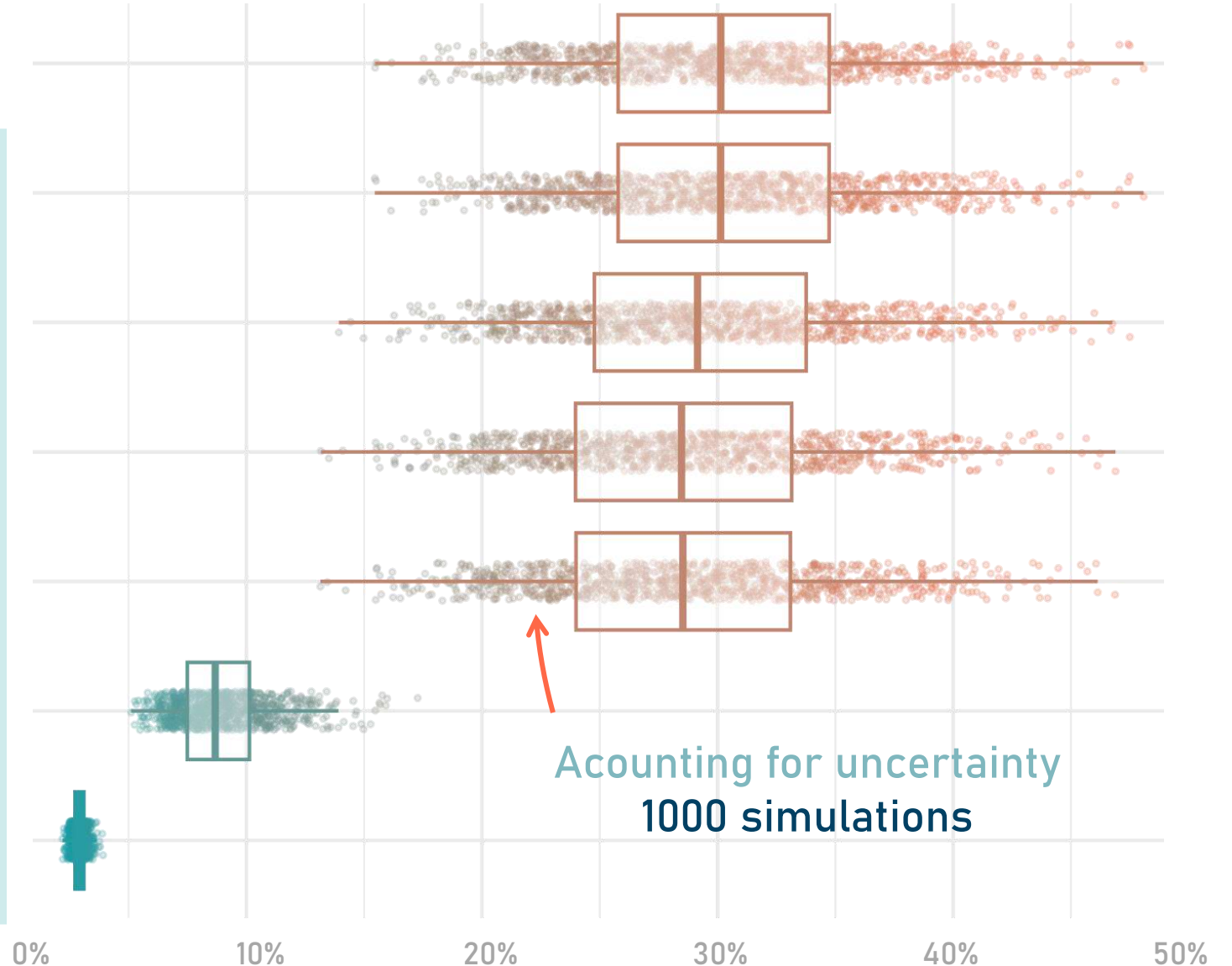
29%

Screening all herds before pasture

8%

Do not share pastures

3%



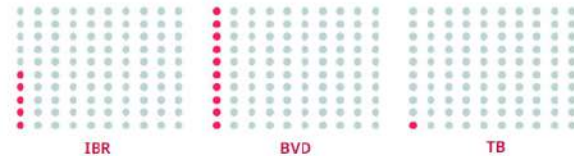
Results: Farm-specific feedback

març 2025

Informe de risc d'entrada de malalties

ID Granja: bl2_v2 Data enquesta: 03-10-2024

La probabilitat anual d'entrada de malalties és del 5% (3-7%) per a la rinotraqueïtis



infecciosa bovina (IBR), del 9% (4-17%) per a la diarrea viral bovina (BVD) i del 0,006% (0,003-0,015%) per a la tuberculosi.

El risc prové majoritàriament de les entrades de vehicles a la granja i del transport d'animals.

Per reduir el risc de les tres malalties, la mesura de bioseguretat més efectiva és proporcionar botes a tots els visitants.

Noves mesures de bioseguretat analitzades:

- No permetre l'entrada de vehicles al perímetre de la granja
- No compartir transport amb altres animals
- Test durant quarantena amb material exclusiu
- Test durant la quarantena
- No compartir transport
- No compartir equipament amb altres granges

Mesures de bioseguretat ja implementades a la granja:

- No permetre contacte directe amb granges veïnes
- Fer proves a tots els animals abans d'anar a concurs
- Netejar i desinfectar el vehicle propi entre transports

La granja no presenta riscos per a les següents vies:

- Entrada d'animals
- Contacte amb la fauna als punts d'aigua

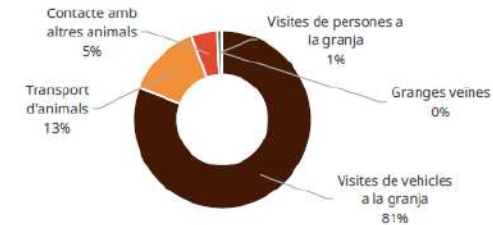
març 2025

Rinotraqueïtis infecciosa bovina (IBR)

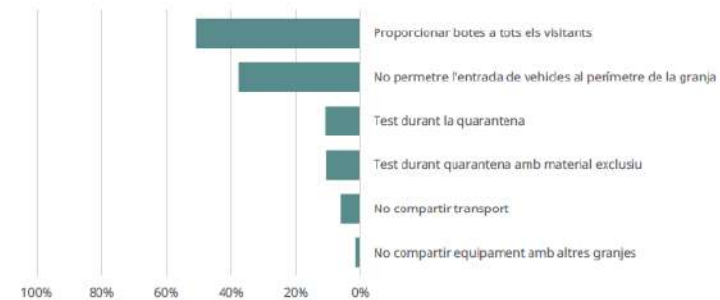
Risc anual d'entrada d'IBR a la granja: 5% (3-7%)

Per via d'entrada:

- Visites de vehicles a la granja: 4% (2-6%)
- Transport d'animals: 0,7% (0,5-0,9%)
- Animals d'altres orígens: 0,04% (0,03-0,06%)
- Visites de persones a la granja: 0,04% (0,02-0,06%)
- Explotacions veïnes: 0,004% (0,0002-0,01%)



Reducció del risc amb mesures de bioseguretat



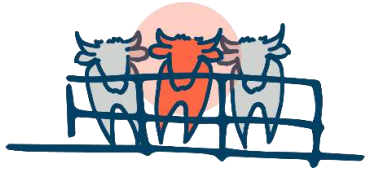
Results for 5 dairy farms in Catalunya, Spain

Annual risk of IBR entry relative risk reduction of new biosecurity measures (median)

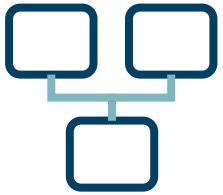
Biosecurity measure	Dairy 1	Dairy 2	Dairy 3	Dairy 4	Dairy 5
No shared rearing		-0.72%			
Screening herds before rearing		0.79%			
Test before transport	-1				
Own vehicle	-12				
No shared transport	-4.30%	-5.40%			
Vehicle disinfection	-8.20%			-1.70%	
Quarantine (with test)	-20.30%	-18.70%		-67%	
No vehicle entry	-42.70%	-30.40%	-65.10%	-1.50%	-80.50%
Boots for drivers	-36.80%	-43.30%	-32.50%	-0.91%	-16.10%
Boots for visitors	0.54%	0.29%		-0.13%	
No shared equipment	-0.16%	-2.50%	-7%	-0.29%	-0.09%

The most effective measures are different for each farm!

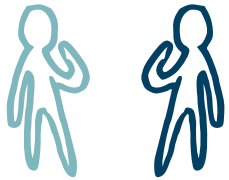
Conclusion



We developed a model to evaluate biosecurity effectiveness on farm-specific contexts using stochastic risk analysis



The modular design allows flexibility for new updates for new pathways, pathogens, and species



This tool can help veterinarians to discuss biosecurity with farmers and provide tailored recommendations that better address their needs

Biosecurity should be tailored to each farm!

Acknowledgements



Funded by
the European Union



UAB Universitat Autònoma
de Barcelona



Dr. Alberto Allepuz



Dr. Giovanna Ciaravino



Teresa
Imperial



Fernando
Duarte

Special thanks to all the farmers and veterinarians who
contribute to the project with their time and data

More info at: farmrisk.eu
Contact: Natalia.ciria@uab.cat

This research project (BioRisk) was supported by MCIN/AEI/10.13039/501100011033, ref. PID2020 118302RB-I00.

Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or REA.

Neither the European Union nor the granting authority can be held responsible for them.



Doodles: nataliaciria.com/doodles