Real-time biosecurity control

First practical steps

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pigChamp® pro europa

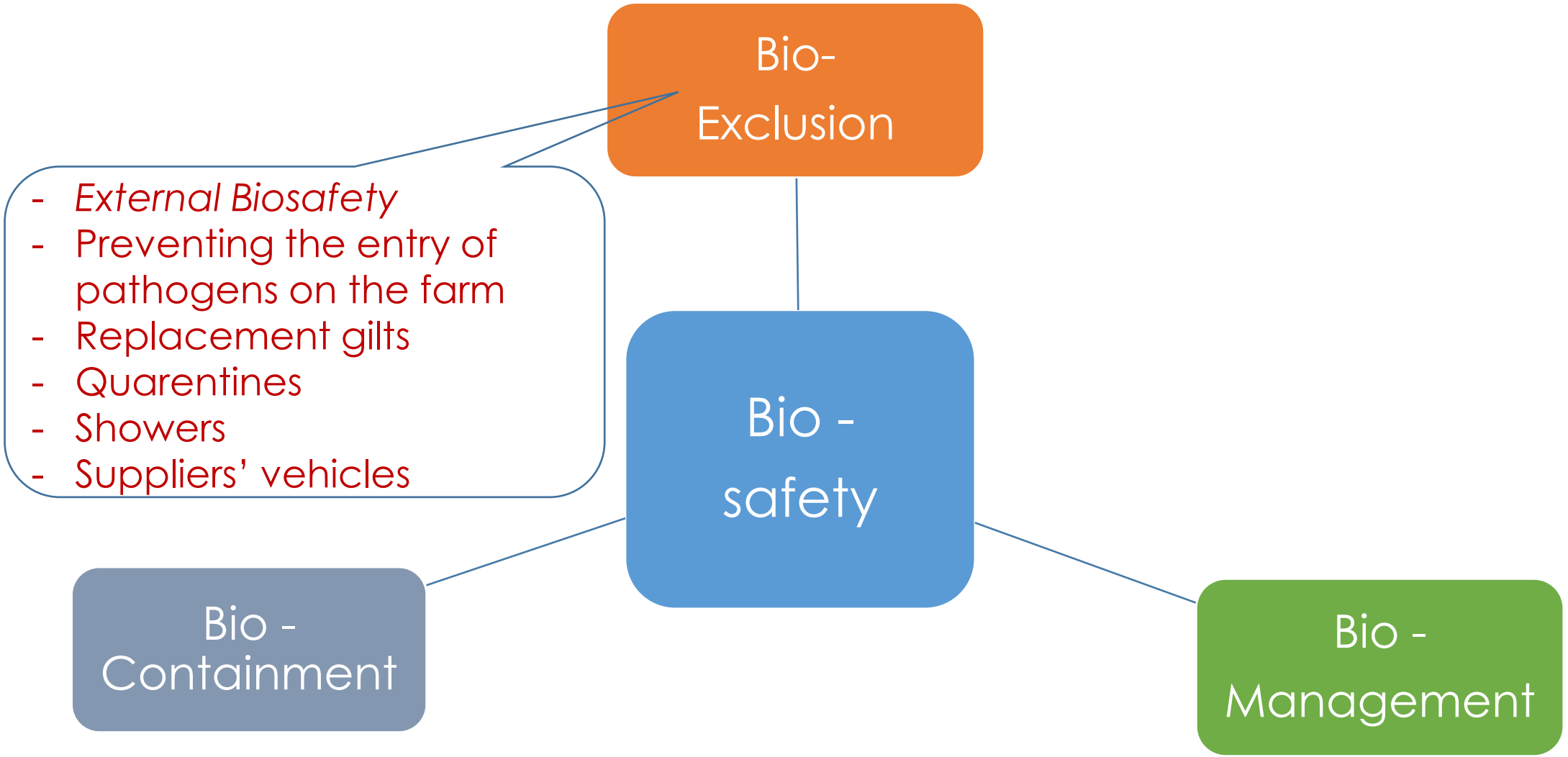
Content

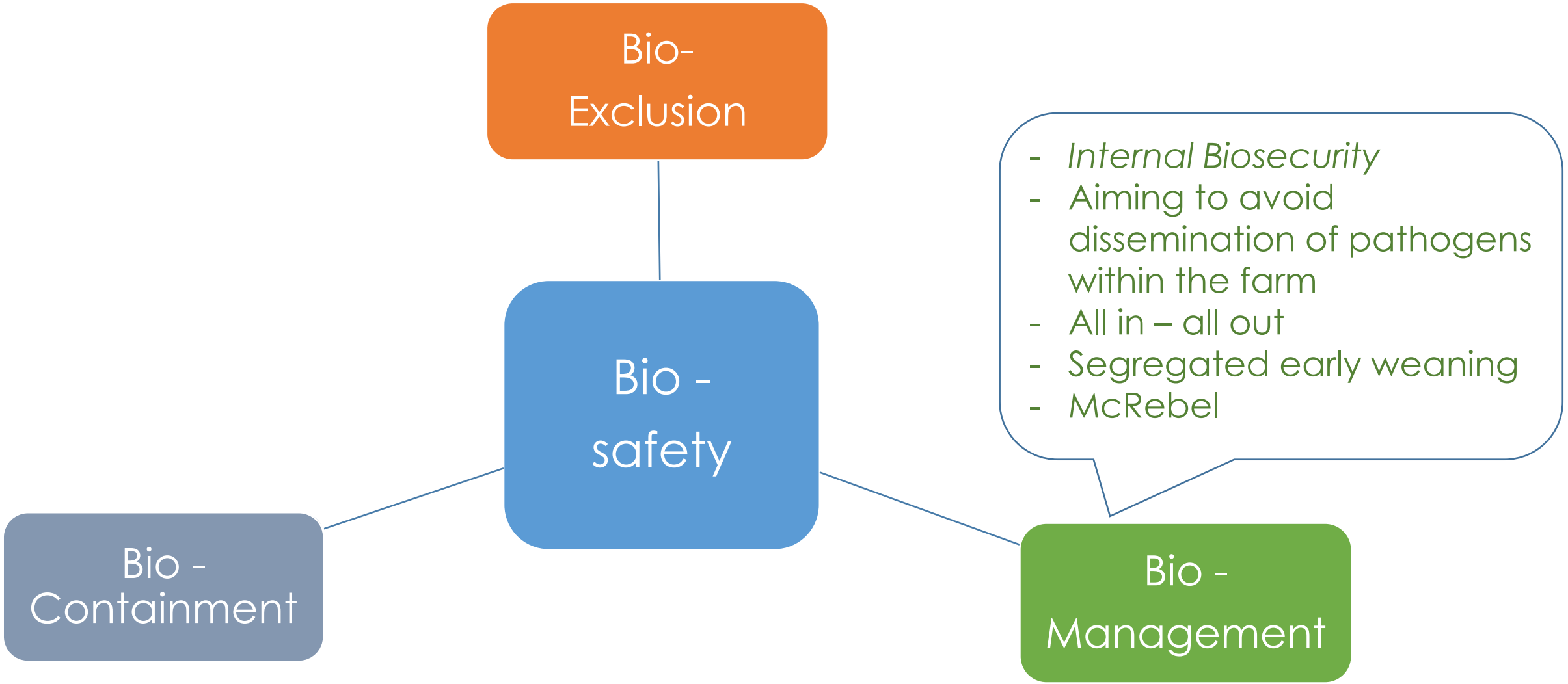
- 40 years of biosecurity evolution
- European Biosafety Survey Results - Prohealth Project
- New tools for external and internal biosafety control

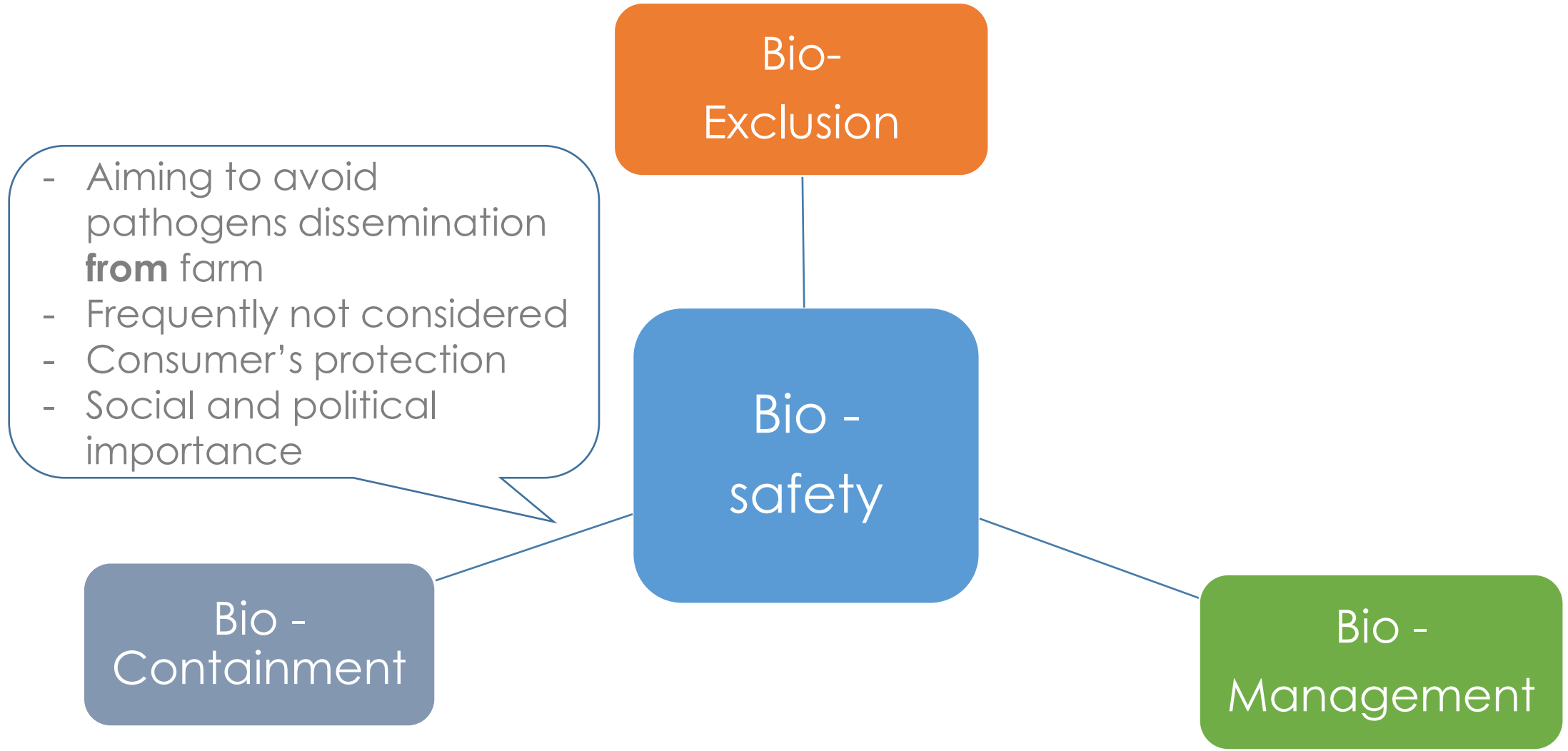
40 years of biosecurity evolution

Huge changes, especially in the last 20 years:

- All in - All out
- Quarantines
- Fencing
- Multi-sites
- MEW / SEW
- Vaccines
- Strategic Medications
- Regional control plans


Bio-
Exclusion
- *External Biosafety*
- Preventing the entry of pathogens on the farm
- Replacement gilts
- Quarentines
- Showers
- Suppliers' vehicles
Bio -
safety
Bio -
Containment
Bio -
Management


Bio-
Exclusion
Bio -
safety
Bio -
Containment
Bio -
Management
- *Internal Biosecurity*
- Aiming to avoid dissemination of pathogens within the farm
- All in – all out
- Segregated early weaning
- McRebel


Bio-
Exclusion
- Aiming to avoid pathogens dissemination **from** farm
- Frequently not considered
- Consumer's protection
- Social and political importance
Bio -
safety
Bio -
Containment
Bio -
Management

PROHEALTH Largest EU grant ever on Animal Health

New ways to ensure sustainability in current livestock production

EU Funded Research Project

2013 - 2018

€12 M Budget

22 European Partners

10 Academic

12 Industry

PROHEALTH

Project Coordinator:

Prof Ilias Kyriazakis,
Newcastle University, UK

Project Partners:

- Newcastle University, UK
- accelopment AG, CH
- Aviagen, UK
- Conseils et Competences en Productions Animales (CCPA Group), FR
- Coren S.C.G., ES
- European Forum of Farm Animal Breeders, NL
- Ghent University, BE
- Institut National de la Recherche Agronomique (INRA), FR
- JSR Genetics Ltd, UK
- MTT Agrifood Research Finland, FI
- Poultry Health Services Ltd, UK
- PigCHAMP Pro Europa SL, ES
- The Danish Agriculture & Food Council, The Pig Research Centre, DK
- The University of Nottingham, UK
- Tivix Europe Sp Zoo, PL
- University of Copenhagen, DK
- University of Reading, UK
- Vedanko Bvba, BE
- Veterinary Research Institute, CZ
- Vitatrace Nutrition Ltd, CY
- Warsaw University of Life Sciences (WULS-SGGW), PL
- Zoetis International Services Sas, FR

WP-1. Evaluation of management and biosecurity in pig farms

This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 613574.

Prof. Dominiek Maes
Marlijn Klinkenberg, Tommy Van Limbergen

Unit Porcine Health Management
Faculty of Veterinary Medicine
Ghent University

UNIVERSITEIT GENT

FACULTEIT DIERGENEESKUNDE
approved by EAEVE

Evolution of production parameters

	1980	2010	2025
Pigs per sow per year	15	25	35?
Litters per sow per year	2,0	2,4	2,4?
Weaning age (d)	30	21-28	21-24?
DWG fattening pigs (g/dag)	550	750	850?
FCR fattening pigs	3,2	2,8	2,4?
% of pigs with pneumonia *	20-25	20-25	?
% of pigs with pleuritis *	15-20	15-20	?

Improvements in pig production during last decades :

- Reproduction sows +++
- Fattening pigs production ++
- Health + or ≅

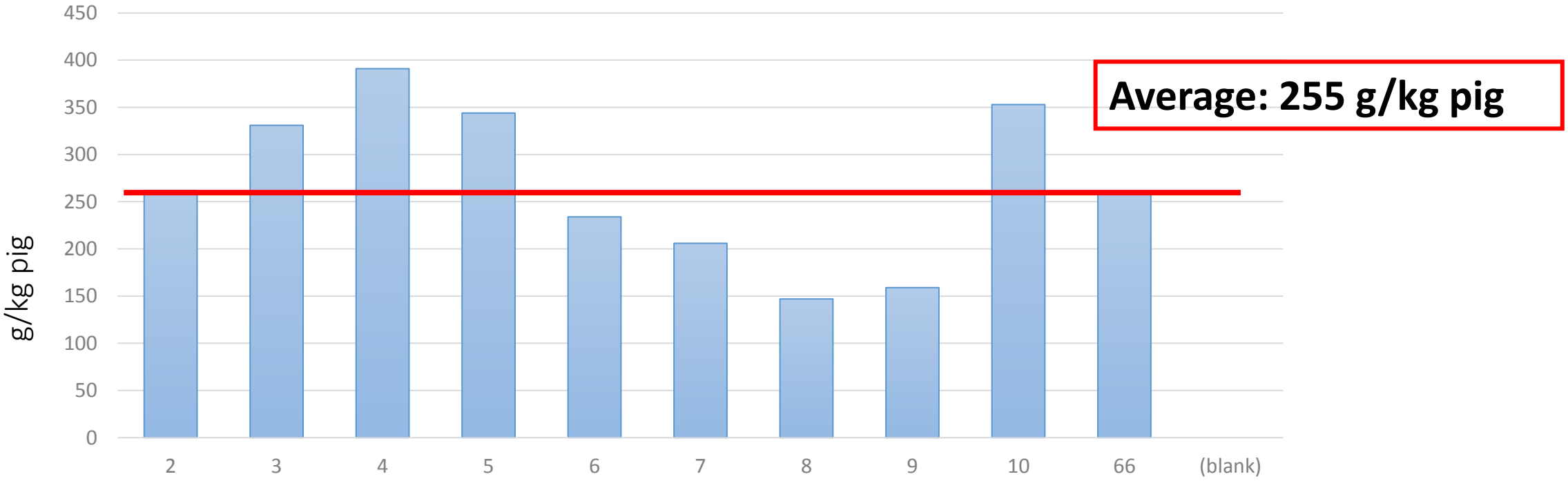
* Meyns et al., Vet J 2011

Some reasons for high antimicrobial use

- Large litters: lower birth weight, less colostrum per pig
- Early weaning (21d on average)
- Overstocking!
- Poor management, nutrition, housing
- Farmer habit: used as an ‘insurance’
- Large herd size
- No antimicrobial growth promotors

Colostrum production average in different herds

Declerck et al, 2015



28% of the piglets consume less than 170 g colostrum per kg

(Devillers et al. 2004)

PROHEALTH Project: work package 1

This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 613574.

Task 1.1 To assess current situation on health, welfare and performance in pigs across Europe

Task 1.2 To score biosecurity and management practices potentially related to poor health, welfare and performance in pig farms

Task 1.3 To quantify risk and protective factors in pigs regarding poor health, welfare and performance in a standardized way in diverse EU systems in 9 EU countries

Score system development Prohealth

This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 613574.

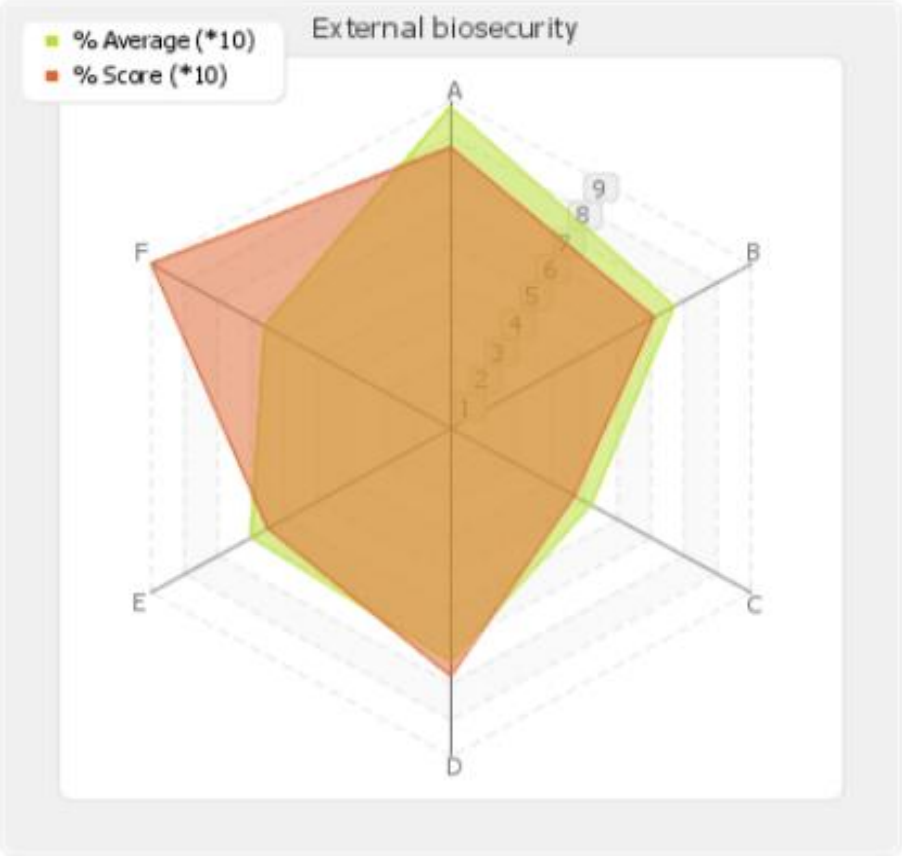
- Scoring tool to highlight strengths and weaknesses in on-farm internal and external biosecurity
- Based on **Biocheck.ugent®** with minor adjustments
- Goal: to score biosecurity practices in an objective and standardized way across Europe*

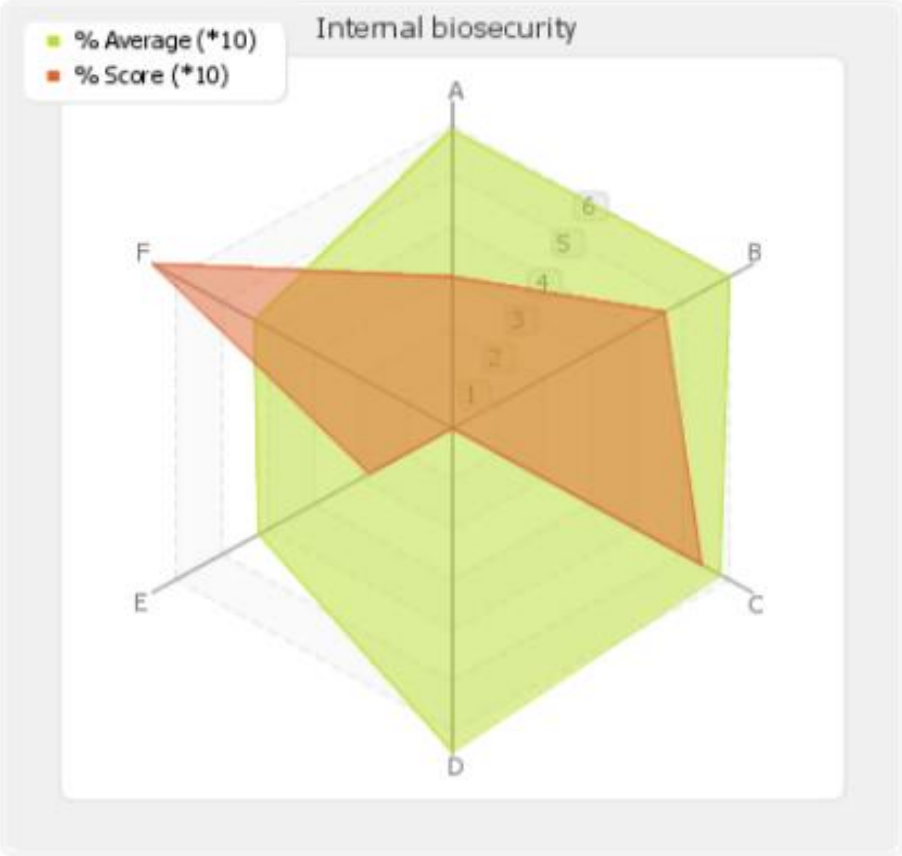
*Many studies have been conducted in a small number of farms, and biosecurity has been assessed in different, sometimes qualitative ways

External and internal biosecurity

- 2-11 questions per subcategory
- Weighted scores: weight factor for each subcategory and each question → based on scientific research and expert opinion
- Maximal score is 100 (**perfect biosecurity**), minimal score is 0 (**total absence of biosecurity**)

Visual report after biosecurity scoring tool





Naming of the axes is linked to the numbering on the first page

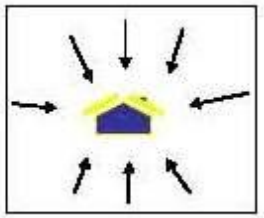
http://www.rohh.ugent.be/limesurvey/index.php/531429/lang-en

Results of external biosecurity in pig farms

PROHEALTH Project, 2016

This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 613574.

	Mean	Min	Max
External Biosecurity	**78,0**	**67,5**	**96,0**
Purchase of animals and semen	94,2	74,9	99,8
Transport of animals, removal of manure and dead animals	70,1	45,8	91,5
Feed, water and equipment supply	68,3	28,6	100
Personnel and visitors	88,7	64,7	100
Vermin and bird control	75,0	18,2	100
Environment and region	76,0	0	100

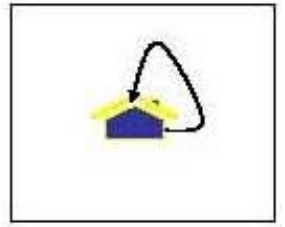


Results of internal biosecurity in pig farms

PROHEALTH Project, 2016

This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 613574.

	Media	Min	Max
Internal Biosecurity	**60,1**	**37,5**	**91,6**
Disease management	79,3	55,0	100
Farrowing and suckling unit management	55,3	10,7	85,7
Nursery unit management	56,8	21,4	89,3
Fattening unit management	50,7	0	100
Measures between areas and about the use of equipment	47,8	25,0	100
Cleaning and disinfection	69,8	7,5	100



Management and biosecurity, *some comments*

Do the basic things properly and consistently → <u>every day challenge, also during weekend, holidays …</u>* *The human factor*

Biosecurity scoring of herds provides a general idea and is good for sensitizing and evaluate. *The benchmarking attraction*

Farmers and advisors mostly know the correct solution, but do not always practice it. The human (nature) factor

Biosecurity relationship with the incidence of antibiotic treatments* Laanen et al., 2011

	R^2	Coefficient (β)	p-value
Overall biosecurity	0,037	-2,45	0,06
External biosecurity	0,015	-1,97	0,24
Internal biosecurity	0,040	-1,77	0,05

→ neg. associations with antimicrobial use, very low R^2

* Overall treatment, no further classification according to disease

Internal biosecurity can be better on many pig herds!

Teeth clipping

Drugs

Sink and hands' hygiene

Dead animal containers

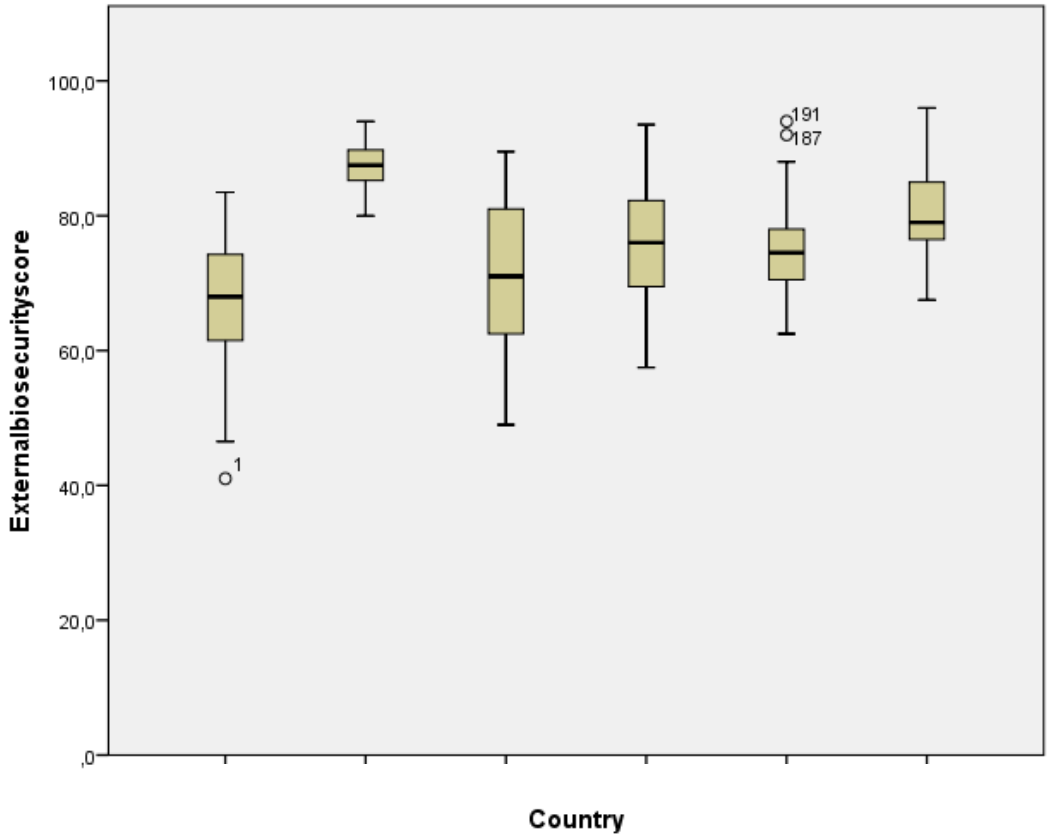
Foot bath

Plank to move pigs

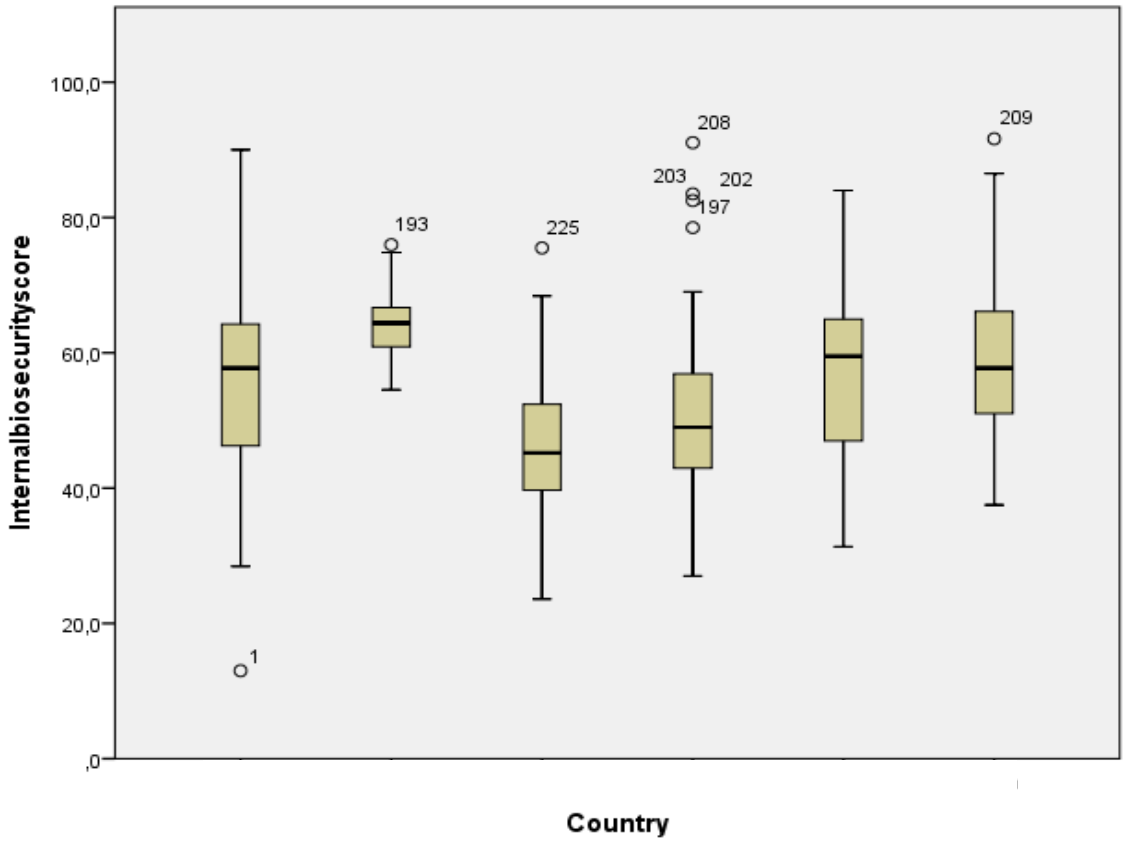
Biosecurity in sows' farms

This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 613574.

External biosecurity score: 76,3%



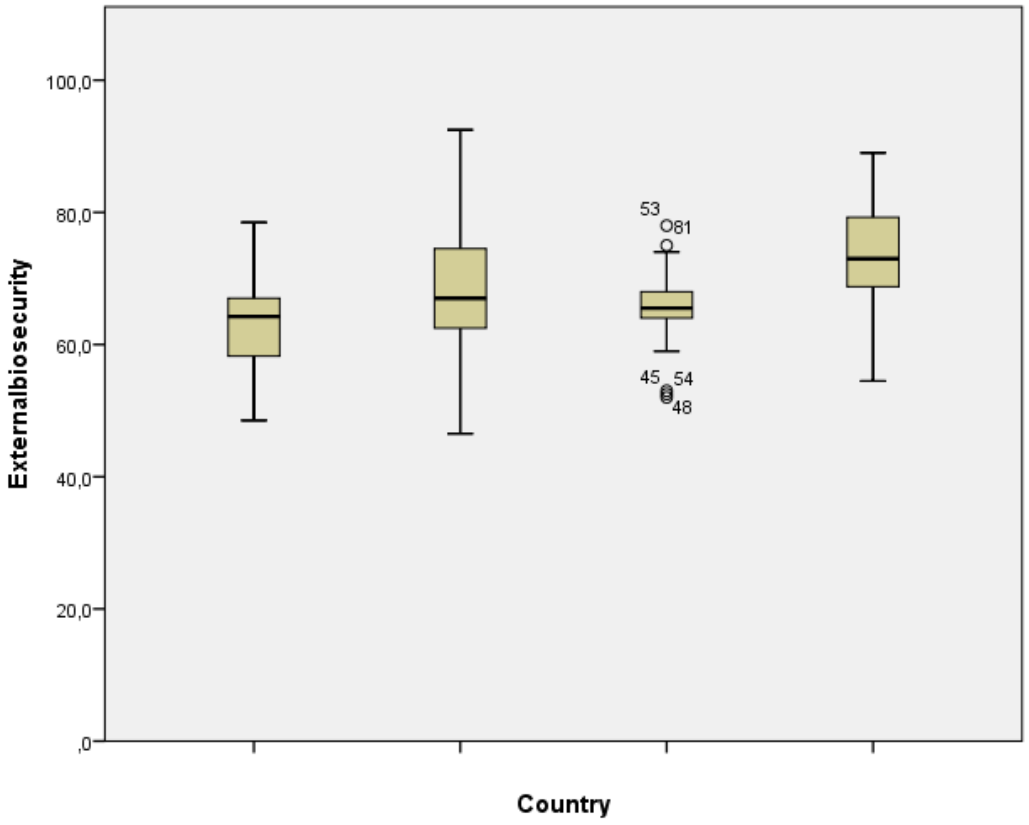
Internal biosecurity score: 56.9%



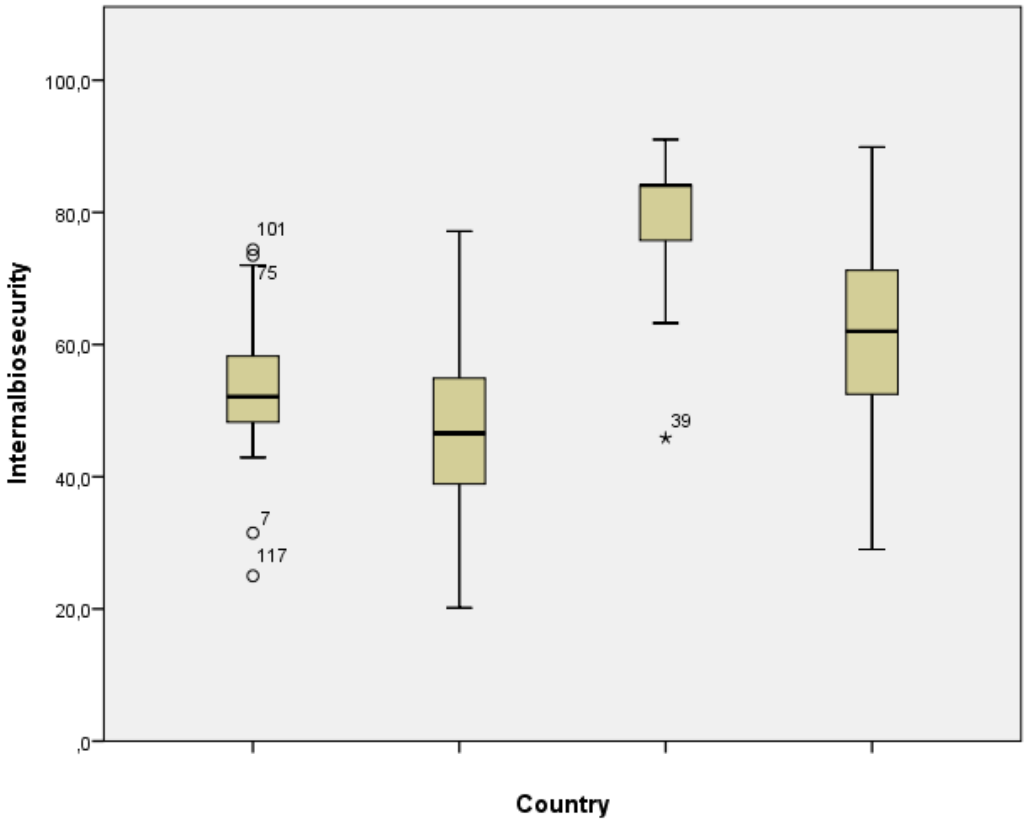
Biosecurity in fattening farms

This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 613574.

External biosecurity score: 67,4%



Internal biosecurity score: 59,2%



Conclusions related to external biosecurity

Good: Purchase of animals and semen

- 97% of sows' farms purchase semen
- 89% of AI-center have high health status
- 67% of sows' farms purchase breeding gilts
  - 90% from same supplier
  - 79% uses quarantine compartment
  - 61% practice quarantine period >40 days

Critical: Feed, water and equipment supply

- Only 16% of farms has specific route for materials to enter the farm
- Only 24% of farms takes action on new material (cleaning, disinfection, quarantaine)

Conclusions related to internal biosecurity

Good: Disease management

- 98% of farms use prelisted vaccination schemes and protocols for strategic treatments
- 92% regularly evaluate the health status of the farm

Critical: Farrowing period

Cross-fostering → 98% of sow farms

- 30% → possibility of moving the piglet more than once.
- 65% → cross fostering > 4 days after farrowing

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Conclusions

Large differences between countries and also between farms in the same country

	External biosecurity	Internal biosecurity	Total biosecurity
Sows' farms	76,3	56,9	66,6
Fattening pig farms	67,4	59,2	63,3
Best scored category:	Purchase of animals and semen	Disease management	
Worst scored category:	Feed, water and equipment supply	Farrowing period management	

Next steps: 1) Statistical analysis of biosecurity / management data
2) Associations between biosecurity/ management and health / production parameters

This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 613574.

We are generating data where there were no data and, therefore, we can now answer questions that before could not be answered

Farms with **PCR +** in nursery units are 7 times more likely to have outbreaks

Tabl.2:PRRSv prev. nursery and reproductive disorders

	farms with PRRSv+ nursery	farms with PRRSv- nursery
farms with repro probl.	12 (80%)	3 (20%)
farms with no repo. probl.	35 (36%)	64 (64%)

Odds ratio:7.3 (95%CI: 1.9-27.7) P=0.0034

Development of PRRSv prevalence and ORF-5 homology in The Netherlands and its possible influence on reproductive disorders in sows.

V. Geurts [1*], A. Cruijsen [1], M Geurts[1] :1. MSD-AH Nederland

Which is the probability of infection between infected-free groups due to incorrect movements?

For example, if the probability is only 0.1%

$$P = 1-(1-p)^n$$

met p = de kans op infectietransmissie per keer

n = het aantal keer

If we make a wrong movement once a day for one year:

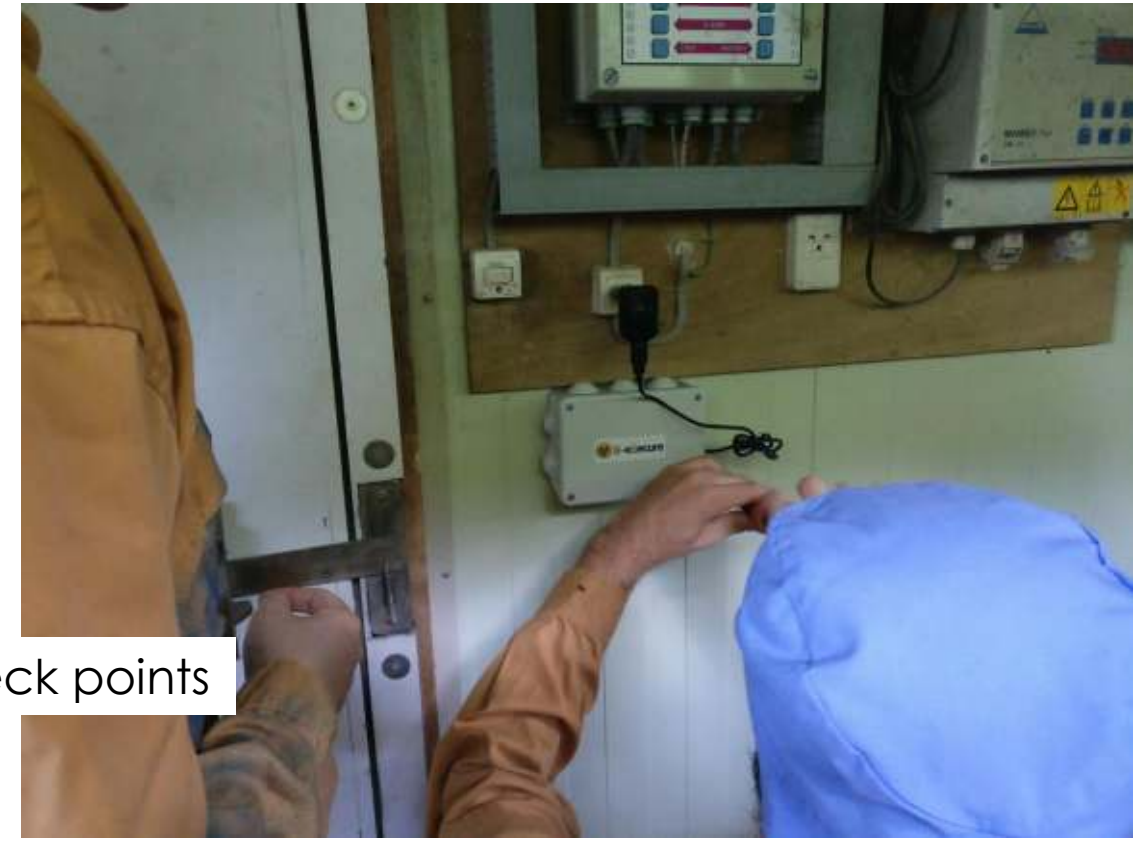
31%

If we make a wrong movemen twice a day in a year:

52%


Is there any way to control farm staff movements in a farm?
NATIONAL GEOGRAPHIC
Photograph by Jim Richardson

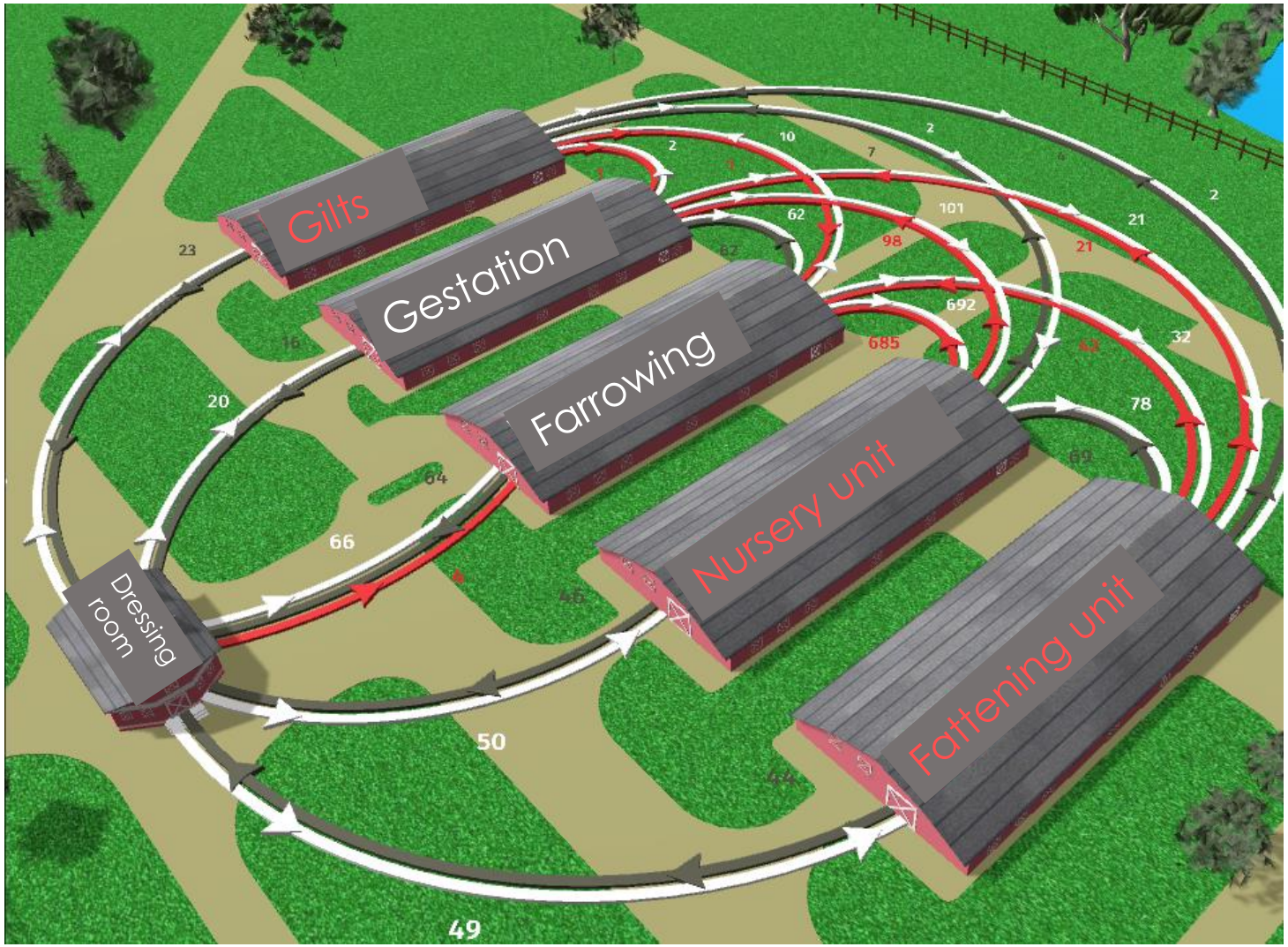
On-farm movement control system



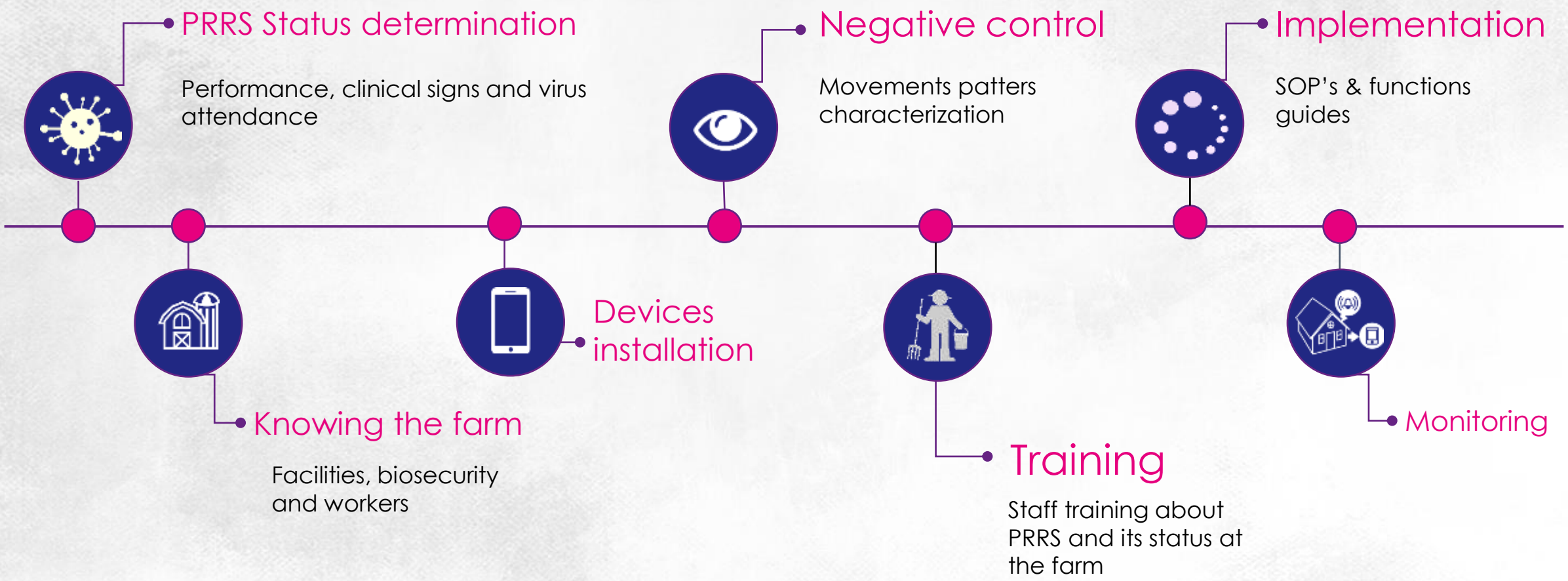
Check points

Operator identification

Relationship between movements and PRRS status within different areas in a farm



- Right movements
- Wrong movements
- Involvement of the farmer in the Project
  - (experience of more than two years)


PRRS Status determination
Performance, clinical signs and virus attendance
Knowing the farm
Facilities, biosecurity and workers
Devices installation
Negative control
Movements patters characterization
Training
Staff training about PRRS and its status at the farm
Implementation
SOP's & functions guides
Monitoring

Starting point. Farm 1, very unstable

Farm	Origin	Destination	Wrong movements (%)	Farm Avg. (%)
Farm 1	Gilts	Gestation	25	45
		Lactation	50	
		Nursery	22	
		Finishing	8	
	Nursery	Gestation	49	
		Lactation	50	
	Finishing	Gestation	50	
		Lactation	57	
		Nursery	47	
		Gilts	91	

- Most unstable farm
- Almost all destinations shows a high percentage of WM
- It is remarkable the high % of WM from finishing to everywhere and gilts in particular

Starting point. Farm 4, very stable

Farm	Origin	Destination	Wrong movements (%)	Farm Avg. (%)
Farm 1	Gilts	Gestation	0	13
		Lactation	0	
		Nursery	30	
		Finishing	0	
	Nursery	Gestation	46	
		Lactation	50	
	Finishing	Gestation	0	
		Lactation	0	
		Nursery	0	
		Gilts	0	

- Remarkably 70 % of destinations with ‘0’ WM
- 2 out of 3 wrong destinations, are low risk and difficult to avoid (same barn)

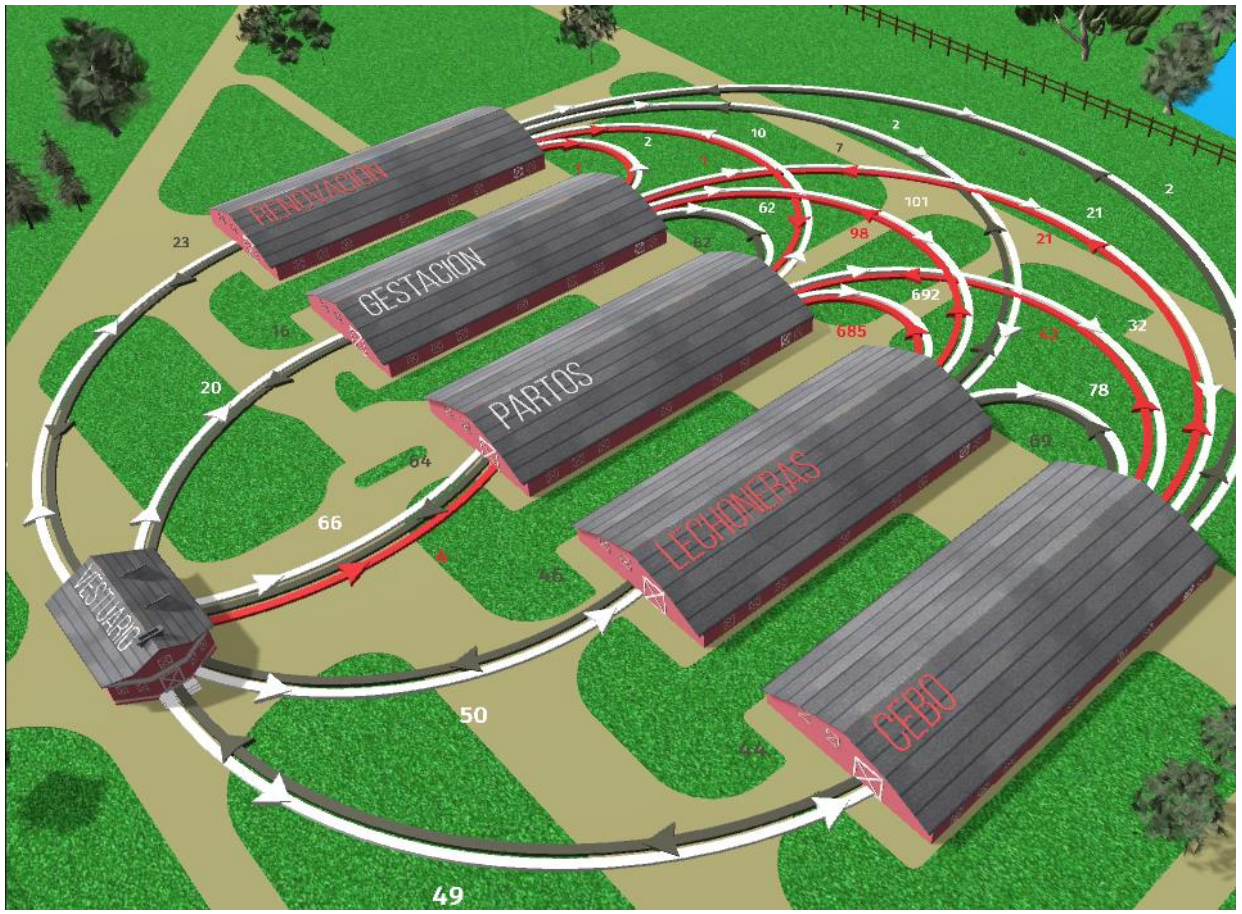
3. Devices installation

Control points

Worker identification

4. Negative control

Regular movements patters characterization



- Right/Wrong movements
- Without training
- One month

Experience shows that one of the most important ways to control long-term PRRS in farms is

Involving the farmer in the Project


¿Qué pasa con el principal factor en las granjas?
¿El factor humano?

Staff reaction & attitude

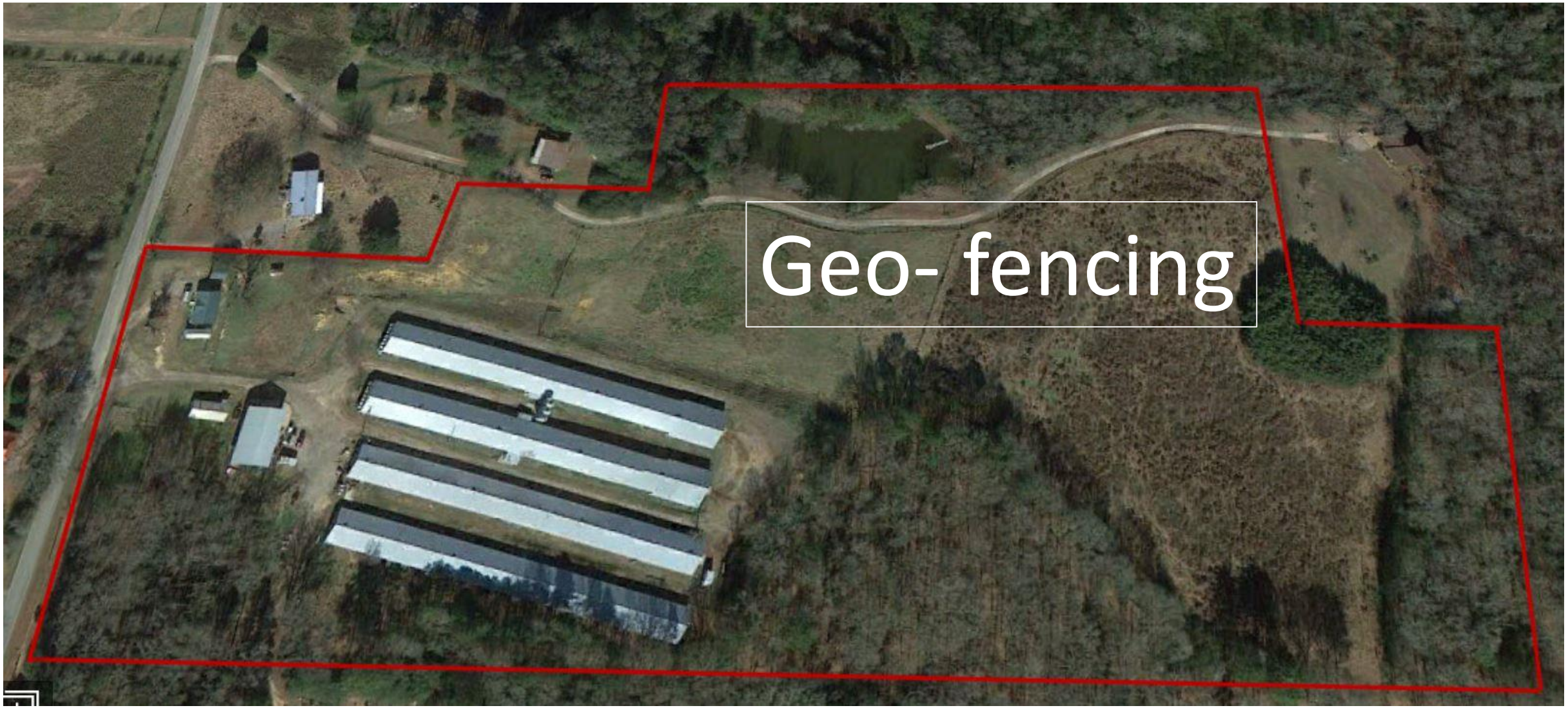
VERY POSITIVE!

New lockers, clothes, showers
New boots changing areas
Biosecurity responsible
Increased feeling of ‘group & team work’
Better work organization
Better knowledge of the disease

Conclusions (preliminary)

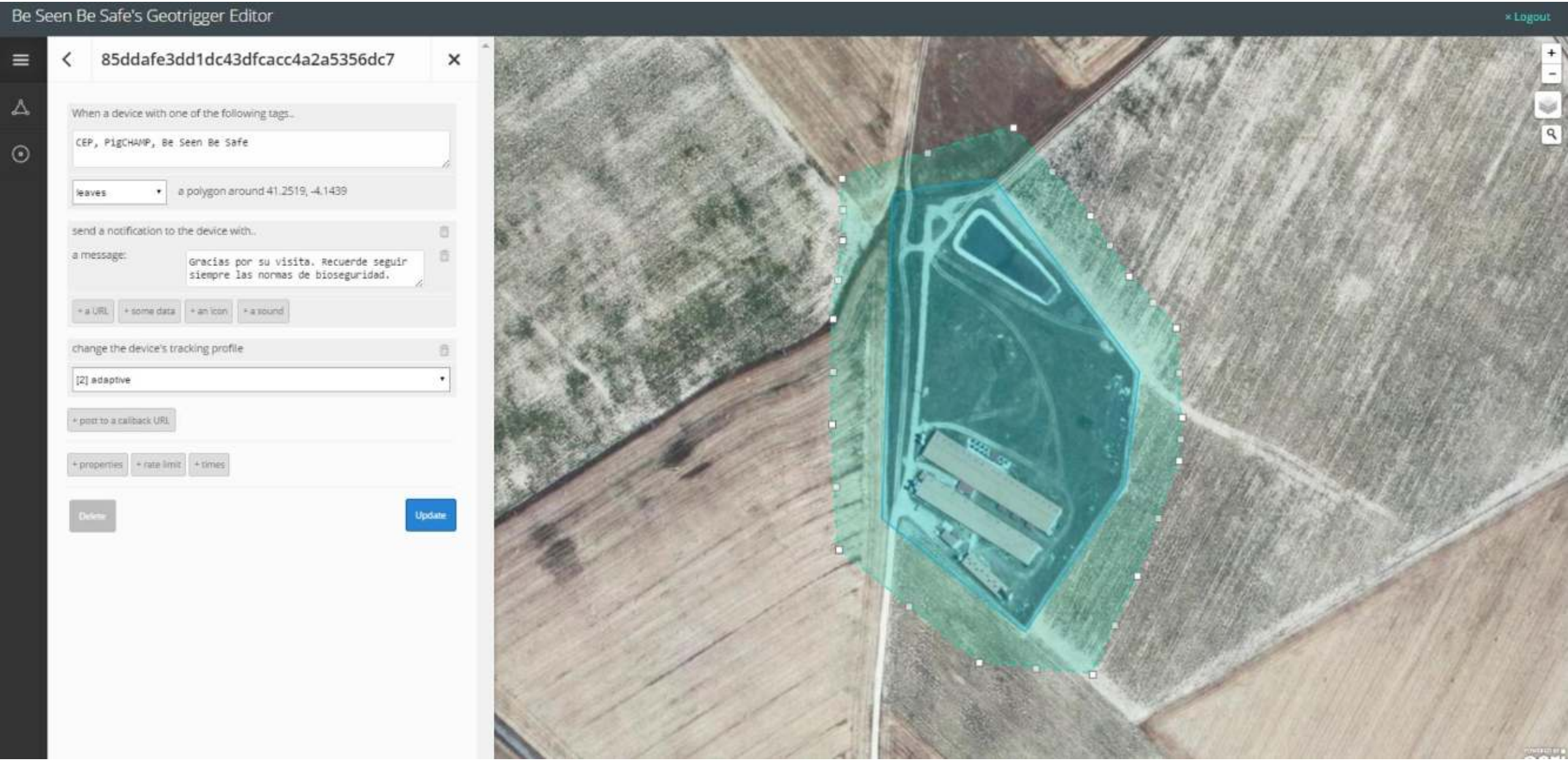
- Seems to exist a correlation between the movements quality and the stability of the disease
- Wrong risky movements are clearly improved
- First health indicators are positive (PCR)
- Improved knowledge of the disease and engagement of farm staff

Could we control external biosecurity in real time?



Lares – Agri System

- Operates via visitors' mobiles (persons and vehicles)
- They are detected when crossing the virtual fence of the property
- **Real-time alert to farm manager**
- It is an **electronic guestbook** that using an algorithm is capable of relating different farms
- It only works inside private property, NOT outside


Be Seen Be Safe's Geotrigger Editor
× Logout
85ddafe3dd1dc43dfcacc4a2a5356dc7
When a device with one of the following tags..
CEP, PigCHAMP, Be Seen Be Safe
leaves
a polygon around 41.2519, -4.1439
send a notification to the device with..
a message:
Gracias por su visita. Recuerde seguir siempre las normas de bioseguridad.
+ a URL
+ some data
+ an icon
+ a sound
change the device's tracking profile
[2] adaptive
+ post to a callback URL
+ properties
+ rate limit
+ times
Delete
Update

Vista General
Directorio de propiedades
Crear libro de visitas
Envío de mensajes
Simular el brote
Directorio de usuarios
Configuración de la cuenta

Crear Simulación de Brote

Submit

INFECTION DATE: 18/03/2017

STEP 2

Please select the incubation period of the disease reported.

INCUBATION PERIOD: 5

STEP 3

Please select the property on which the disease was reported.

Search Table

Nombre de la granja(s)	Propietario(s)	Última Actividad ?
Gilsampa		Feb 17, 2017
Avícola Subirats		-
CEP		**Mar 17, 2017**
Porcináguila - pollos		-

Reports

Activity Log 1 | Outbreak Report 1 | Outbreak Report 2 | Outbreak Report 3 | Outbreak Report 4 | Outbreak Report 5 | Outbreak

- Infected farm CEP has created these pathogen fomites Ricardo Pérez, Paloma Roncal, Elena Vizcaíno, Antonio Pelaez, Unregistered Device kp9qZbxtYKv3KvSU, cep cep
- These equipment persons are now designated pathogen fomites Ricardo Pérez, Paloma Roncal, Elena Vizcaíno, Antonio Pelaez, Unregistered Device kp9qZbxtYKv3KvSU, cep cep
- Pathogen fomite Ricardo Pérez has come into contact with these farms CEP, Porcináguila-Cerdos, Jubeansa, Terreros, Test4
- Pathogen fomite Paloma Roncal has come into contact with these farms CEP
- Pathogen fomite Elena Vizcaíno has come into contact with these farms CEP, Test4
- Pathogen fomite Antonio Pelaez has come into contact with these farms CEP, Test4
- Pathogen fomite Unregistered Device kp9qZbxtYKv3KvSU has come into contact with these farms CEP
- Pathogen fomite cep cep has come into contact with these farms CEP
- These farms are now designated infected Porcináguila-Cerdos, Jubeansa, Terreros, Test4
- Infected farm Porcináguila-Cerdos has created these pathogen fomites Ricardo Pérez, Antonio Egea
- Infected farm Jubeansa has created these pathogen fomites Ricardo Pérez
- Infected farm Terreros has created these pathogen fomites Ricardo Pérez
- Infected farm Test4 has created these pathogen fomites Ricardo Pérez, Test Test, Antonio Pelaez, UserTest Test, Elena Vizcaíno
- These equipment persons are now designated pathogen fomites Antonio Egea, Test Test, UserTest Test
- Pathogen fomite Antonio Egea has come into contact with these farms Porcináguila-Cerdos
- Pathogen fomite Test Test has come into contact with these farms Test4
- Pathogen fomite UserTest Test has come into contact with these farms TestA_1, Test4
- These farms are now designated infected TestA_1
- Infected farm TestA_1 has created these pathogen fomites UserTest Test
- There are no new equipment persons designated as pathogen fomites

Conclusions

- Biosafety is likely to be the industry's **biggest challenge in the upcoming years**
- There is a lot of variability between farms and in general, good room for improvement
- The **human factor is key** and will continue to be so
- We have **new tools (Information and Communication Technologies)** to improve our understanding and assessment of existing protocols
- The use and cross-checking of the data generated will be of extraordinary value in decision-making

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