FACULTY OF VETERINARY MEDICINE
accredited by EAEVE

DEPARTMENT OF INTERNAL MEDICINE, REPRODUCTION AND POPULATION MEDICINE
VETERINARY EPIDEMIOLOGY

THE IMPORTANCE OF BIOSECURITY IN ANIMAL HEALTH PROTECTION

Prof. Jeroen Dewulf

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Bio-what ?

BIOSECURITY =

The application of a set of **management**, **behavioural** and **physical** measures designed to reduce the risk of **introduction**, **establishment** and **spread** of pathogenic agents **to, within and from** an animal population.

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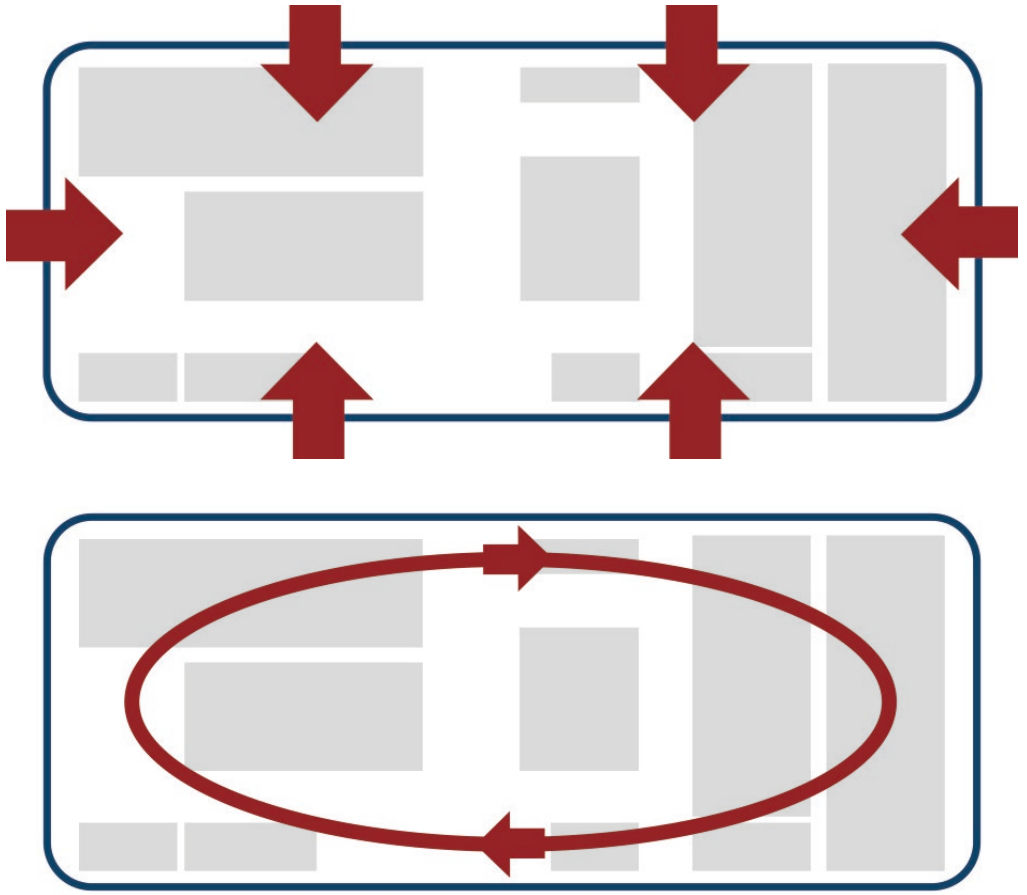
EXTERNAL biosecurity

= reduce introduction

INTERNAL biosecurity

= reduce spread



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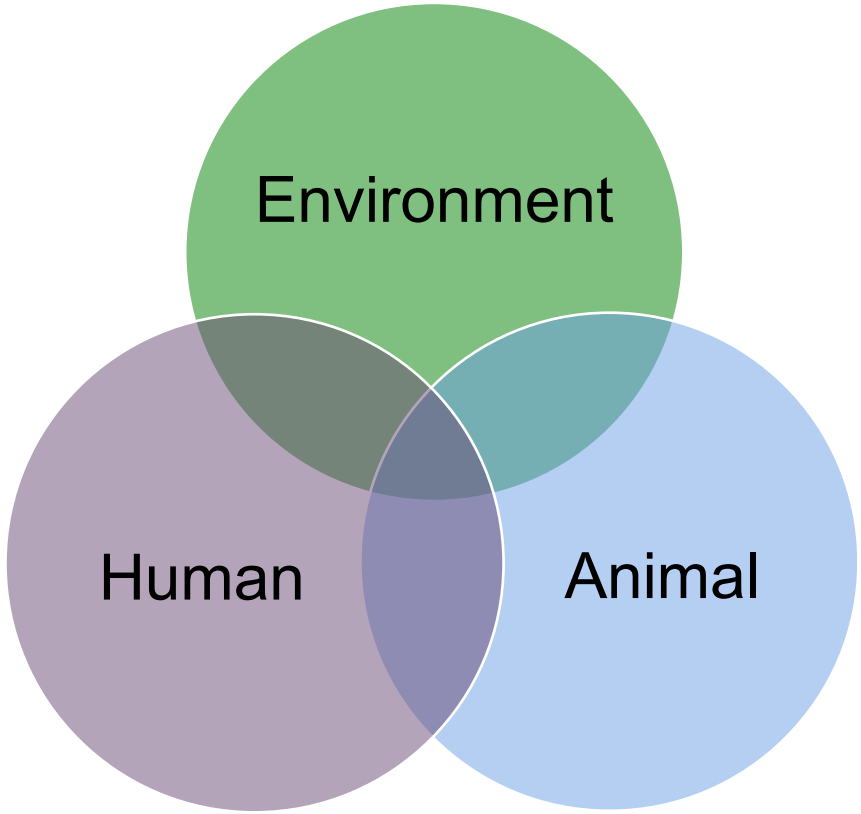
WHAT IS BIOSECURITY?

Animal ⟷ Animal

Human ⟷ Animal

One Health



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BIOSECURITY is (should be) the basis of any disease control program

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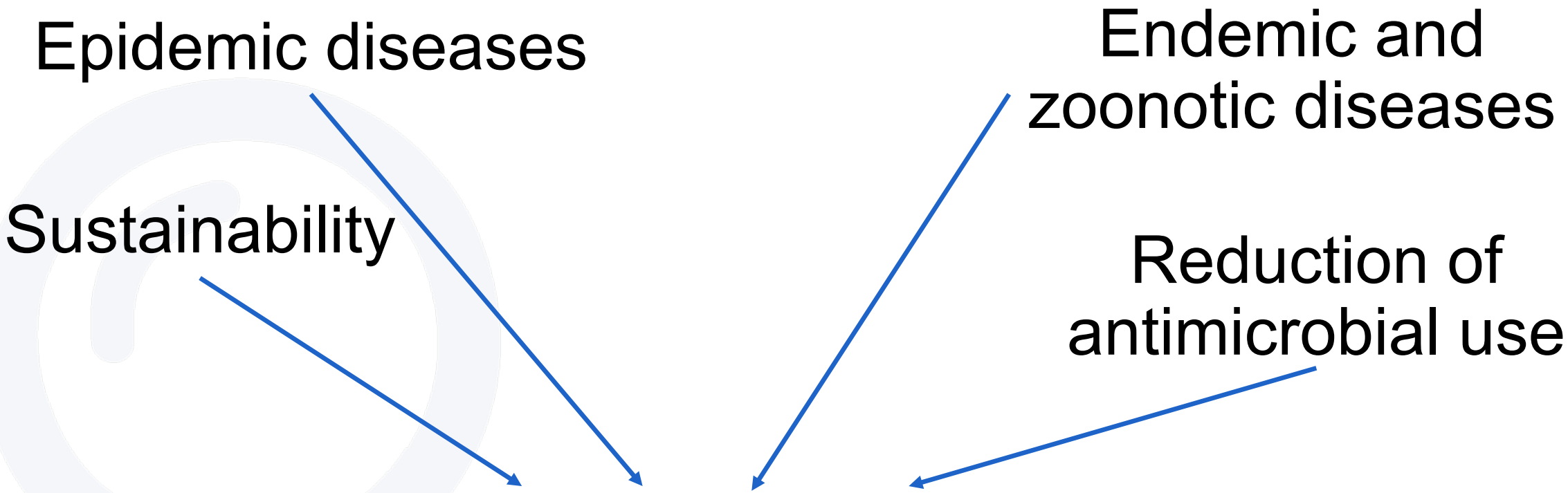
Is biosecurity important?



Biosecurity helps to address of all of these challenges

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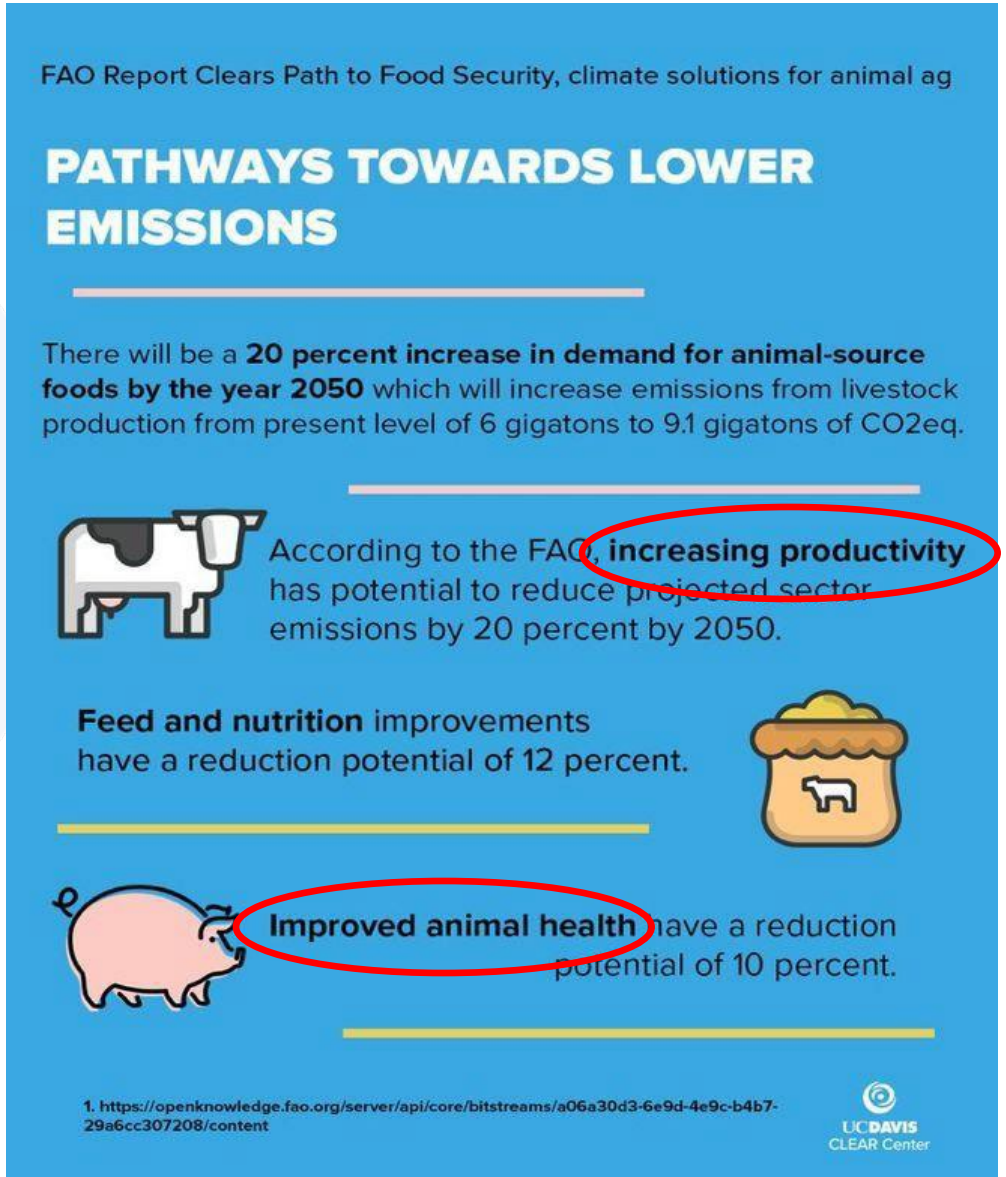
Is biosecurity important?



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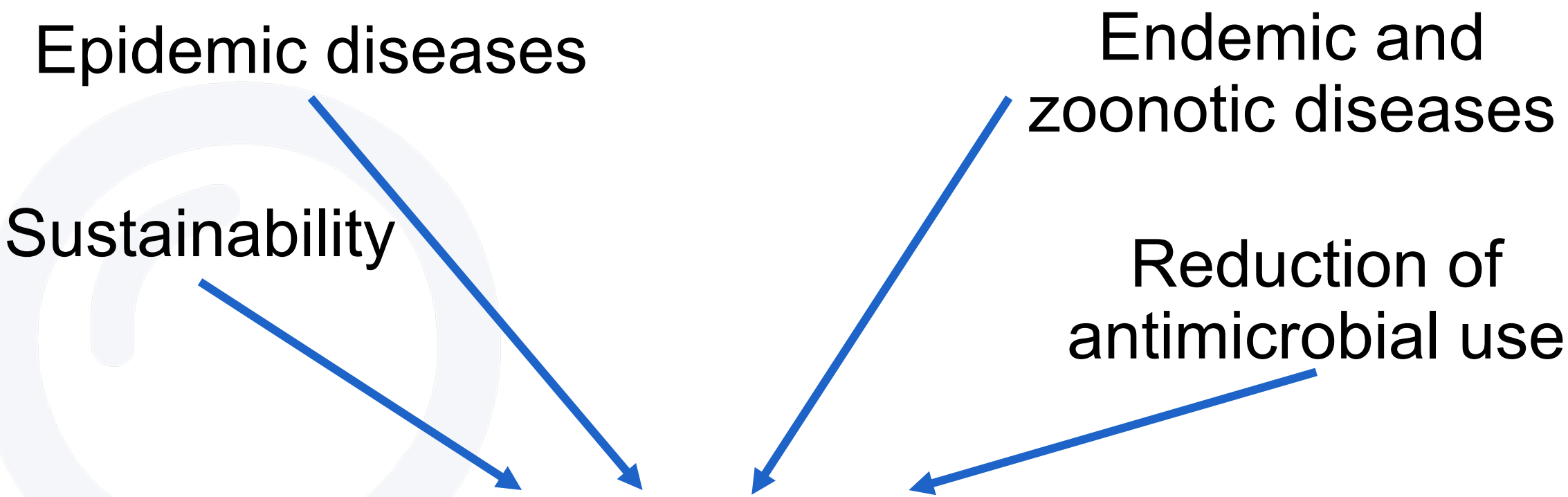

Biosecurity helps to address of all of these challenges

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World Organisation for Animal Health

The State of the World's Animal Health | 92nd General Session | SEARCH

WHO WE ARE | WHAT WE DO | WHAT WE OFFER | MEDIA | WAHIS

Home » What we do » Standards » Codes and Manuals

Codes and Manuals

Our Terrestrial and Aquatic Animal Health Codes provide standards for the improvement of animal health and welfare and veterinary public health worldwide, including through standards for safe international trade in terrestrial and aquatic animals and their products.

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SECTION 4.

DISEASE PREVENTION AND CONTROL

CHAPTER 4.X.

BIOSECURITY

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Principles of biosecurity

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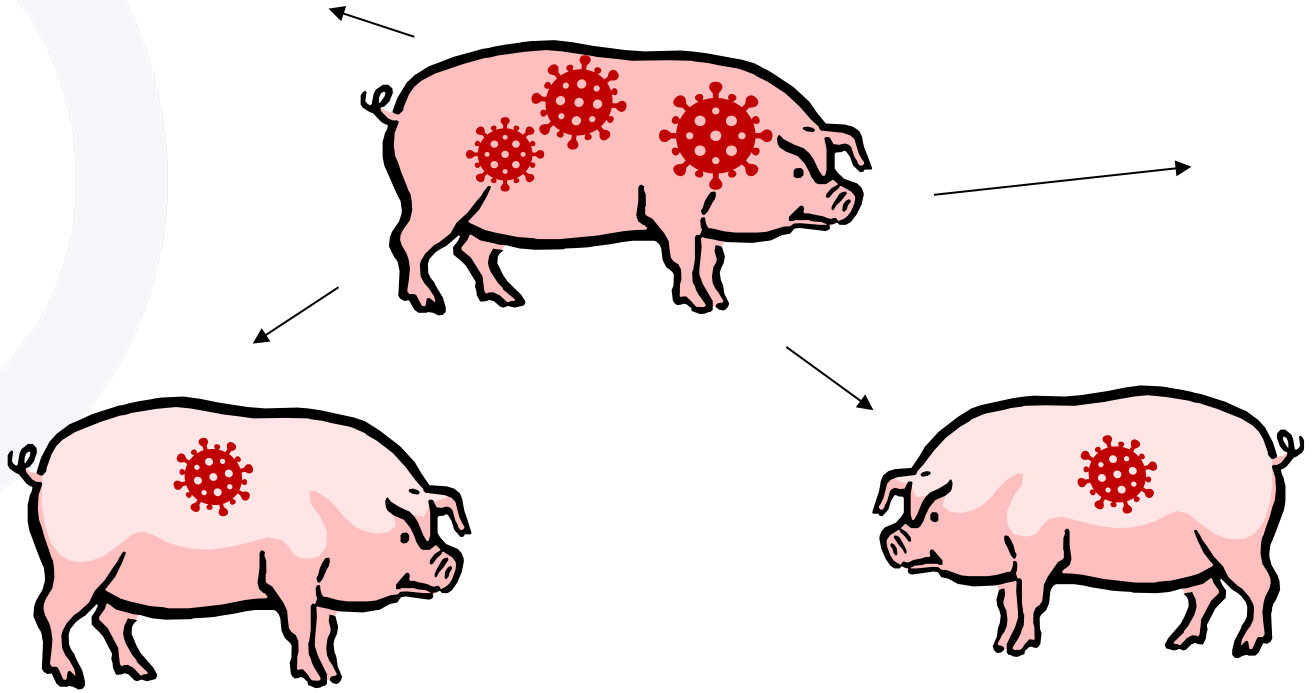
PRINCIPLES OF BIOSECURITY

1) Separation of infectious and susceptible animals

→ avoid direct contact!



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PRINCIPLES OF BIOSECURITY

1) Separation of infectious and susceptible animals

→ avoid indirect contact!

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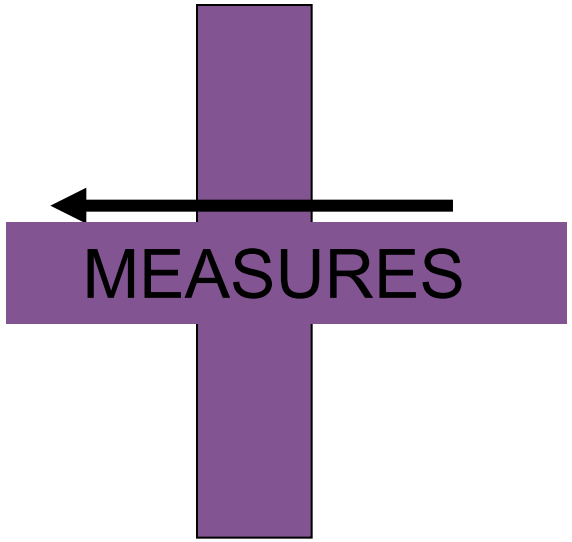
PRINCIPLES OF BIOSECURITY

CLEAN
(susceptible animals)



DIRTY
(direct and indirect
sources of infection)

- Dependent upon herd situation (status, type,…)
- Perform well and consequent

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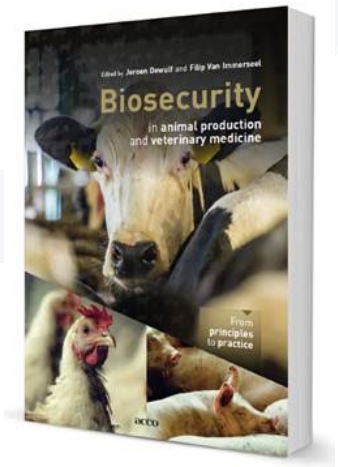
	Direct contact	Indirect contact									
		People	Semen	Manure	Domestic/feral animals	Rodents	Insects (Vectors)	Aerosol	Animal feed	Water	Fomites
Actinobacillus pleuropneumoniae	X				X			X		X	X
Bordetella bronchiseptica	X				X	X	X	X		X	X
Brachyspira hyodysenteriae	X	X		X	X	X	X		X	X	X
Brucella suis	X	X	X	X	X		X	X	X		
Classical swine fever virus	X	X	X	X	X		X	X	X		X
Clostridium perfringens	X			X			X	X		X	X
Erysipelothrix rhusiopathiae*	X			X	X	X			X	X	X
Escherichia coli	X	X		X	X	X	X	X	X	X	X
Foot-and-mouth disease virus	X	X	X	X	X			X	X	X	X
Haemophilus parasuis*	X				X						
Lawsonia intracellularis*	X			X	X	X	X				X
Leptospires	X	X	X		X	X				X	
Mycoplasma hyopneumoniae	X	X			X			X		X	X
Pasteurella multocida	X	X		X	X			X		X	X
Porcine circovirus type 2*	X		X	X	X	X	X		X	X	

	Direct contact	Indirect contact									
		People	Semen	Manure	Domestic/feral animals	Rodents	Insects (Vectors)	Aerosol	Animal feed	Water	Fomites
Porcine Epidemic diarrhea virus*	X	X		X	X			X	X		X
Porcine parvovirus	X		X	X	X	X				X	X
Porcine Reproductive and Respiratory Syndrome virus	X	X	X	X	X	X	X	X	X	X	X
Pseudorabies virus	X		X	X	X	X	X	X		X	X
Salmonella spp.	X	X		X	X	X	X	X	X	X	X
Streptococcus suis	X	X		X	X		X	X		X	X
Swine influenza virus	X	X		X	X			X			
Swine vesicular disease virus	X	X	X	X	X			X	X		X
Transmissible gastroenteritis virus	X	X		X	X		X				X



Biosecurity in animal practice and Veterinary Medicine., 2018

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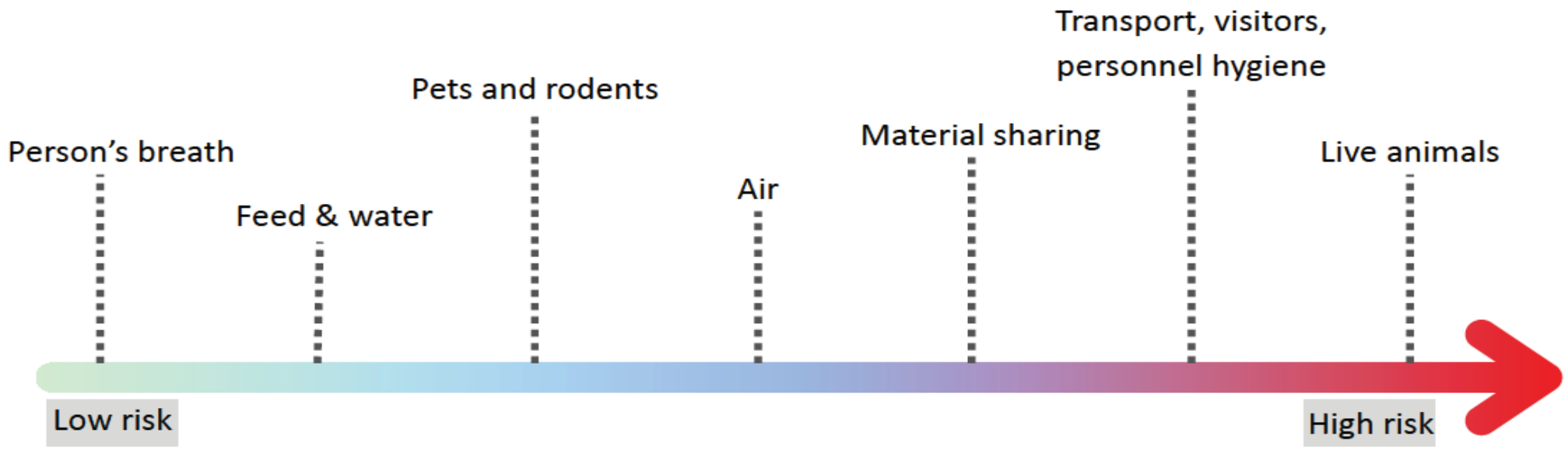
PRINCIPLES OF BIOSECURITY

2. Not every measure is equally important



After Boklund et al., 2008

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PRINCIPLES OF BIOSECURITY

3) Reduction of the general infection pressure

→ breaking the infection cycle, reducing the burden on the immune system↓

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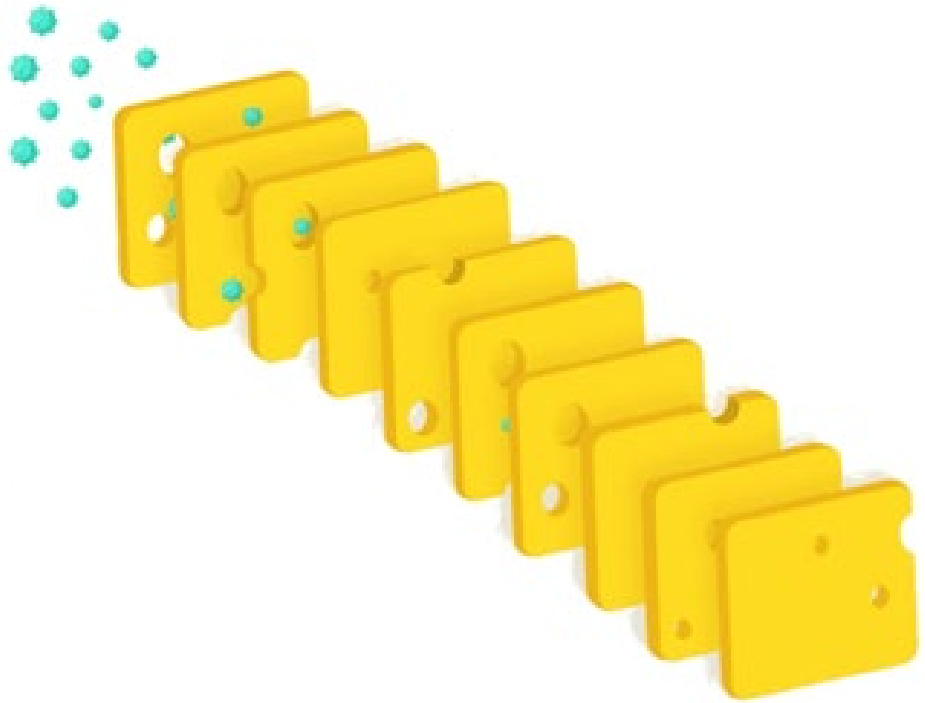
PRINCIPLES OF BIOSECURITY

3) Reduction of the general infection pressure

→ breaking the infection cycle, reducing the burden on the immune system↓



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PRINCIPLES OF BIOSECURITY

Where are biosecurity measures most important?

A. Large herds
B. Small herds
C. Independent of herd size

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PRINCIPLES OF BIOSECURITY

4) Size matters

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PRINCIPLES OF BIOSECURITY

5. Frequency does matter

‘Thousand times a small chance becomes a large chance’

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PRINCIPLES OF BIOSECURITY

Assume that the risk of disease introduction to your herd through feed delivery is 1 out of 1000, and the feed delivery truck comes weekly.
What is the annual risk?

A. 0,5%
B. 5%
C. 50%

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PRINCIPLES OF BIOSECURITY

5. Frequency matters

- ‘Thousand times a small chance becomes a large chance’
  - Risk transmission route (p)
  - **Frequency transmission route (n)**
- $P = 1 – (1-p)^n$
  - p= 0.1% (1 out of 1000)
  - n= 52 (e.g. weekly)
    - **5,06%**= $1 – (1-0.001)^{52}$

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THE 5 PRINCIPLES OF BIOSECURITY

1. Separate infectious and susceptible animals
2. Not every measure is equally important
3. Reduce the general infection pressure
4. Size matters
5. Frequency matters

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BIOSECURITY AND ITS LINK WITH ANIMAL HEALTH & PRODUCTION

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IMPACT OF BIOSECURITY – PRODUCTION

"It is health that is real wealth and not pieces of gold and silver."

- Mahatma Gandhi -

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antibiotics

MDPI

Review

Can improved farm biosecurity reduce the need for antimicrobials in food animals? A Scoping Review

Pankaj Dhaka [1,2,*], Ilias Chantziaras [1,*], Deepthi Vijay [3], Jasbir Singh Bedi [2], Iryna Makovska [1], Evelien Biebaut [1] and Jeroen Dewulf [1]

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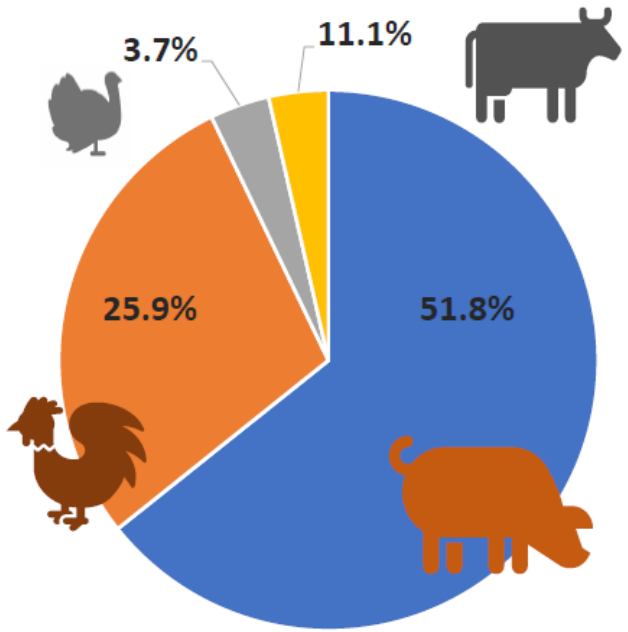
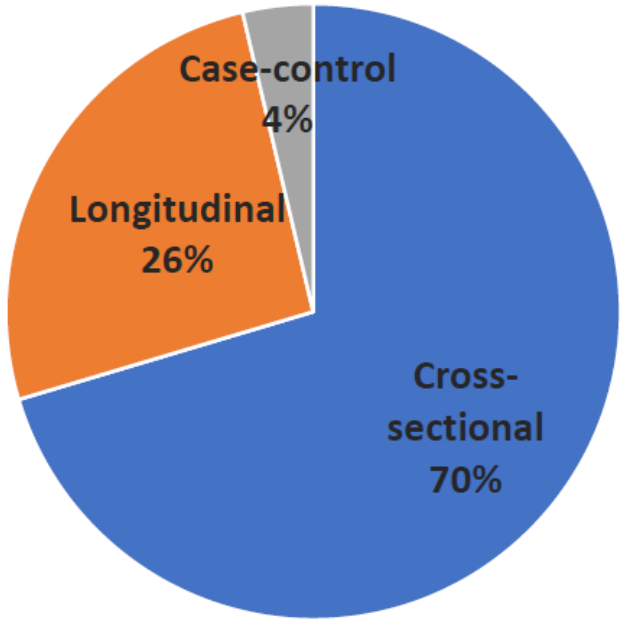
IMPACT OF BIOSECURITY

Species distribution



Two studies included both pigs and poultry farms

Study types



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IMPACT OF BIOSECURITY

Association between farm biosecurity and AMU

- 51.8% (14/27) studies
  ↑ farm biosecurity : ↓ AMU
- 18.5% (5/27) studies
  ↑ farm management : ↓ AMU
- 2 studies
  ↑ coaching & awareness: ↓ AMU
- 1 study
  ↑ biosecurity : ↓ AMU : ↑ farm economics

5 studies: farm biosecurity & AMU → Uncertain or spurious association

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Biosecurity is important!

Yet…

- Big differences exist between farming systems and countries
- Many of the biosecurity measures are insufficiently evidence based
- Biosecurity is insufficiently included in veterinary education
- Big differences exist between farmers expectations and veterinary delivery

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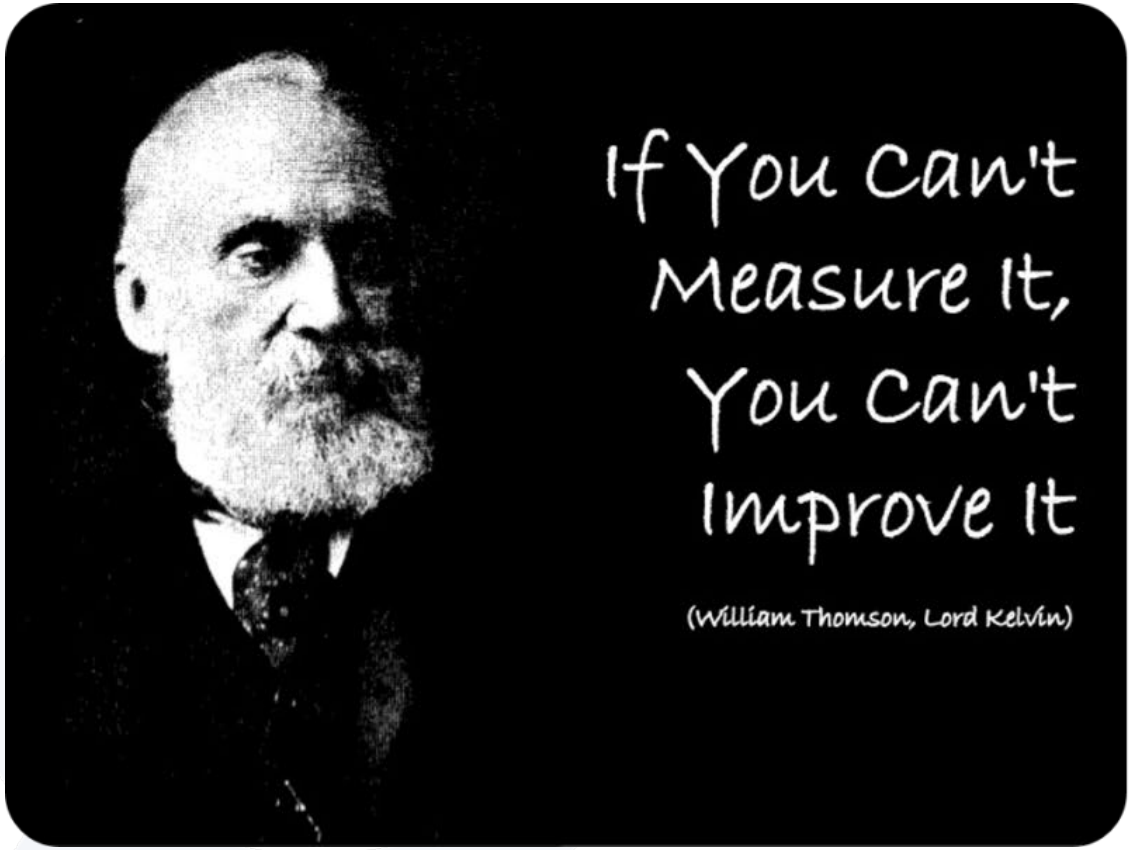

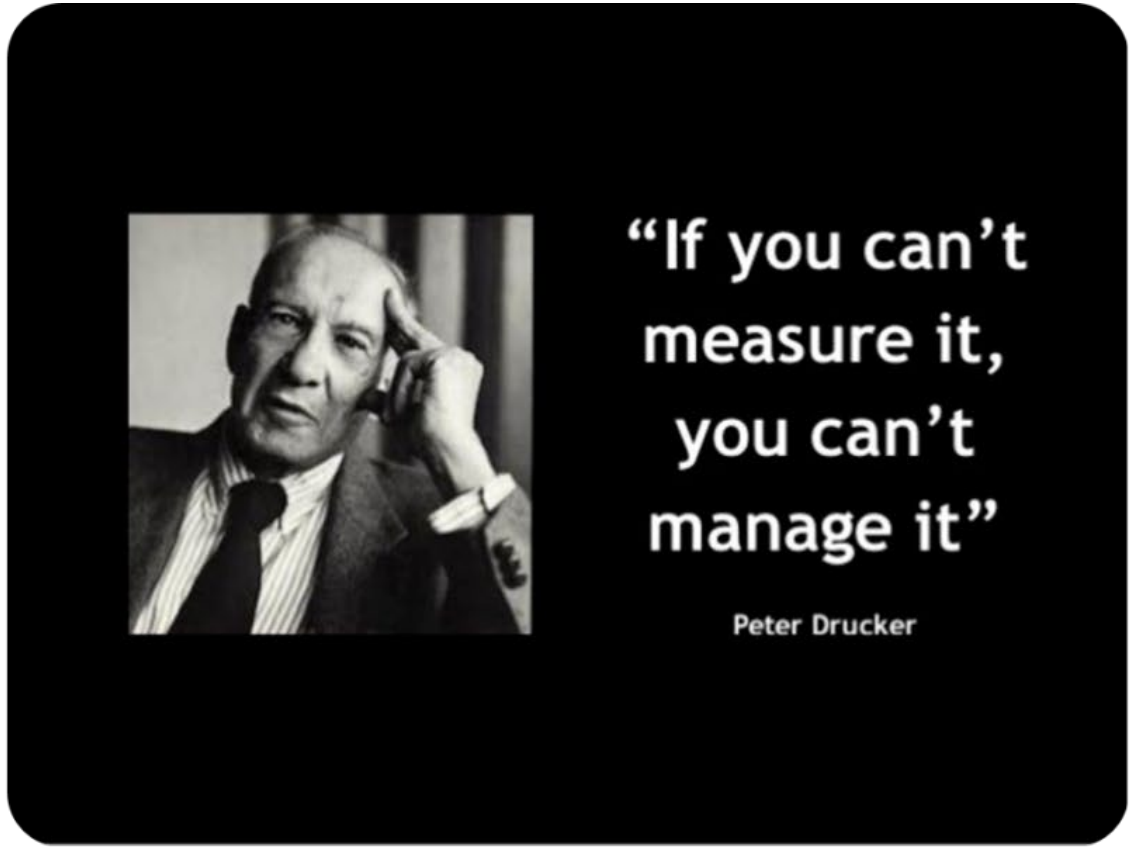

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Keeping healthy animals healthy!

Biocheck.UGent is a scientific risk-based and independent scoring system to evaluate the quality of your on-farm biosecurity.

Quantify your biosecurity level right now!

BIOCHECK.UGENT

Platform to help increase biosecurity levels

Data-driven recommendations

With the goal to keeping healthy animals healthy

www.biocheckgent.com

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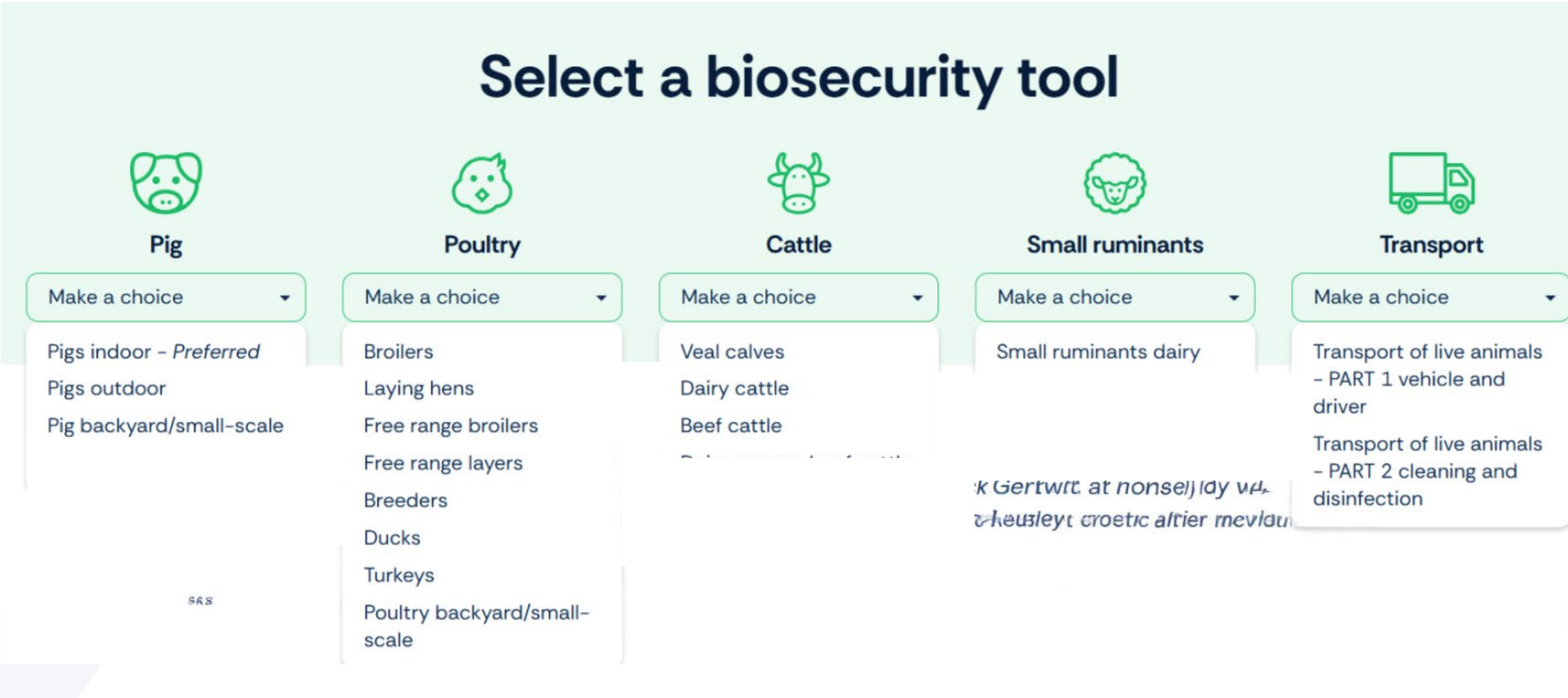
BIOCHECK.UGENT



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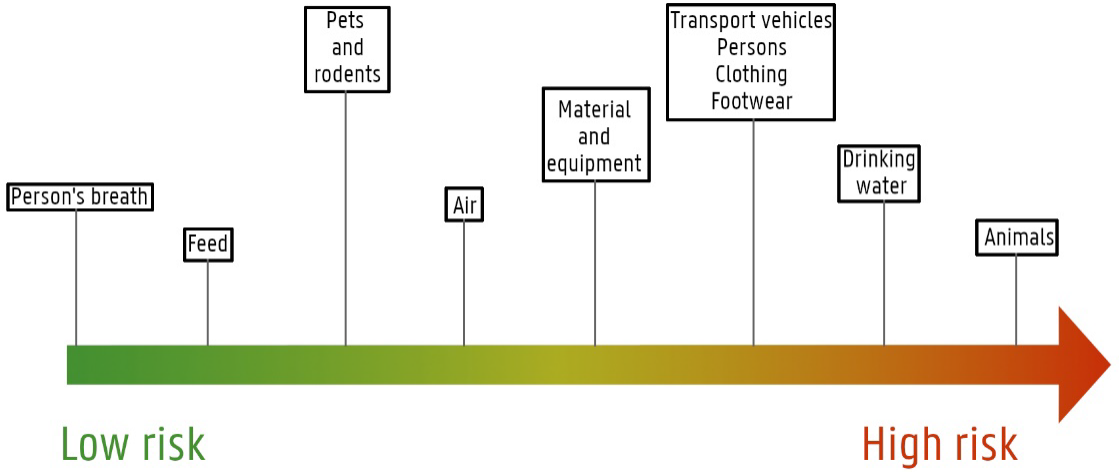
Risk based scoring system



Weighted scores

Based on scientific research

Risk for transmission: direct vs. indirect contact

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ID: 20388/691653/v/2_1/F
Entry date: 2019-03-10 13:22:08
Identification:

PIG

Nr	Description	Score	Country average	Global average
External biosecurity				
A	Purchase of animals and semen	100 %	88 %	89 %
B	Transport of animals, removal of manure and dead animals	41 %	70 %	70 %
C	Feed, water and equipment supply	27 %	38 %	50 %
D	Personnel and visitors	41 %	64 %	68 %
E	Vermin and bird control	50 %	64 %	67 %
F	Environment and region	60 %	53 %	64 %
	Subtotal External biosecurity:	***57 %***	***66 %***	***70 %***
Internal biosecurity				
A	Disease management	40 %	56 %	67 %
B	Farrowing and suckling period	64 %	59 %	56 %
C	Nursery unit	36 %	65 %	66 %
D	Fattening unit	N/A	72 %	67 %
E	Measures between compartments and the use of equipment	39 %	44 %	48 %
F	Cleaning and disinfection	20 %	48 %	59 %
	Subtotal Internal biosecurity:	***38 %***	***55 %***	***58 %***
N/A = Not applicable	**Total:**	**48 %**	**61 %**	**64 %**

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Biosecurity Assessment Report

Pigs_4.0_EN · HEUV92026 · NL

Generated on 15 May 2026

Executive Summary

The farm demonstrates strong performance in external biosecurity, particularly in the purchase of breeding pigs and feed supply, achieving top scores in these areas. However, there are notable risks in disease management and the farrowing and suckling period, indicating a need for targeted improvements to enhance overall biosecurity practices.

- **Schedule annual disease evaluations**; arrange yearly assessments with a veterinarian to review treatment plans and compliance with current practices, ensuring effective disease management.
- **Limit cross-fostering of piglets**; restrict cross-fostering to the first 48 hours after birth to minimize pathogen transmission and document all instances for monitoring.
- **Improve cleaning protocols**; implement a seven-step cleaning and disinfection protocol for all pens after each production cycle to enhance hygiene and reduce disease risks.

Overall biosecurity performance

Treat the recommendations as a stepwise plan — adopt a few, embed them, then move on. Prioritise by disease-transmission risk and by what is realistically within reach. General recommendations sit at the end of the document.

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External biosecurity

Purchase of breeding pigs, weaned piglets and semen

Your score: 100/100 · Average: 84/100

You have a perfect score for this section, continue to work in this way.

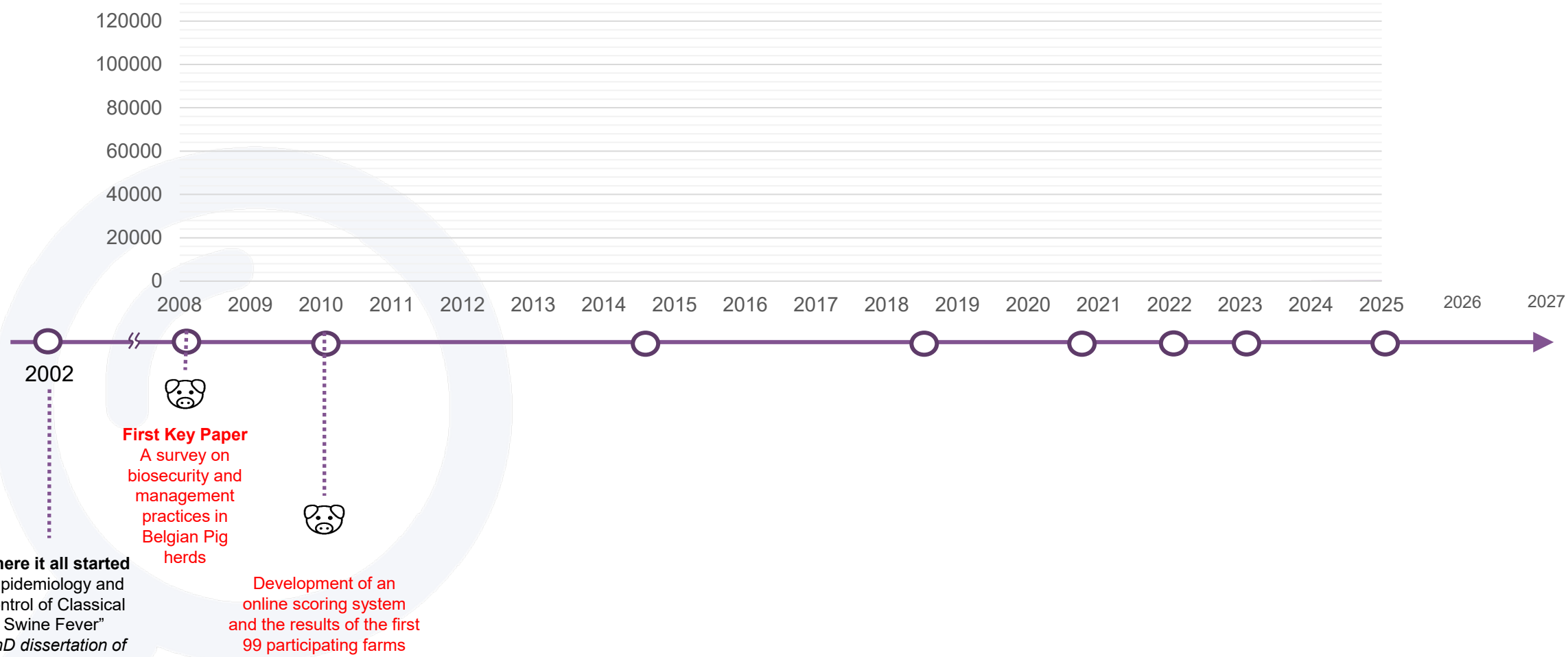
Location of the farm

Your score: 36/100 · Average: 43/100

The farm is located in a high-density pig area with neighboring farms nearby, increasing disease transmission risks.

Fencing and wild boar control

- Install wild-boar-proof fences at least 2 meters high and partially buried to a depth of 50 centimeters.
- Schedule monthly inspections of fencing to identify breaches and document findings in a maintenance log.
- Repair any identified breaches within 48 hours and label all repaired sections to track maintenance history.



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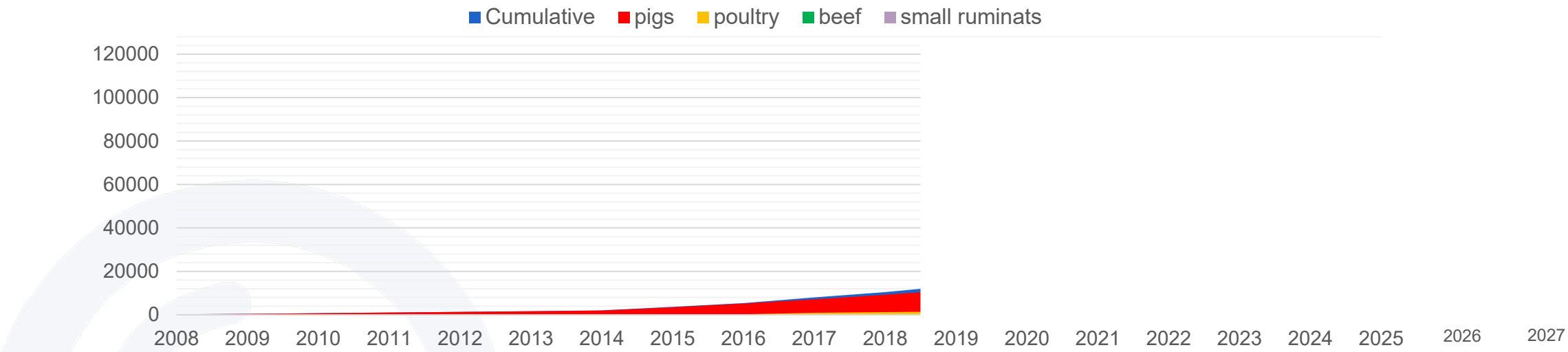

2002

Where it all started
"Epidemiology and control of Classical Swine Fever"
PhD dissertation of Jeroen Dewulf

First Key Paper
A survey on biosecurity and management practices in Belgian Pig herds

Development of an online scoring system and the results of the first 99 participating farms

Launch of Biocheck for broiler production

Launch of Biocheck for cattle production

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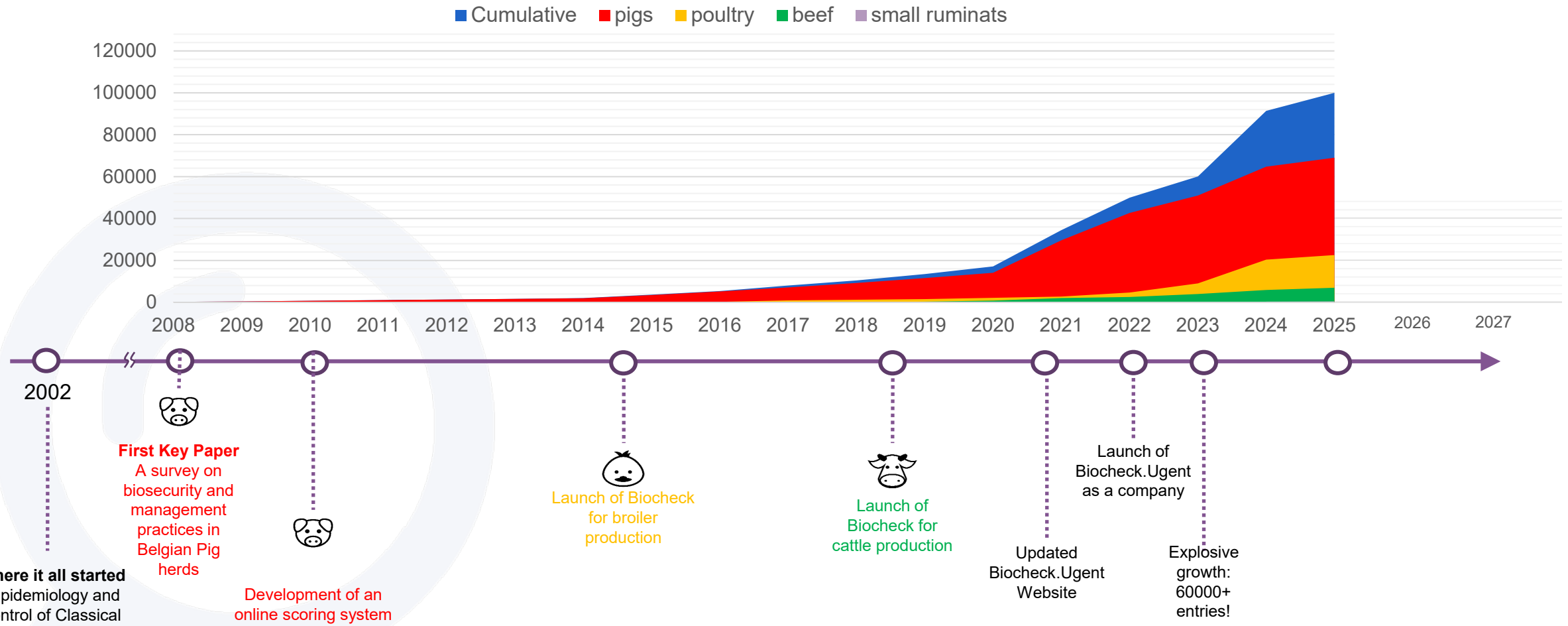

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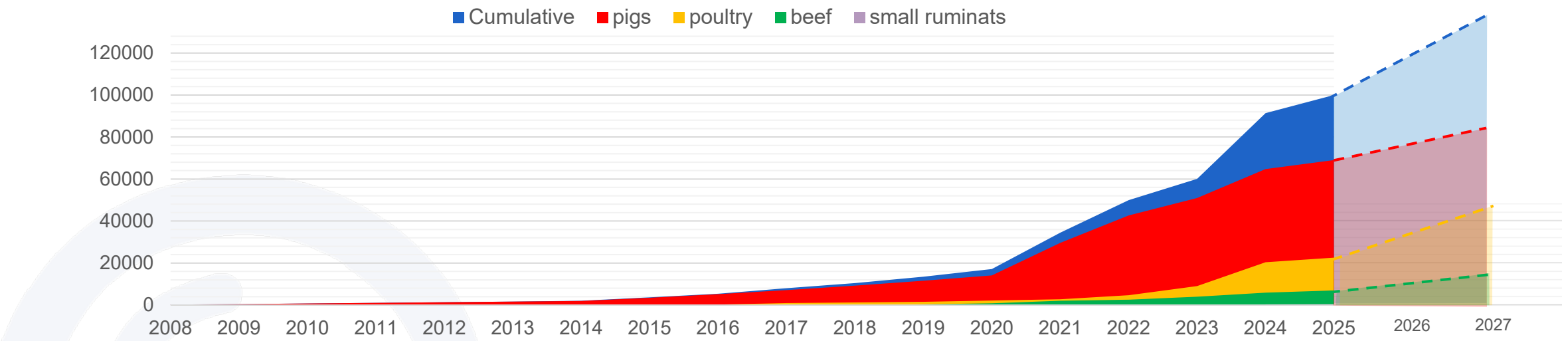

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Launch of Biocheck for broiler production

Launch of Biocheck for cattle production

Updated Biocheck.Ugent Website

Launch of Biocheck.Ugent as a company

Explosive growth: 60000+ entries!

100 000 entries

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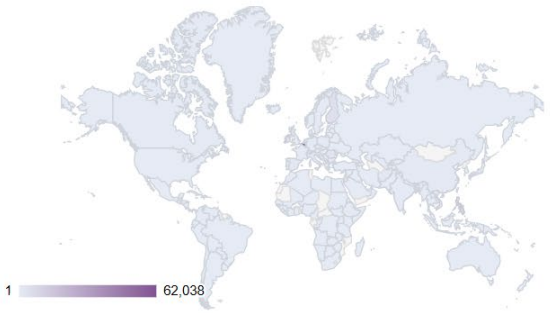
WORLD LARGEST DATABASE ON BIOSECURITY



Worldwide usage of Biocheck.Ugent

The Biocheck.Ugent has already been used 108024 times to improve biosecurity worldwide.

Join them today.

Worldwide statistics

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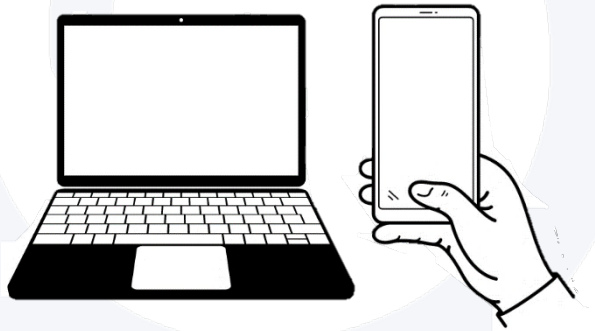
National implementation in

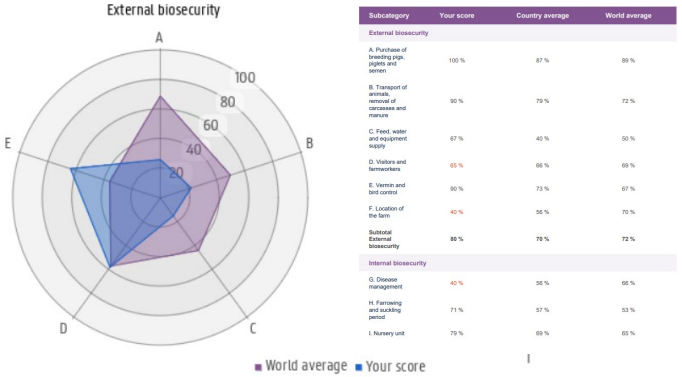
- Belgium (pig, poultry)
- Ireland (pig, poultry)
- Finland (cattle, pig)
- Italy (pig)
- Czech Republic (pig, poultry, cattle)
- Luxemburg (cattle, pig, poultry)
- UK (Pigs)
- Shotland (Pigs)
- …

BIOCHECK IS A DECISION SUPPORT SYSTEM

User input



Comparative scoring



Subcategory	Your score	Country average	World average
External biosecurity			
A. Purchase of breeding pigs, piglets and semen	100 %	87 %	89 %
B. Transport of animals, removal of carcasses and manure	90 %	79 %	72 %
C. Feed, water and equipment supply	67 %	40 %	50 %
D. Visitors and farmworkers	65 %	66 %	69 %
E. Vermin and bird control	90 %	73 %	67 %
F. Location of the farm	40 %	56 %	70 %
Subtotal External biosecurity	80 %	70 %	72 %
Internal biosecurity			
G. Disease management	40 %	56 %	66 %
H. Farrowing and suckling period	71 %	57 %	53 %
I. Nursery unit	79 %	69 %	65 %

Feedback & coaching

Personalized dashboards

Visualize progress

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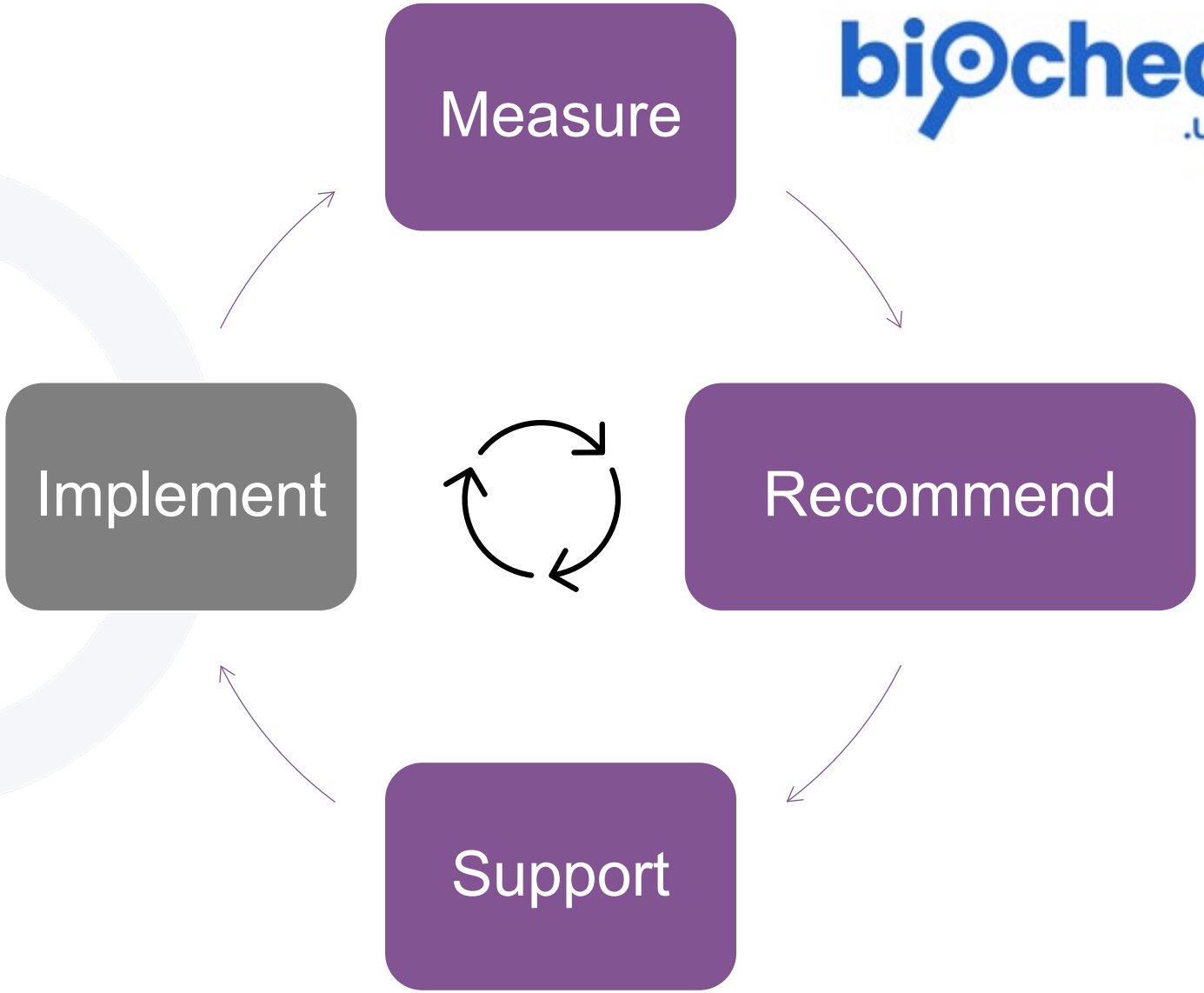
CYCLE OF IMPROVEMENT



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1. Have wild boars been spotted within a 10-kilometres radius (6.2 miles) of your farm?

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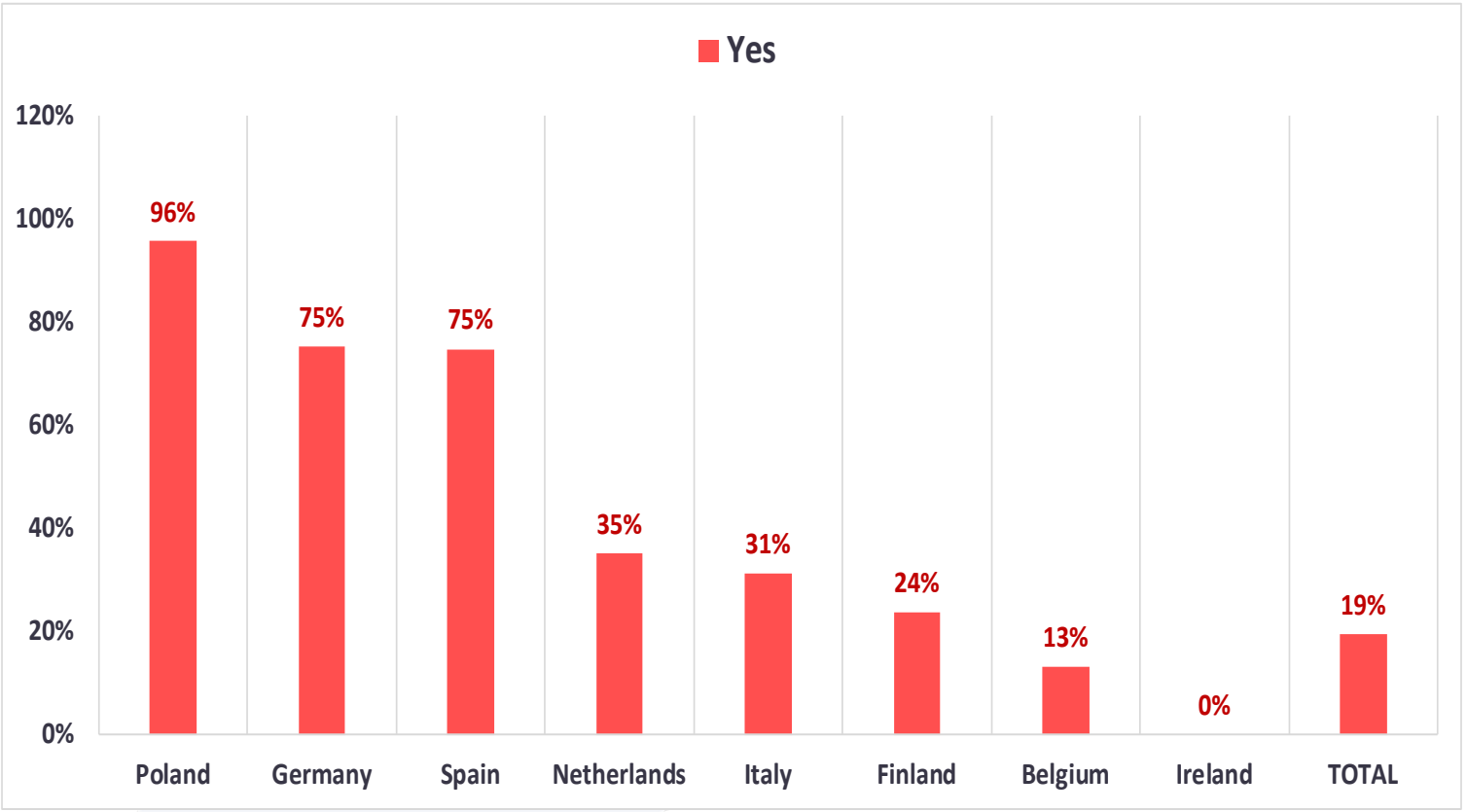
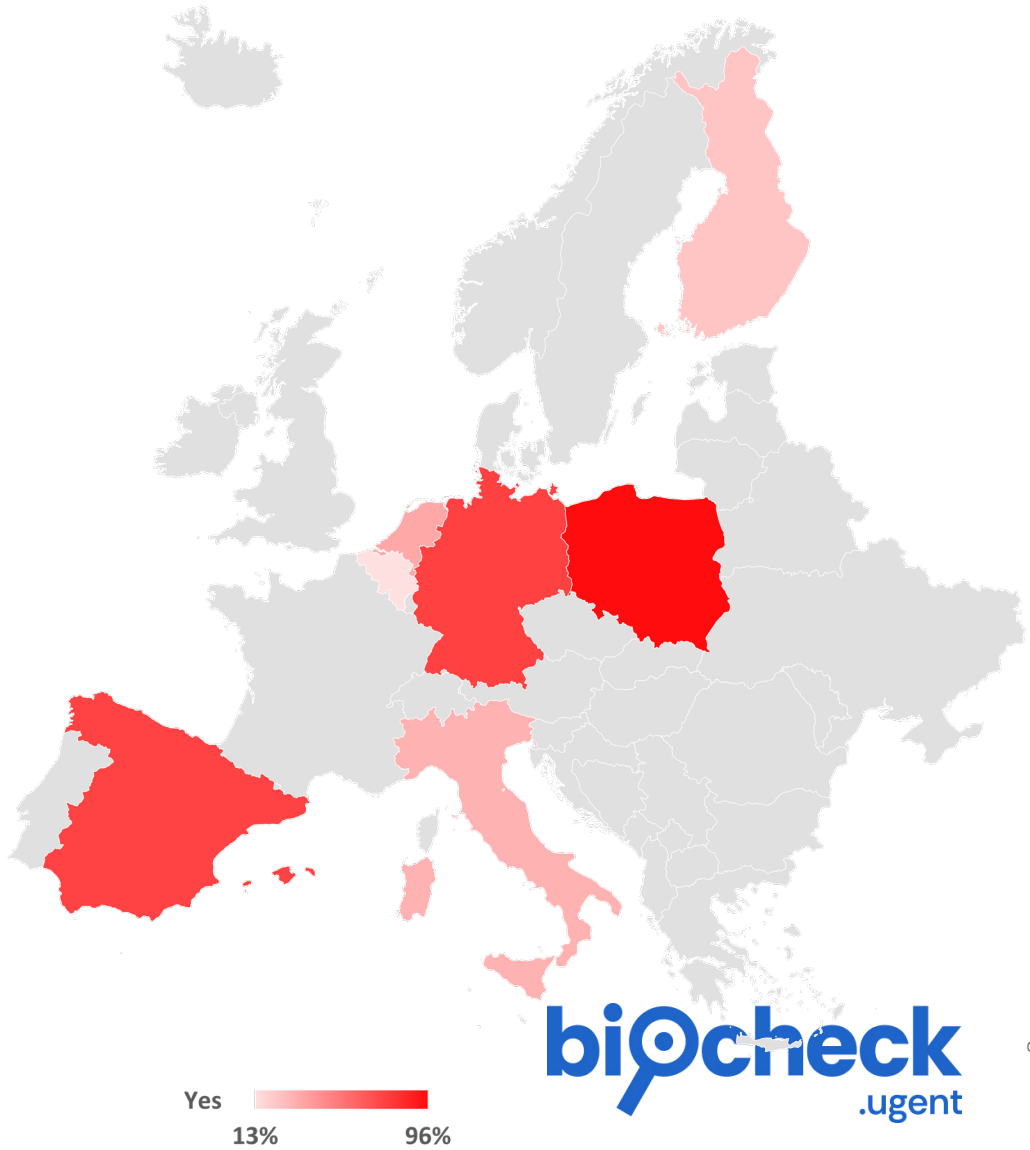
HAVE WILD BOARS BEEN SPOTTED WITHIN A 10-KILOMETRES RADIUS (6.2 MILES) OF YOUR FARM?





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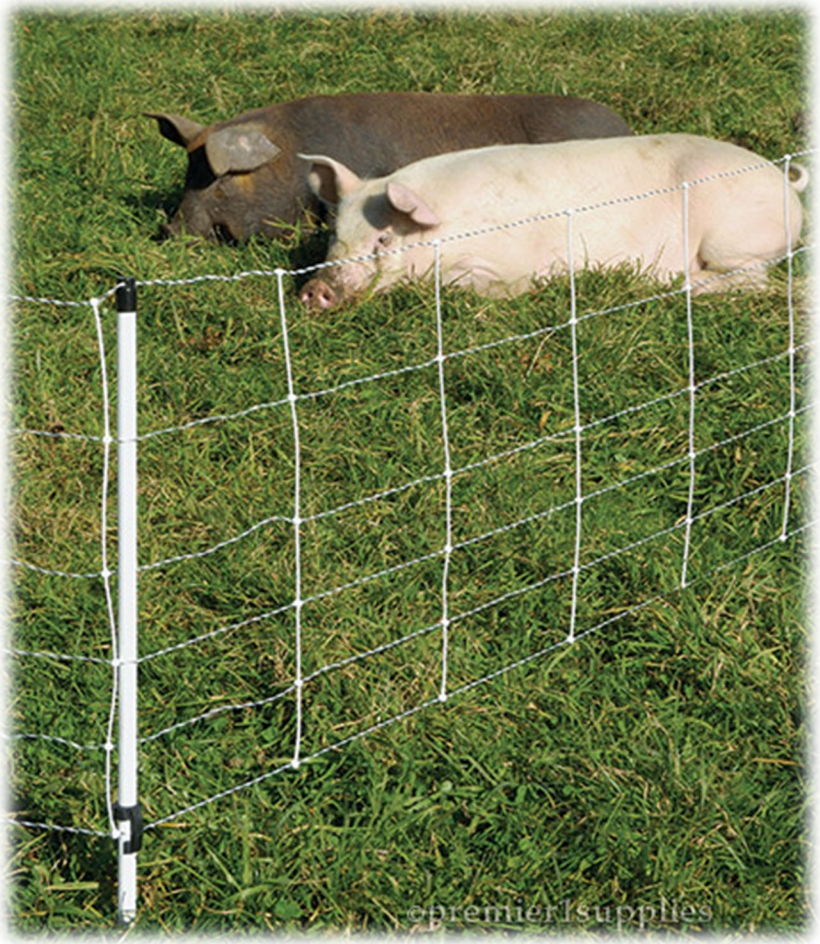
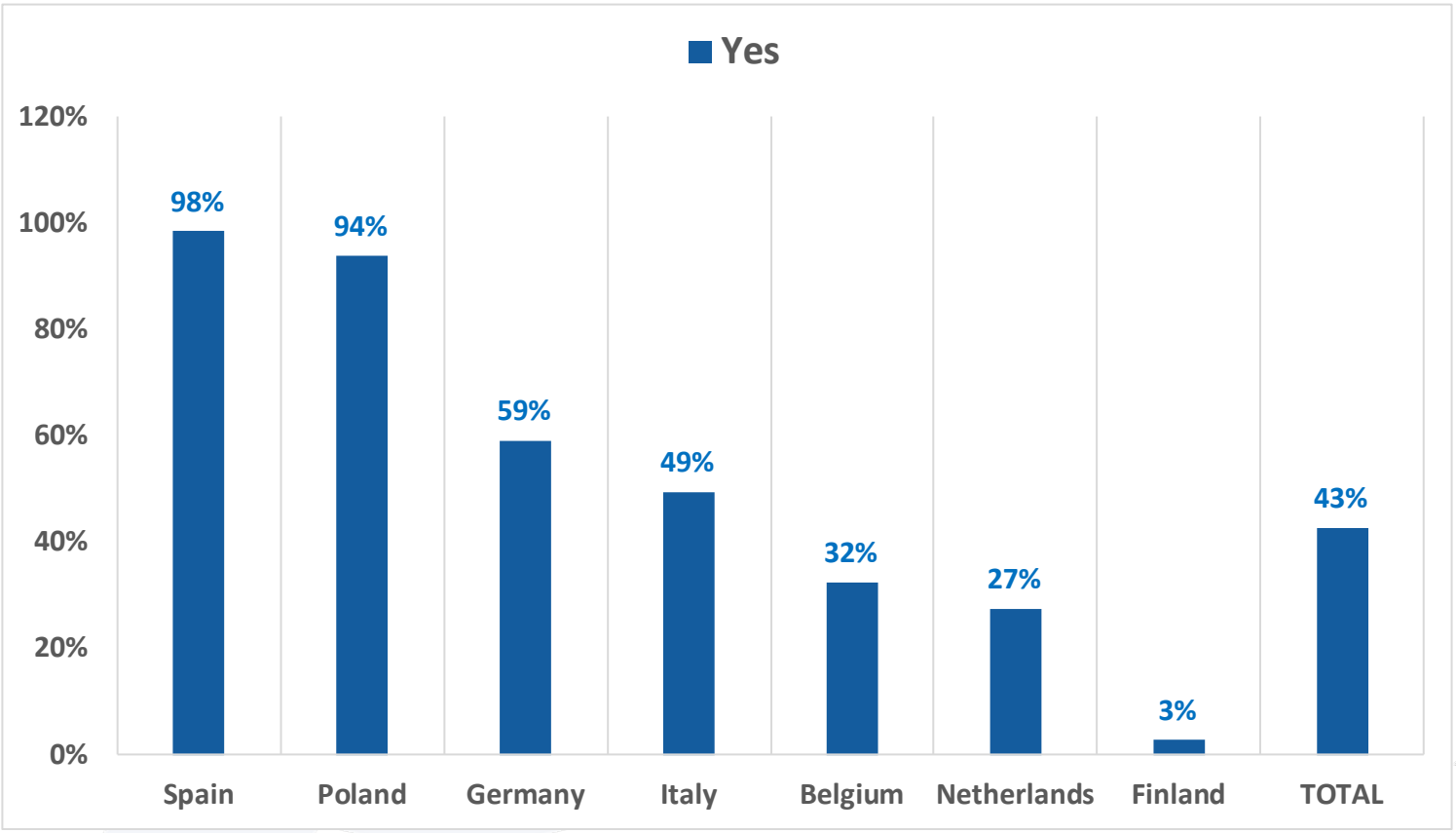
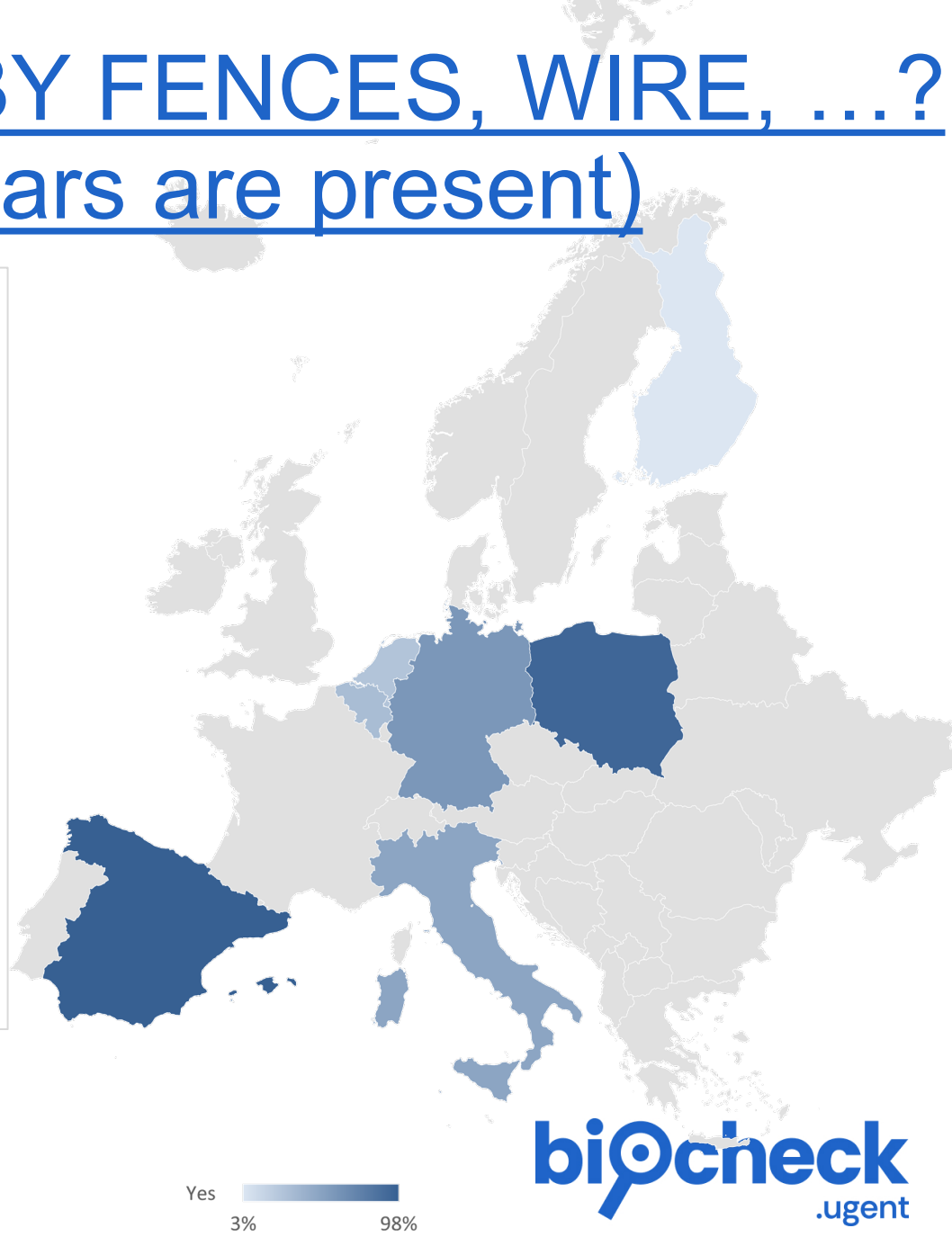
2. IS THE FARM ENCLOSED BY FENCES, WIRE, …?



2. IS THE FARM ENCLOSED BY FENCES, WIRE, …?
(only answered if wild boars are present)





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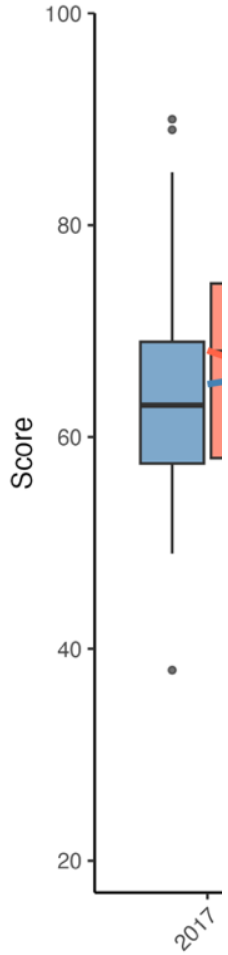
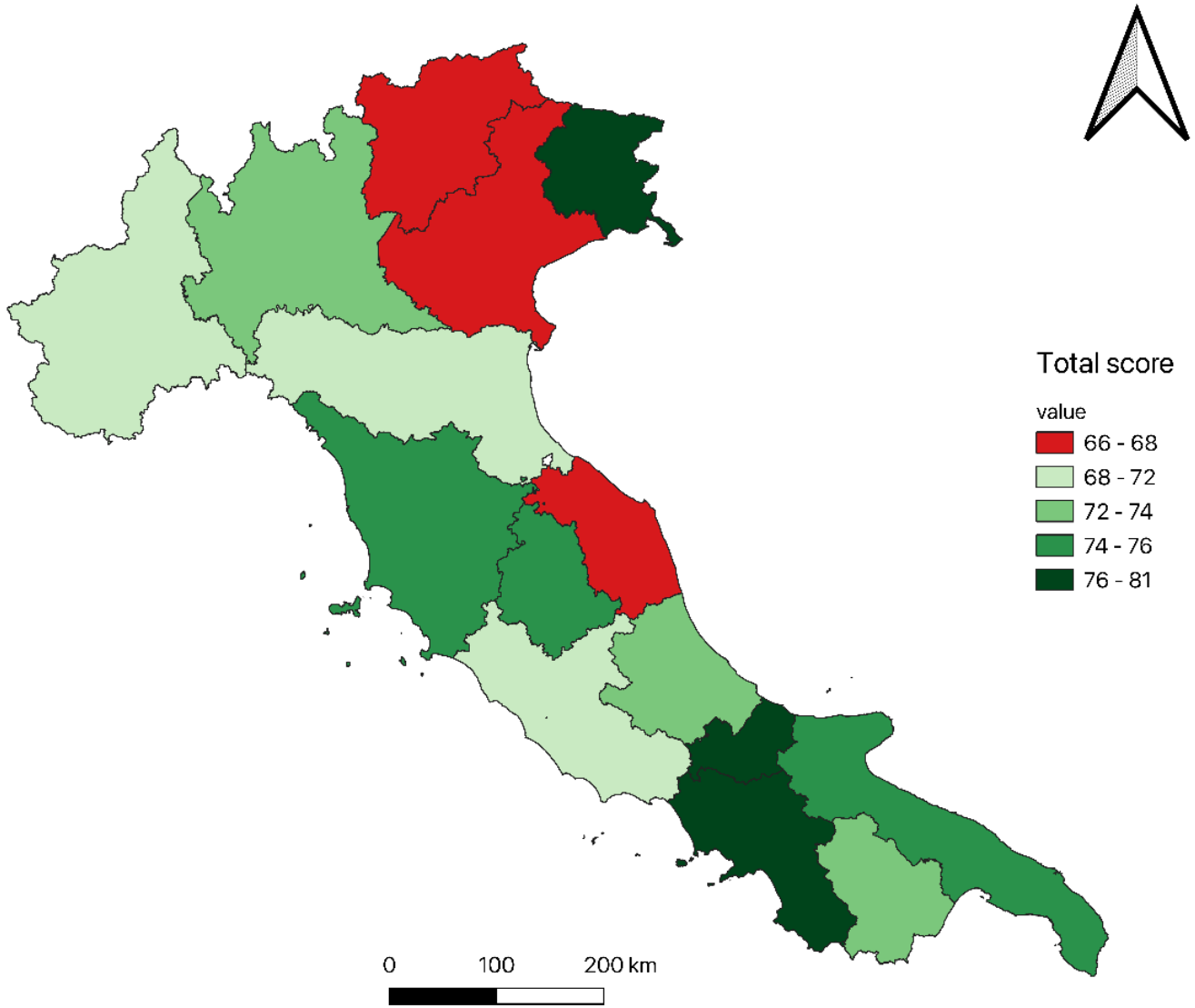
BIOCHECK.UGENT: ITALY (CLASSYFARM)





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INDIVIDUAL RECOMMENDATIONS FOR INDIVIDUAL FARMS

Every farm is unique and requires a tailored approach

Based on the survey input, Biocheck.UGent helps designing individual action plans for specific farms

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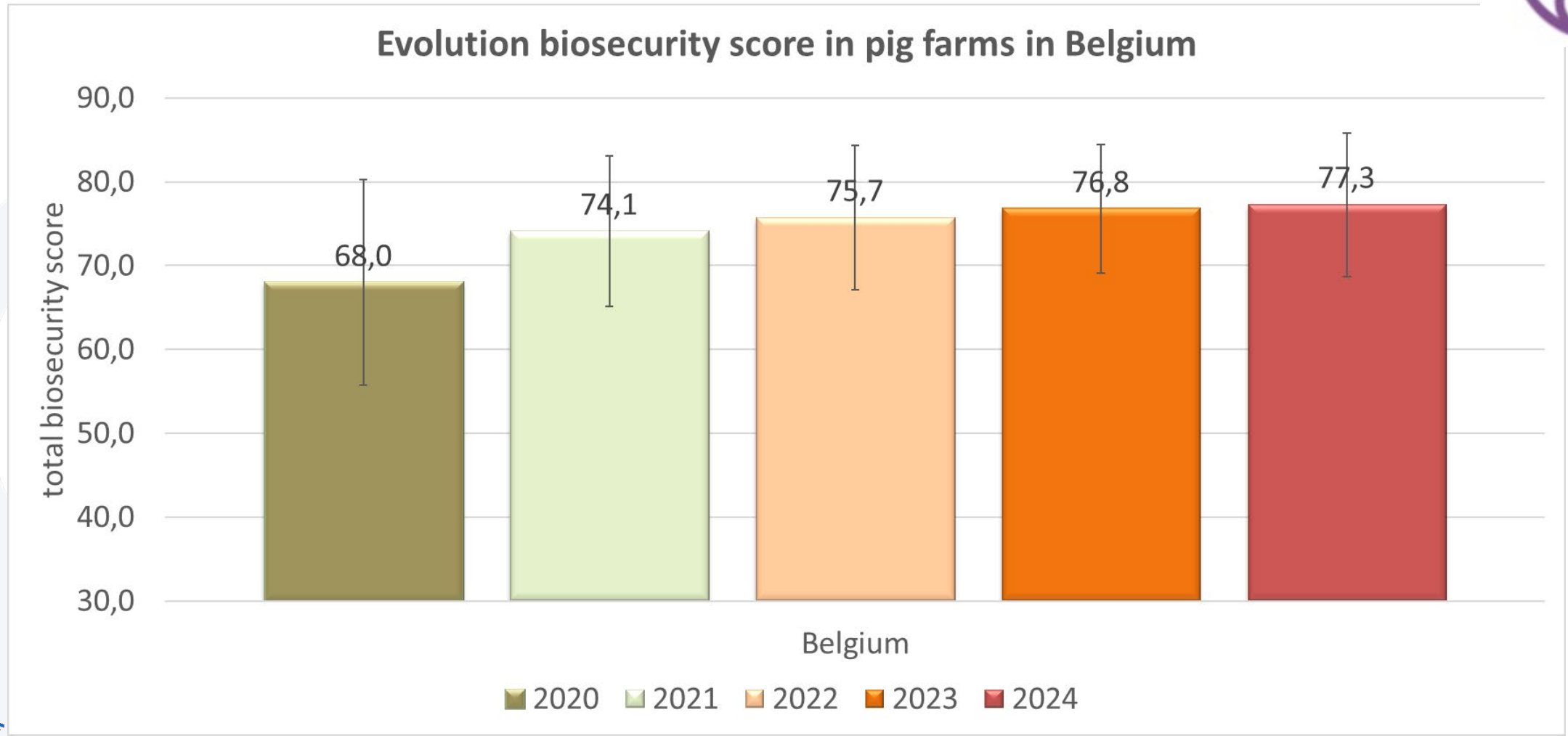
MEASURABLE INCREASE IN BIOSECURITY SCORE



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De app installeren

NIEUWE PODCASTAFLEVERING

#3 Exploring technical tools to ensure biosecurity

BIOSECURE Podcast

1 mrt · 29 min. 20 sec

Beschrijving van aflevering

In this episode, we had **Carlos Piñeiro** CEO of **Animal Data Analytics (ADA)** as our guest. Together, we explore the technical tools that play a crucial role in ensuring biosecurity

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