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DEPARTMENT OF INTERNAL MEDICINE, REPRODUCTION AND POPULATION MEDICINE
VETERINARY EPIDEMIOLOGY

20 YEAR OF BIOSECURITY RESEARCH,

AN EXAMPLE OF CITIZEN SCIENCE APPROACH

Jeroen Dewulf, Iryna Makovska, Nele Caekebeke, Moniek Ringenier, Nelima Ibrahim, Merel Postma, Miroslav Kjosevski, Ilias Chantziaras.

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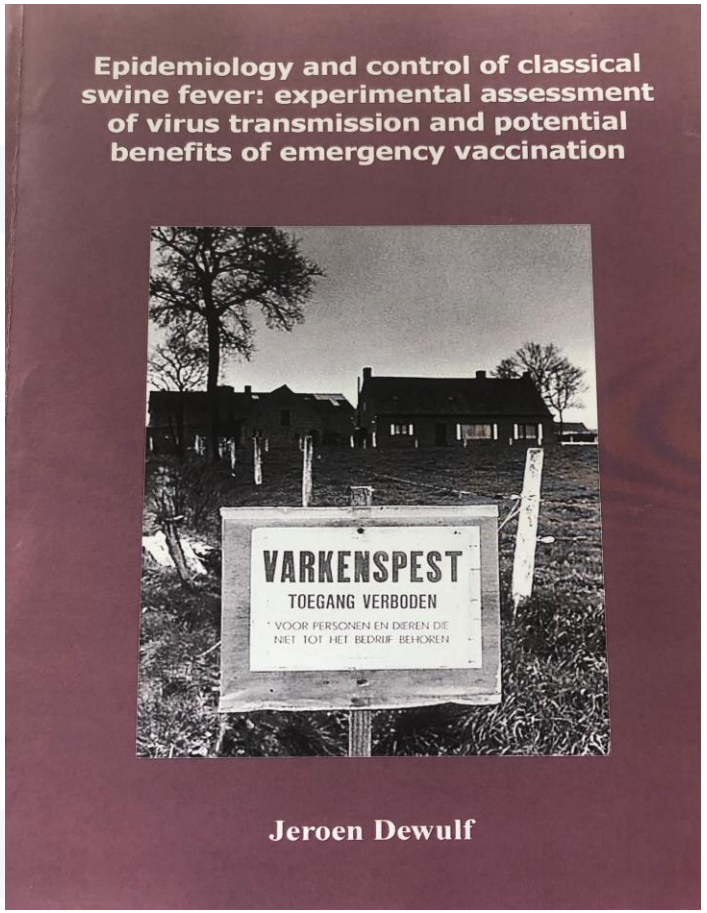
WHERE IT STARTED



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WHERE IT STARTED

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Available online at www.sciencedirect.com
ScienceDirect

Preventive Veterinary Medicine 83 (2008) 228–241

PREVENTIVE VETERINARY MEDICINE

www.elsevier.com/locate/prevetmed

A survey on biosecurity and management practices in Belgian pig herds

S. Ribbens [a,*], J. Dewulf [a,1], F. Koenen [b], K. Mintiens [c], L. De Sadeleer [a,1], A. de Kruif [a,1], D. Maes [a,1]

[a] *Ghent University, Faculty of Veterinary Medicine, Department of Reproduction, Obstetrics and Herd Health, Unit of Veterinary Epidemiology, Salisburylaan 133, B-9820 Merelbeke, Belgium*

[b] *Veterinary and Agrochemical Research Centre (CODA/CERVA), Section of Modelisation of Epizootic Diseases, Groeselenberg 99, B-1180 Brussels, Belgium*

[c] *Veterinary and Agrochemical Research Centre (CODA/CERVA), Co-ordination Centre for Veterinary Diagnostics, Groeselenberg 99, B-1180 Brussels, Belgium*

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WHY BIOSECURITY

- Better biosecurity ⟷ less disease
  - Better production results
    - reproduction
    - growth
    - feed conversion
    - uniformity
  - Less antimicrobial use
  - Higher prices when selling the animals

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TOWARDS A BIOSECURITY SCORING SYSTEM

Bioveiligheid op varkensbedrijven: ontwikkeling van een online scoresysteem en de resultaten van de eerste 99 deelnemende bedrijven

Biosecurity on pig herds: development of an on-line scoring system and the results of the first 99 participating herds

[1]M. Laanen, [1]J. Beek, [1]S. Ribbens, [2]F. Vangroenweghe, [1]D. Maes, [1]J. Dewulf

[1]Vakgroep Voortplanting, Verloskunde en Bedrijfsdiergeneeskunde,
Eenheid voor Veterinaire Epidemiologie,
Faculteit Diergeneeskunde, Universiteit Gent,
Salisburylaan 133, B-9820 Merelbeke, België
[2]Diergezondheidszorg Vlaanderen, Industrielaan 29, B-8820 Torhout, België

Maria.Laanen@UGent.be

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Impact of biosecurity

The Veterinary Journal 198 (2013) 508–512

Contents lists available at ScienceDirect

The Veterinary Journal

journal homepage: www.elsevier.com/locate/tvjl

Relationship between biosecurity and production/antimicrobial treatment characteristics in pig herds

M. Laanen [a,*], D. Persoons [a,b], S. Ribbens [c], E. de Jong [c], B. Callens [a], M. Strubbe [c], D. Maes [a], J. Dewulf [a]

[a] Unit of Veterinary Epidemiology, Department of Reproduction, Obstetrics and Herd Health, Faculty of Veterinary Medicine, Ghent University, 9820 Merelbeke, Belgium
[b] Pharma.be, Belgian Association for the Pharmaceutical Industry, 1170 Brussels, Belgium
[c] Animal Health Care Flanders, 9000 Drongen, Belgium

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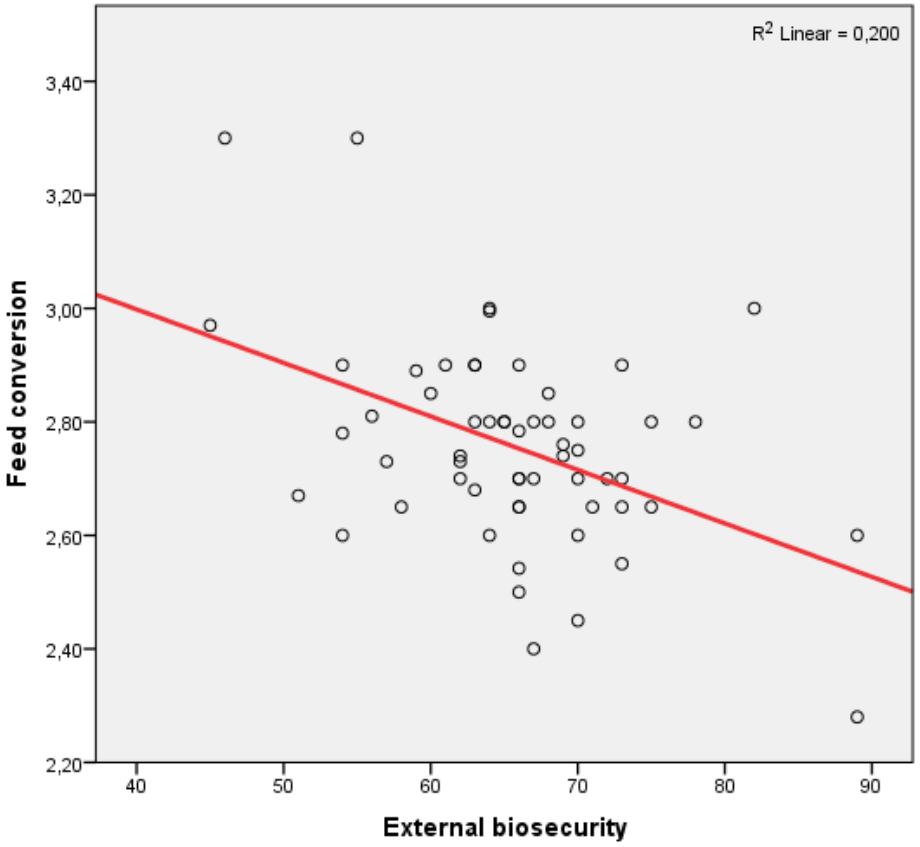
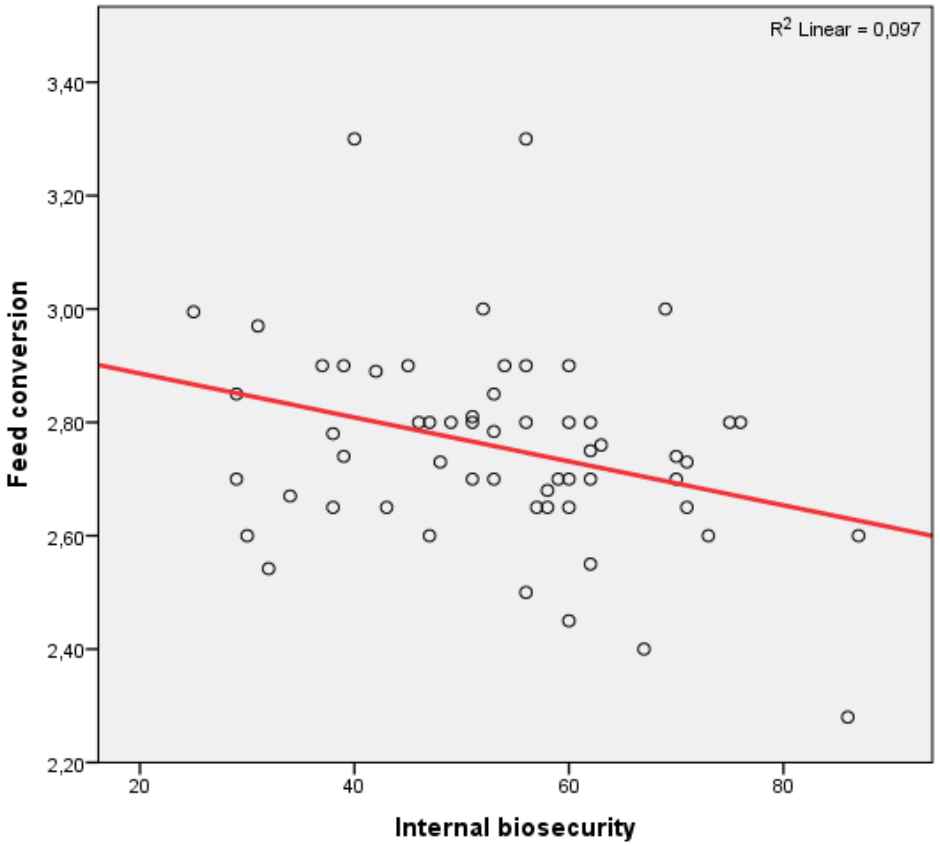
Biosecurity vs feed conversion





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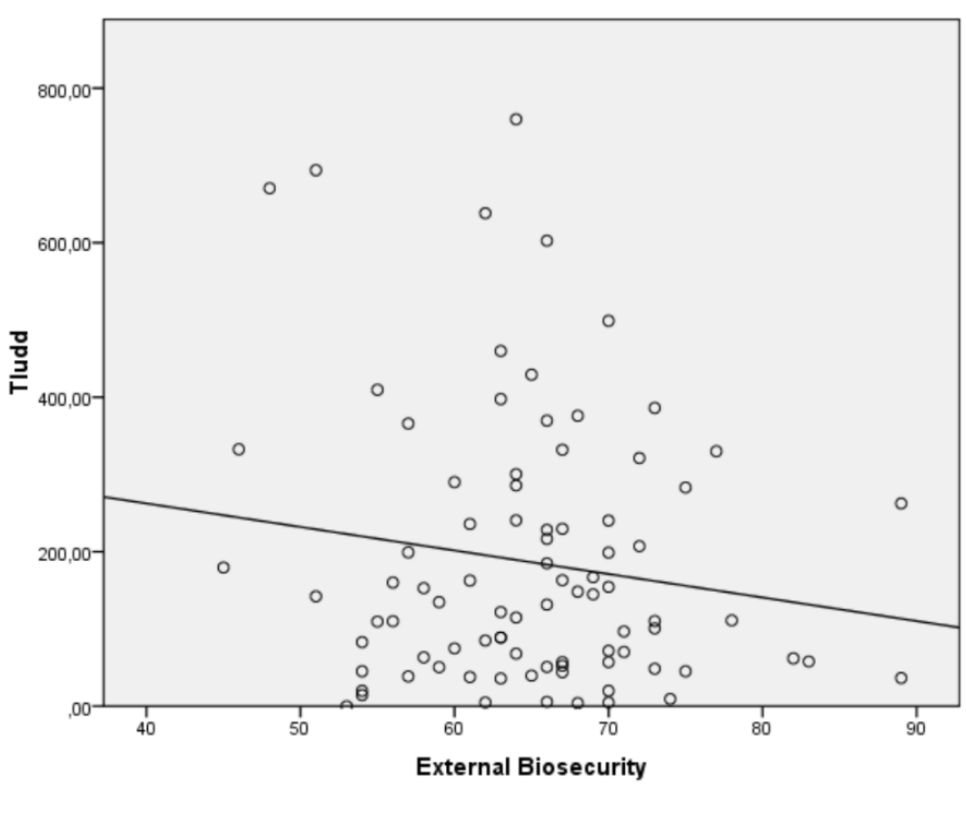
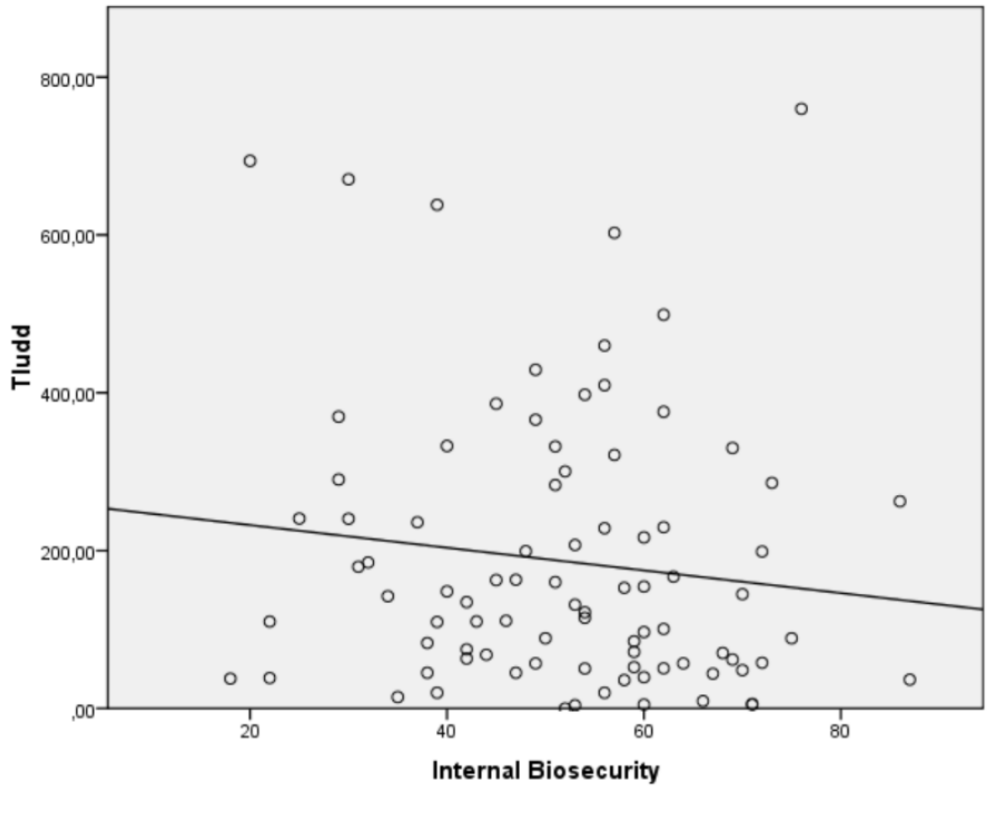
Biosecurity vs antimicrobial use



Pearson r = -0,15, p = 0,17



Pearson r = -0,12, p = 0,25

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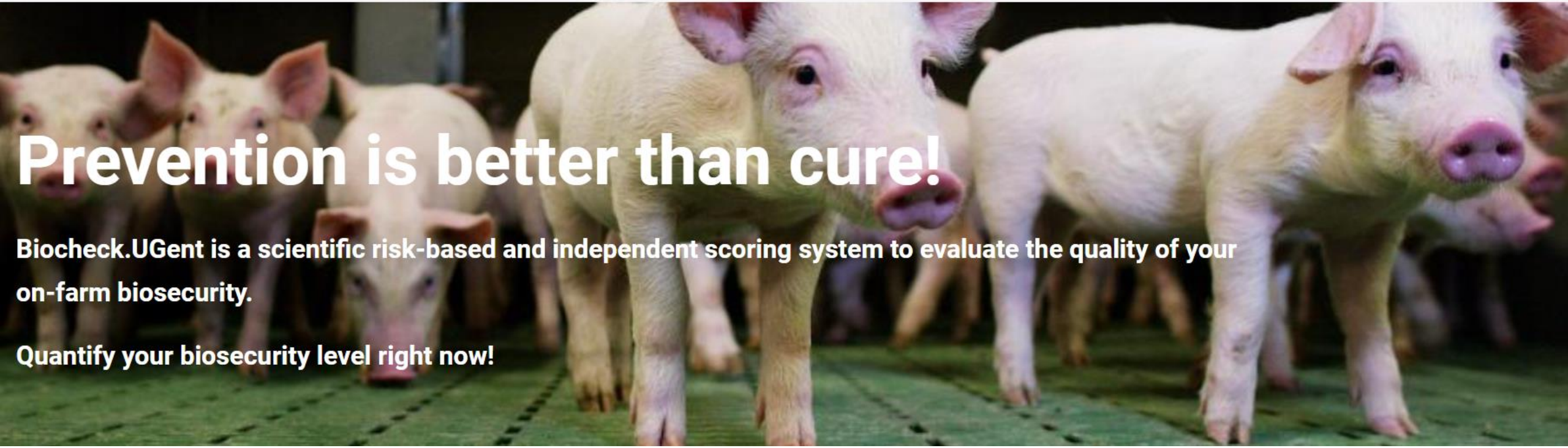

Prevention is better than cure!

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!

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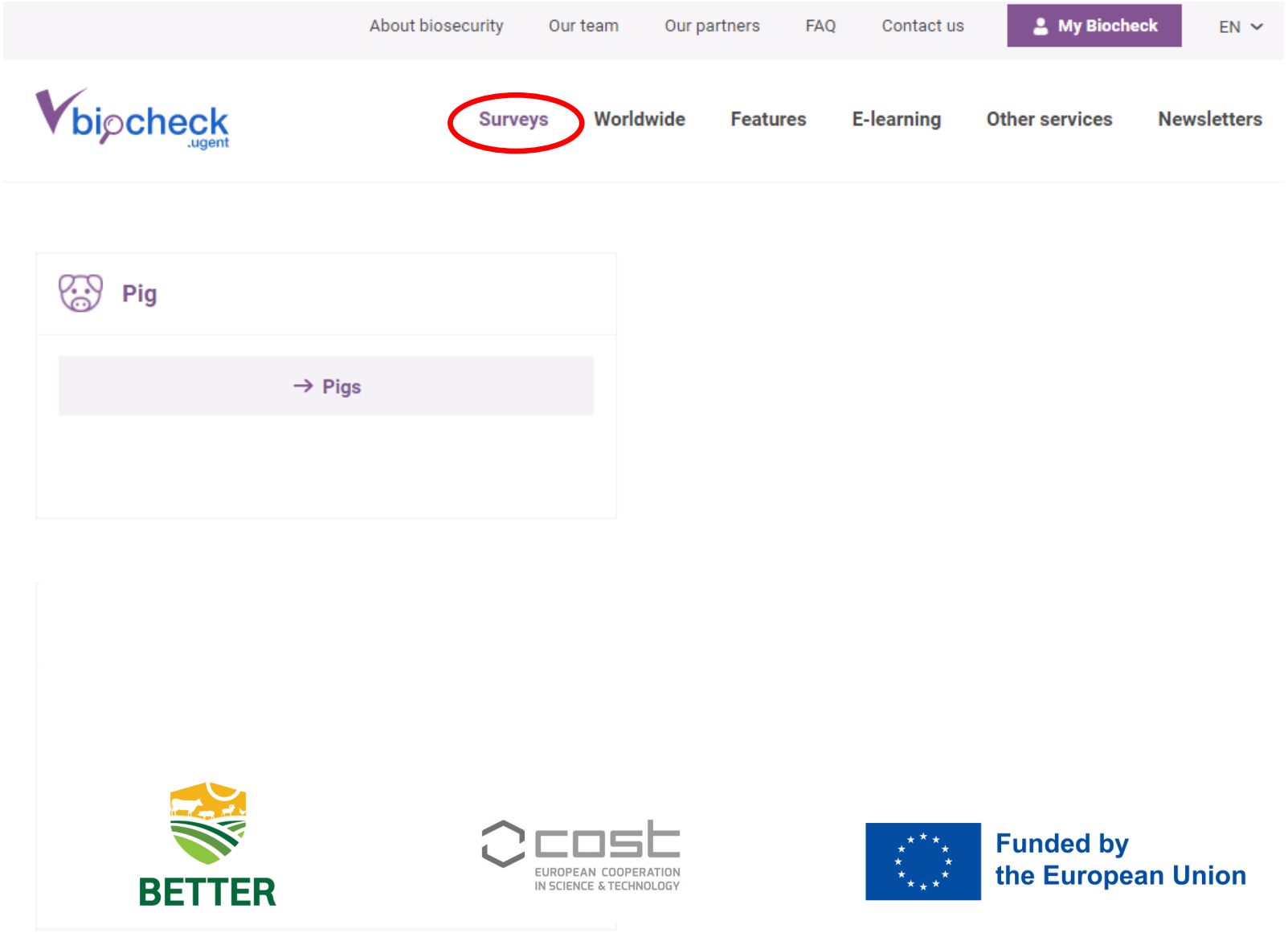
TOWARDS A BIOSECURITY SCORING SYSTEM



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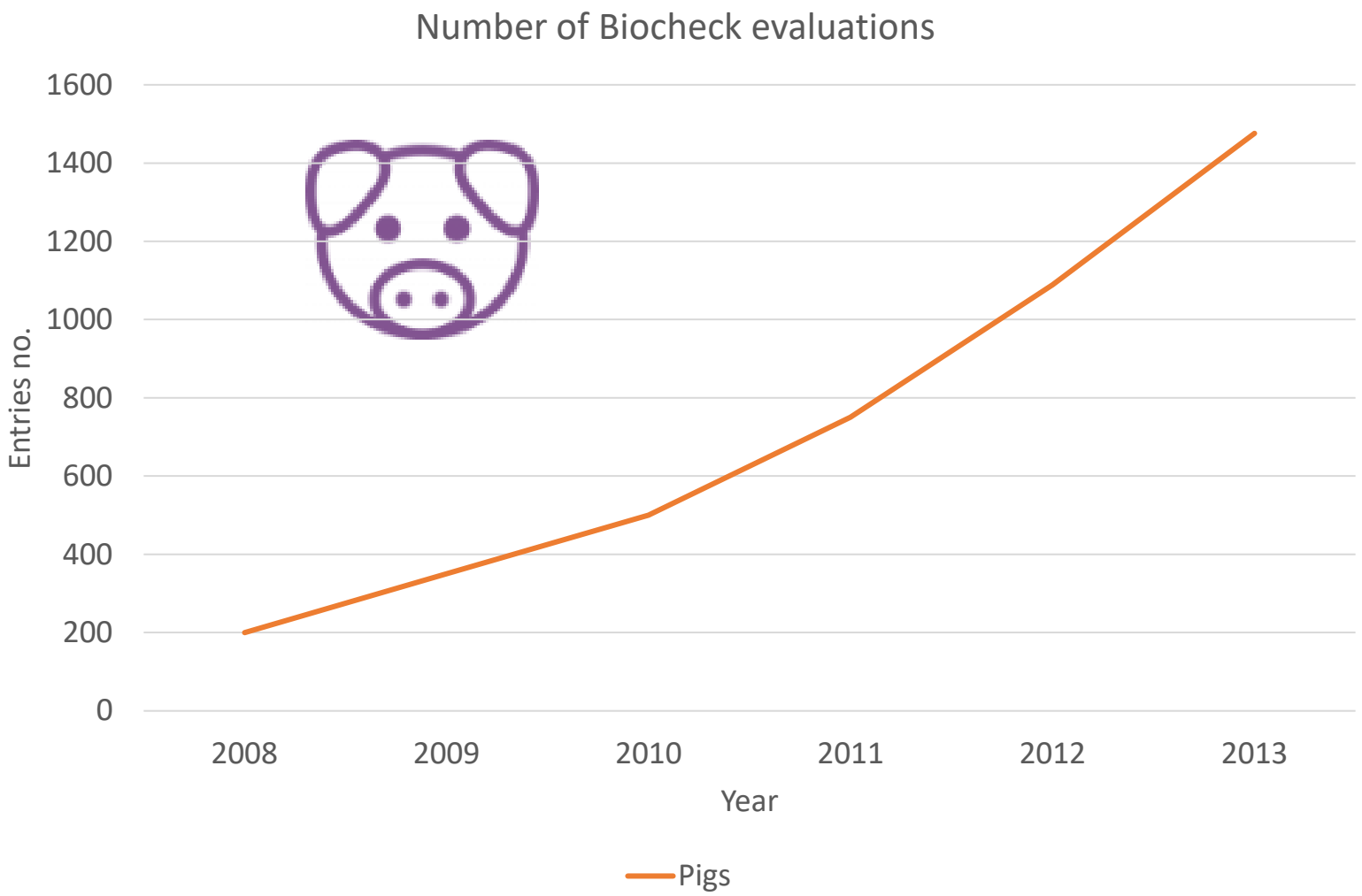

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Impact of biosecurity

Animal, page 1 of 12 © The Animal Consortium 2015
doi:10.1017/S1751731115002487

animal

The biosecurity status and its associations with production and management characteristics in farrow-to-finish pig herds

M. Postma[1†], A. Backhans[2,3], L. Collineau[4,5], S. Loesken[6], M. Sjölund[2,3], C. Belloc[5], U. Emanuelson[3], E. Grosse Beilage[6], K. D. C. Stärk[4] and J. Dewulf[1] on behalf of the MINAPIG consortium*

[1]Veterinary Epidemiology Unit, Department of Reproduction, Obstetrics and Herd Health, Faculty of Veterinary Medicine, Ghent University, Salisburylaan 133, 9820 Merelbeke, Belgium; [2]Department of Animal Health and Antimicrobial Strategies, National Veterinary Institute, SVA, SE-751 89 Uppsala, Sweden; [3]Department of Clinical Sciences, Swedish University of Agricultural Sciences, P.O. Box 7054, SE-750 07 Uppsala, Sweden; [4]SAFOSO AG, Waldeggstrasse 1, CH-3097 Liebefeld, Switzerland; [5]ONIRIS, UMR 1300 BioEpAR, BP40706, F-44307 Nantes, France; [6]Field Station for Epidemiology, University of Veterinary Medicine Hannover, Büscheler Straße 9, D-49456 Bakum, Germany

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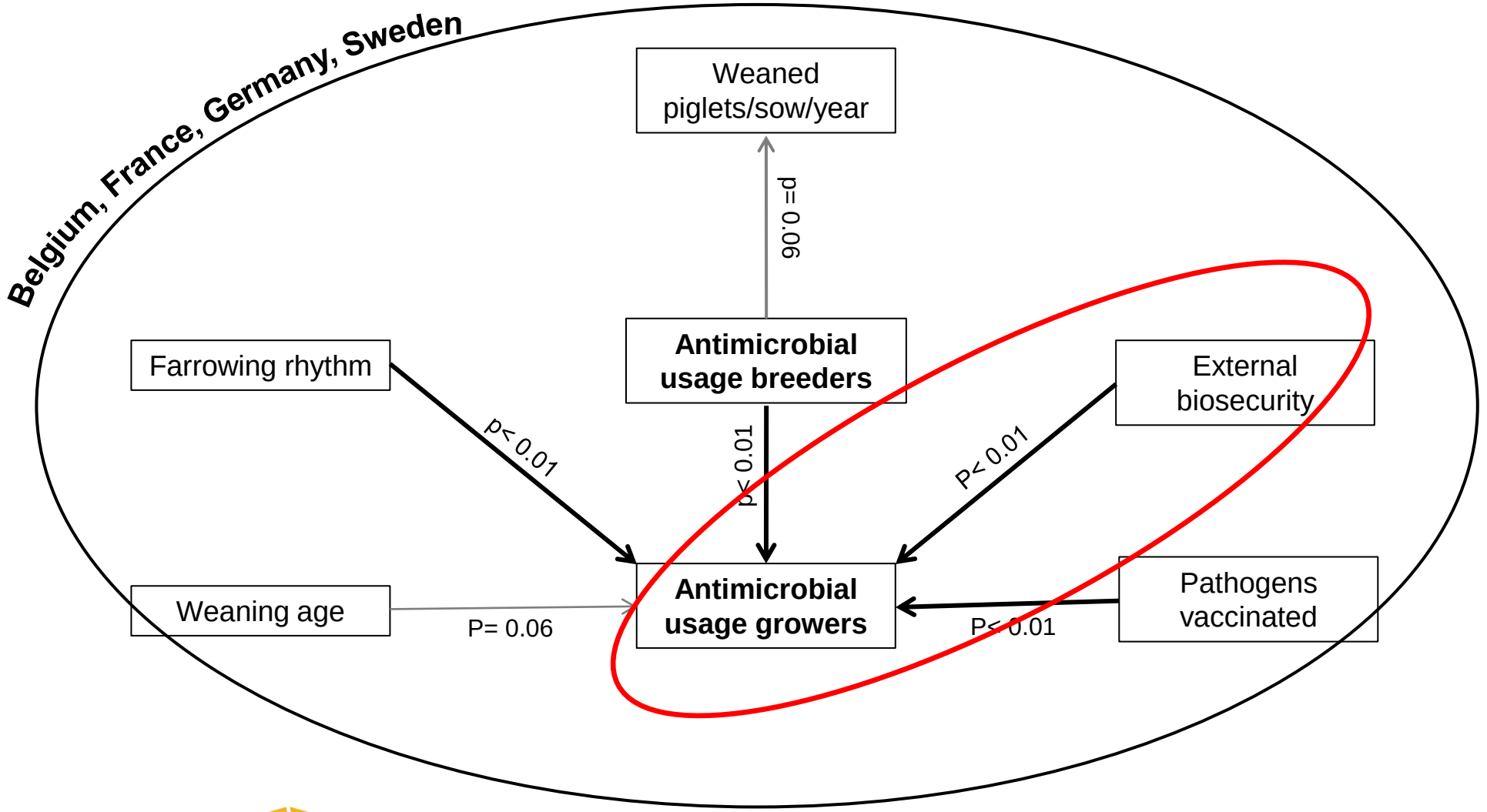
Impact of biosecurity



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Impact of biosecurity

PAPER

Profile of pig farms combining high performance and low antimicrobial usage within four European countries

Lucie Collineau,[1,2] Annette Backhans,[3] Jeroen Dewulf,[4] Ulf Emanuelson,[3] Elisabeth grosse Beilage,[5] Anne Lehébel,[6] Svenja Loesken,[5] Elisabeth Okholm Nielsen,[7] Merel Postma,[4] Marie Sjölund,[3,8] Katharina D C Stärk,[1,9] Catherine Belloc[6]

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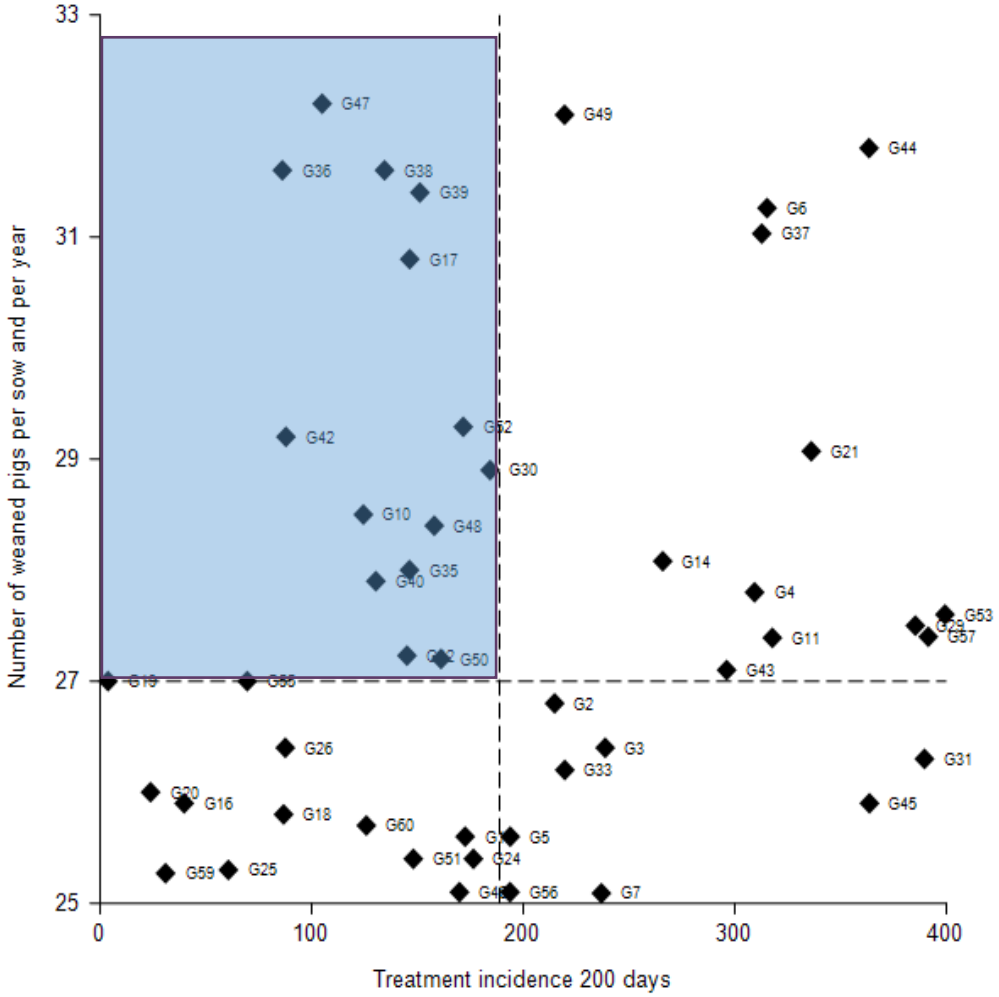
Impact of biosecurity



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BIOCHECK.UGENT POULTRY

ELSEVIER

Poultry Science

Volume 93, Issue 11, 1 November 2014, Pages 2740-2751

Immunology, Health, and Disease

Biocheck.UGent: A quantitative tool to measure biosecurity at broiler farms and the relationship with technical performances and antimicrobial use

P. Gelaude *, M. Schlepers *, M. Verlinden †, M. Laanen *, J. Dewulf *

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IMPACT OF BIOSECURITY – PUBLIC HEALTH

	Before	After	Change
External biosecurity	64	69	+5
Internal biosecurity	73	77	+4
Mortality first week	1,08	1,27	+0,19%
Total mortality	3,54	3,05	-0,49%
Average daily weight gain	57	57	+0
Feed conversion	1,8	1,7	-0,1
Performance index	318	332	+14
Antimicrobial use (TI)	**192**	**136**	**-29%**

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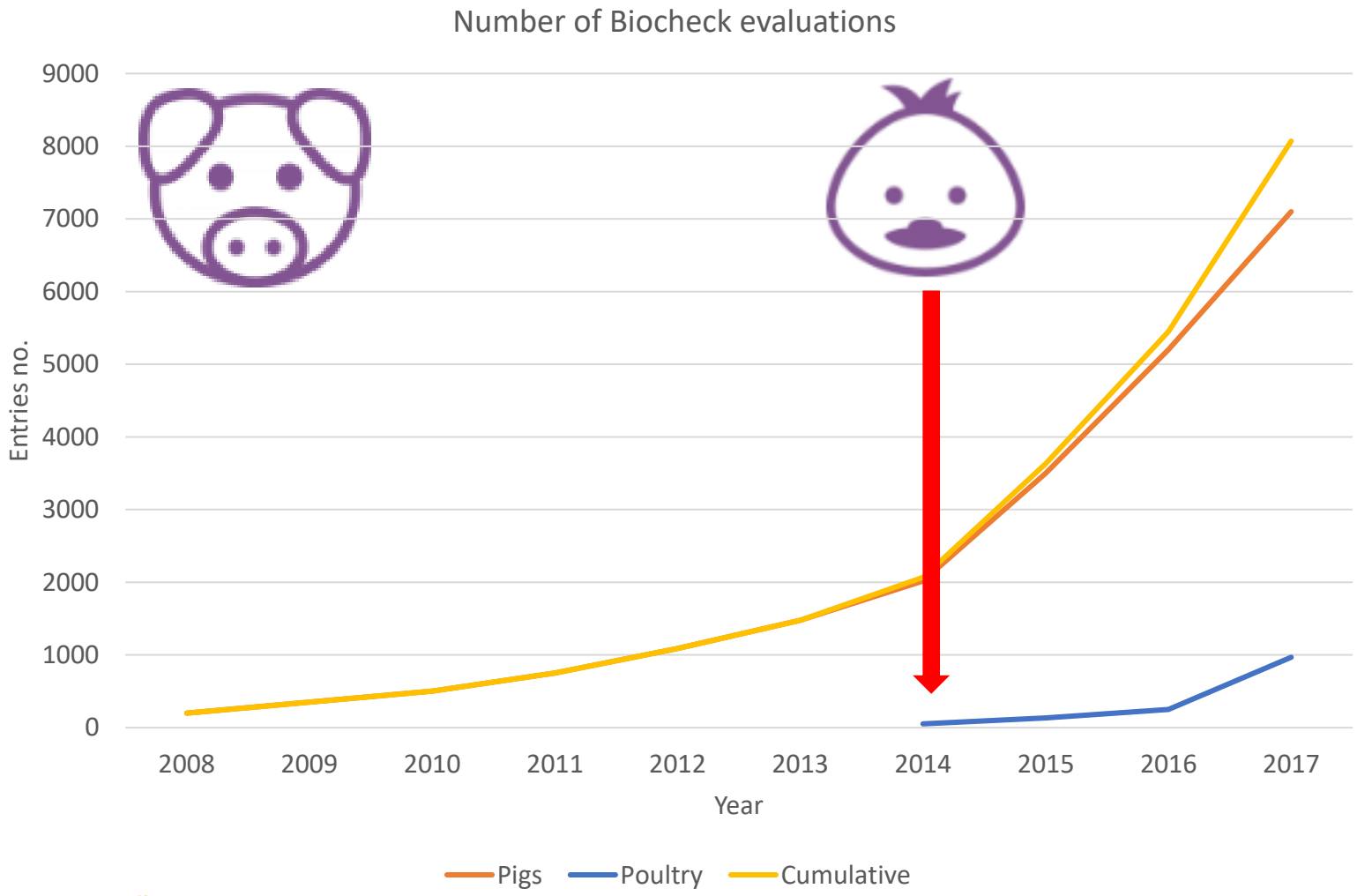
TOWARDS A BIOSECURITY SCORING SYSTEM



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Applications of Biocheck.Ugent in broiler and cross-breed sonali poultry farms in Bangladesh

Nelima Ibrahim, PhD student, Ghent University

Co-author Names:

Ilias Chantziaras, Shoieb Mohsin, Filip Boyen, Guillaume Fournié, SK Shaheenur Islam, Anna Catharina Berge, Nele Caekebeke, Philip Joosten and Jeroen Dewulf

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OBJECTIVES

To quantify AMU at farm level by calculating the exact Treatment Incidence (TI) per 100 days

To quantify the biosecurity level of farms

Association between AMU and biosecurity status

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Broiler

Sonali

Rhode Island Red
X
Fayoumi hens

Taste and texture
↓
native chicken

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FARM CHARACTERISTICS

Parameters	Broiler (n = 94) median (min – max)	Sonali (n = 51) median (min – max)
Herd size (number of birds)	1000 (1000-4000)	2000 (1000-4000)
Production length (days)	30 (24-36)	67 (60-69)

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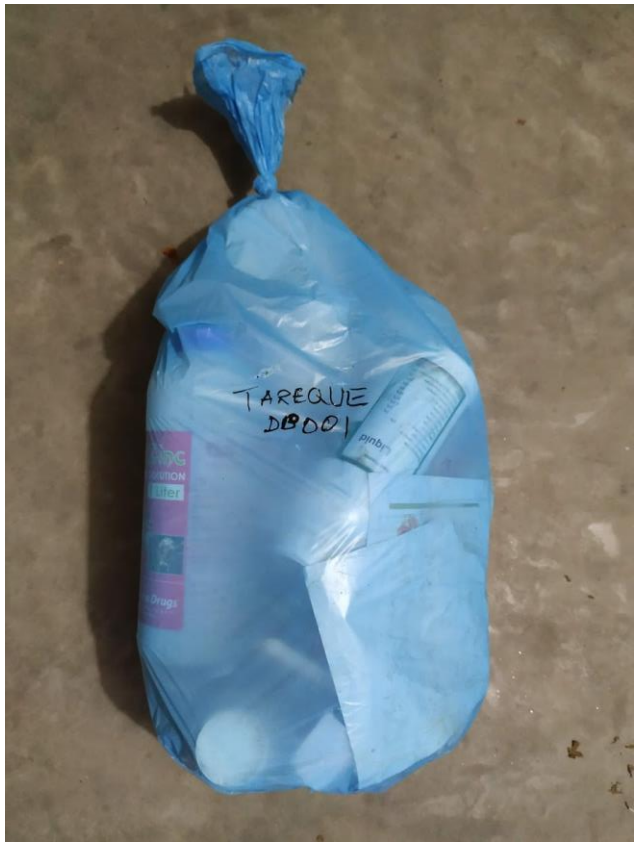
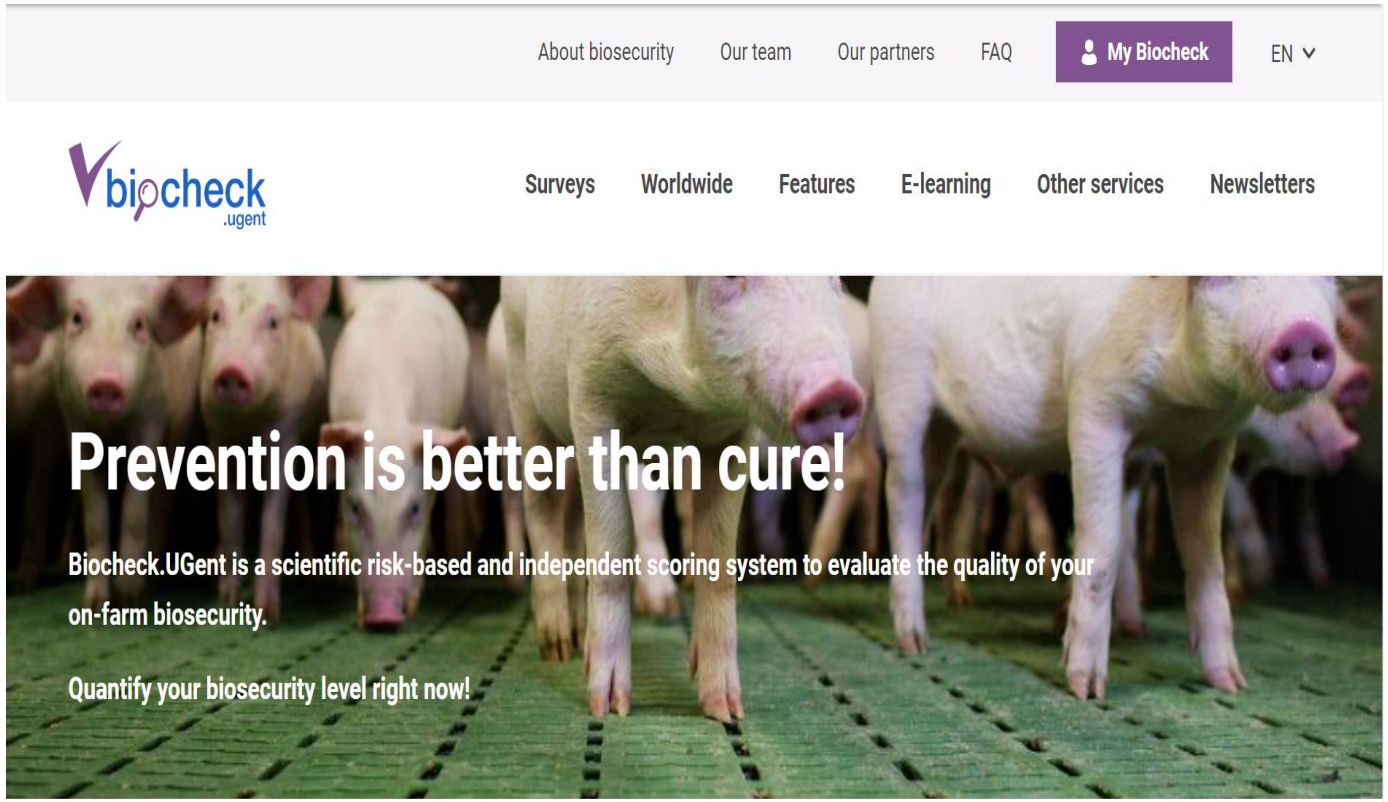


Garbage bin method



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Common scenario of small scale poultry farms in Bangladesh

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RESULTS

	Median [minimum–maximum]	
	Broiler flocks	**Sonali flocks**
TIDDDvet	60 [18.3-188.2]	58 [31.1–212.6]

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	Average biosecurity scores in Bangladesh	
	Conventional broiler (n=94)	**Sonali (n=51)**
External biosecurity		
A. Purchase of one-day-old chicks	26.9%	36.7%
B. Depopulation of broilers (slaughterhouses, traders, individuals)	27.3%	35.9%
C. Feed and water	27.1%	34.2%
D. Removal of manure and carcasses	17.7%	19.9%
E. Visitors and farmworkers	47.6%	49.0%
F. Material supply	56.0%	56.0%
G. Infrastructure and biological vectors	60.1%	63.9%
H. Location of the farm	43.4%	43.4%
Subtotal external biosecurity	**39.2%**	**43.5%**
Internal biosecurity		
I. Disease management	71.5%	66.1%
J. Cleaning and disinfection	60.4%	67.2%
K. Materials and measures between compartments	48.6%	42.5%
Subtotal internal biosecurity	**61.4%**	**61.2%**
Total	**45.9%**	**48.8%**

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AVERAGE BIOSECURITY SCORES IN DIFFERENT COUNTRIES

Biosecurity	Average biosecurity scores in Bangladesh		Average biosecurity scores in Philippines	Average biosecurity scores in Vietnam
	Broiler	Sonali		
External biosecurity	39.2%	43.5%	68.5%	59.5%
Internal biosecurity	61.4%	61.2%	77.2%	65.1%
Total biosecurity	45.9%	48.8%	71.1%	62.3%

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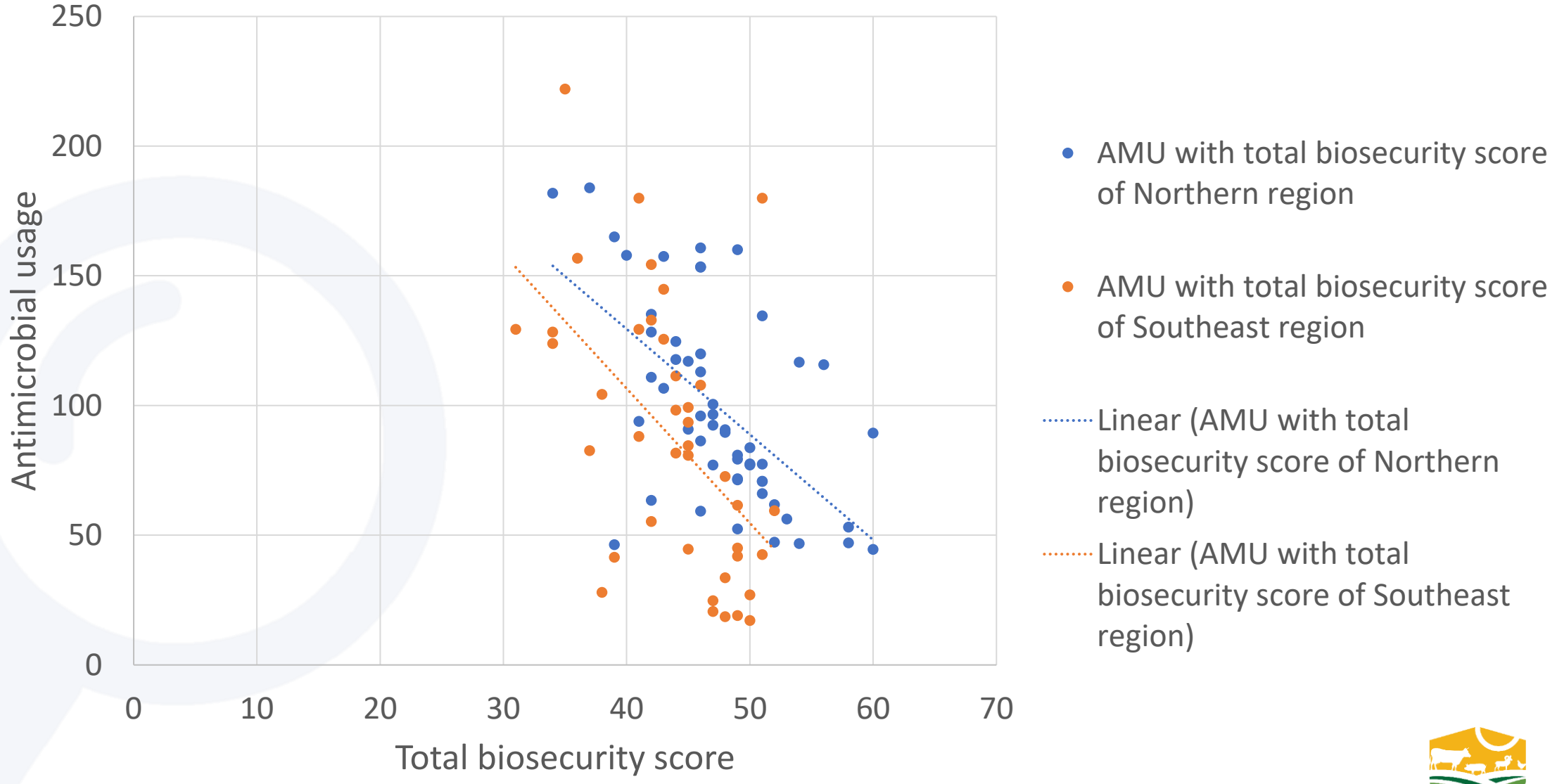
Association of AMU with total biosecurity score in broiler



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QUANTITATIVE ASSESSMENT OF BIOSECURITY IN BACKYARD POULTRY FARMS USING BIOCHECK.UGENT IN BANGLADESH

- To standardize of Biocheck.UGent tool for low or middle-income country's free-range poultry systems
- To quantify biosecurity levels in backyard poultry farms

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METHODOLOGY

Part 1 - Existing Biocheck.Ugent Broiler and Layer adapted to free-range (backyard) poultry

Part 2 - Panel of backyard poultry experts gave opinion for:

- Feedback on questionnaire
- Weight assignment to subcategories
- Weight assignment to questions

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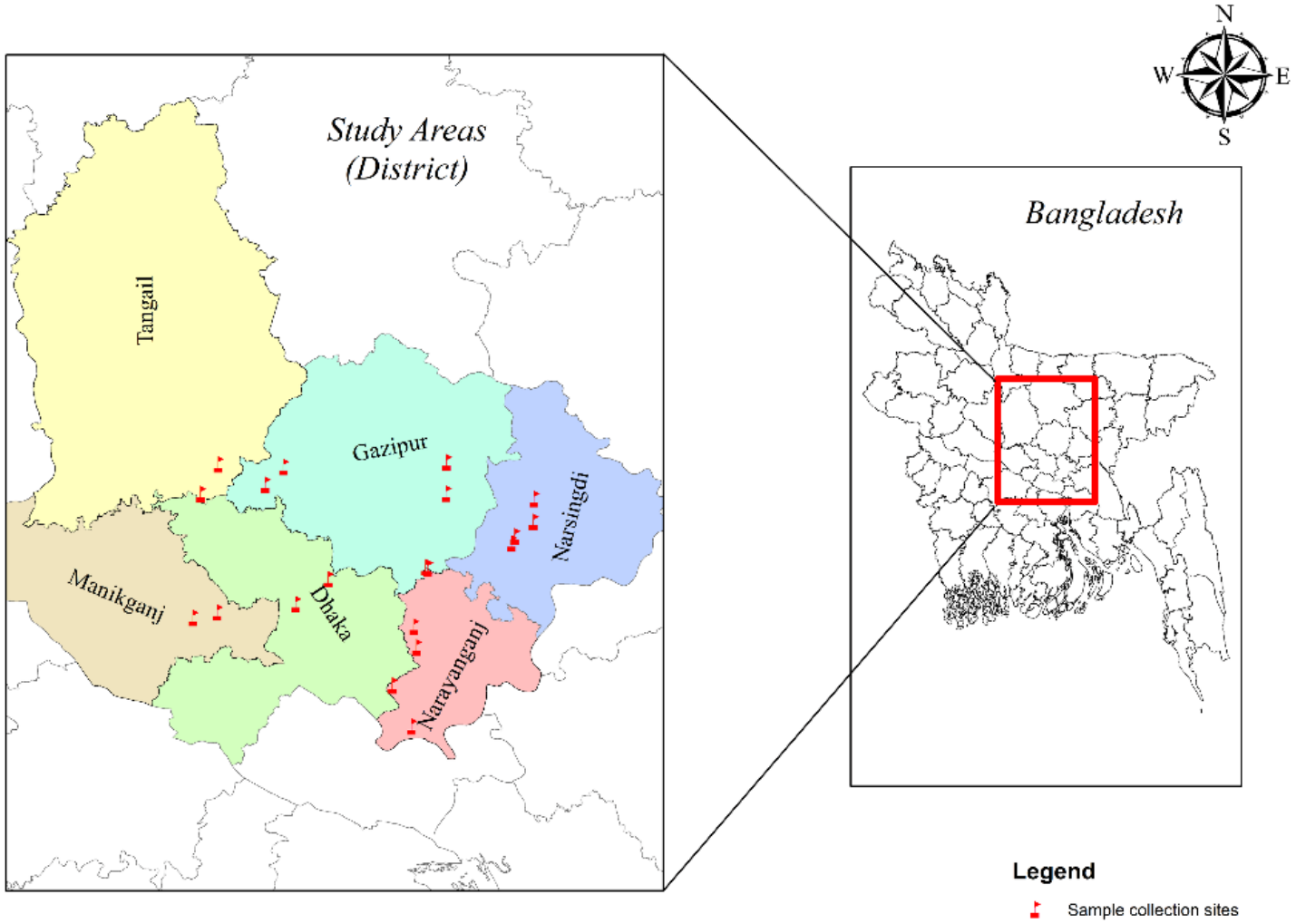

Piloting 400 households in 6 districts of Bangladesh

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Common scenario of backyard poultry farms in Bangladesh

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External Biosecurity	Average score (%)
Purchase of eggs or one-day-old chicks	29
Purchase of laying hens	52
Depopulation and transport of poultry and poultry products	38
Feed and water	64
Manure and carcass removal	61
Visitors and personnel (drivers / farmworkers / catching crew/ veterinarian)	29
Infrastructure and biological factors	48
Location of the farm	55
Sub-total external biosecurity	**43**
Internal biosecurity	**Average score**
Disease management	55
Cleaning and disinfection	60
Sub-total internal biosecurity	**54**
Total biosecurity	**45**

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M +32 484 88 09 78

Collaborator:

Department of livestock services

One health poultry hub

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IMPACT OF BIOSECURITY – PUBLIC HEALTH

antibiotics

MDPI

Article

Coaching Belgian and Dutch broiler farmers aimed at antimicrobial stewardship and disease prevention

Nele Caekebeke [1,*], Moniek Ringenier [1], Franca J. Jonquiere [2], Tijs J. Tobias [2], Merel Postma [1], Angelique van den Hoogen [2], Manon A.M. Houben [3], Francisca C. Velkers [2], Nathalie Sleeckx [4], Arjan Stegeman [2], and Jeroen Dewulf [1], on behalf of the i-4-1-Health Study Group

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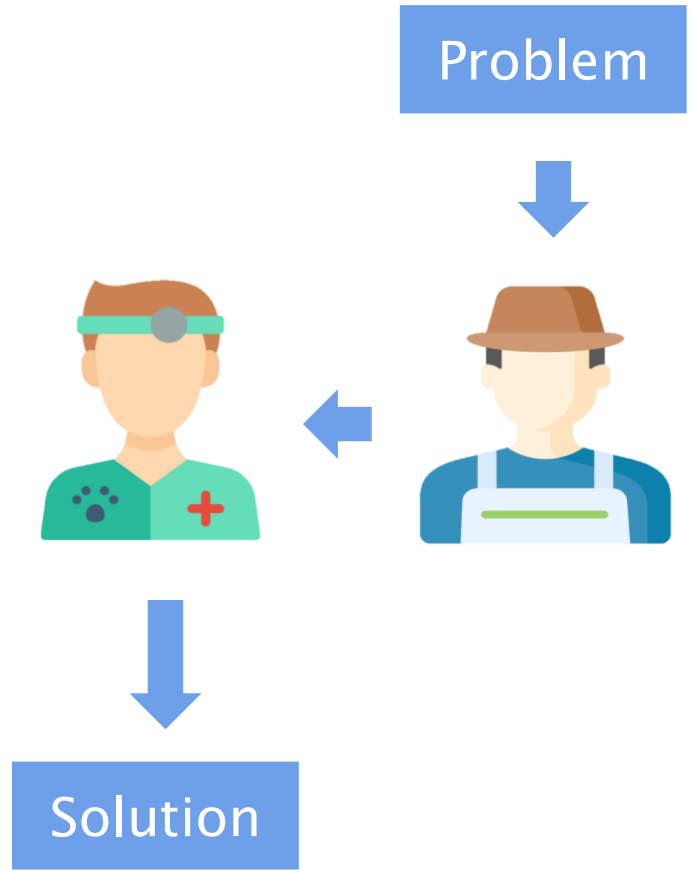
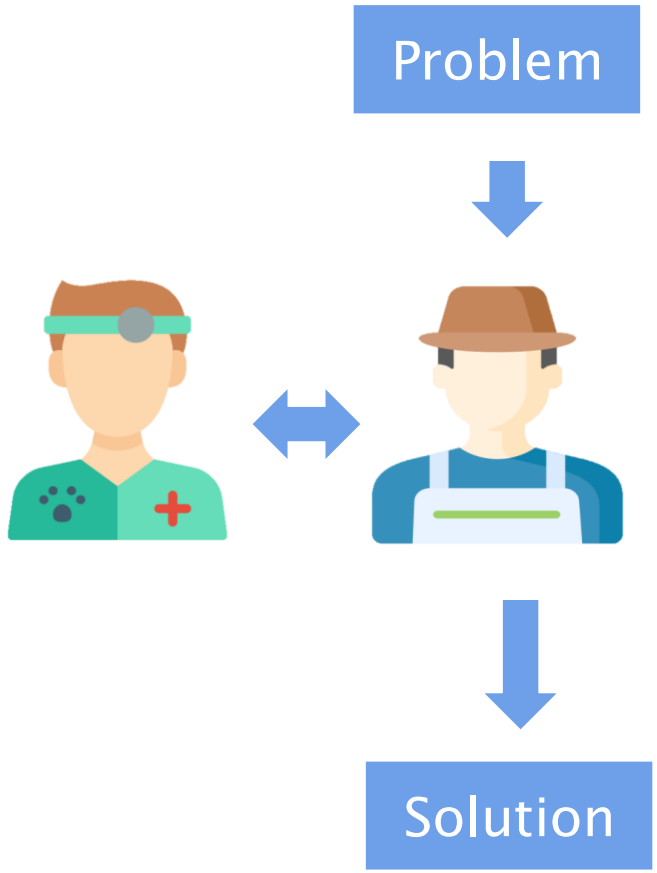
Coaching

ADVISING



COACHING



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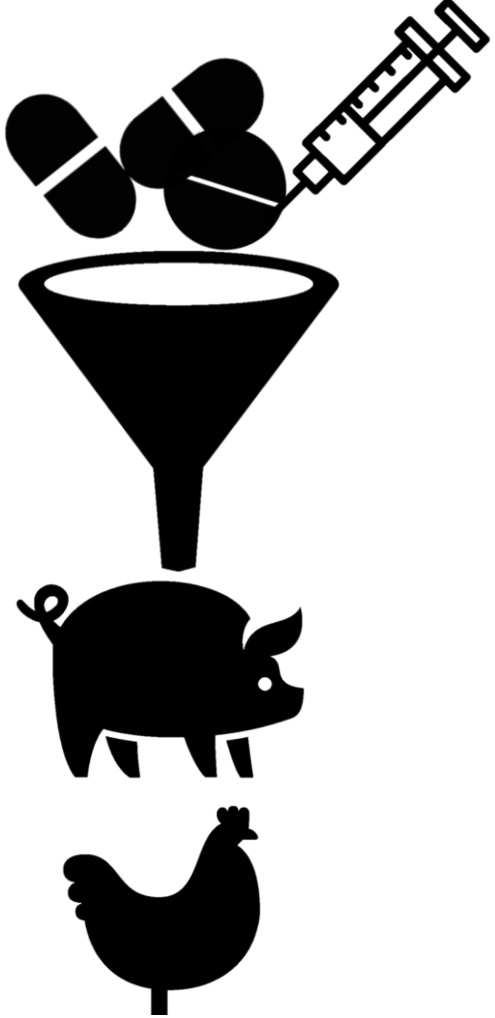
A AWARENESS OF THE NEED FOR CHANGE

D DESIRE TO SUPPORT THE CHANGE

K KNOWLEDGE OF HOW TO CHANGE

A ABILITY TO DEMONSTRATE SKILLS & BEHAVIORS

R REINFORCEMENT TO MAKE THE CHANGE STICK



Livestock-adapted ADKAR®

Hiatt, 2006

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Preventive Veterinary Medicine 179 (2020) 104992

Contents lists available at ScienceDirect

Preventive Veterinary Medicine

journal homepage: www.elsevier.com/locate/prevetmed

A risk-based scoring system to quantify biosecurity in cattle production

Bert Damiaans[a,*], Véronique Renault[b], Steven Sarrazin[a], Anna Catharina Berge[a], Bart Pardon[c], Claude Saegerman[b], Jeroen Dewulf[a]

[a] Veterinary Epidemiology Unit, Department of Reproduction, Obstetrics and Herd Health, Faculty of Veterinary Medicine, Ghent University, Salisburylaan 133, 9820 Merelbeke, Belgium
[b] Research Unit in Epidemiology and Risk Analysis Applied to Veterinary Sciences (UREAR), Faculty of Veterinary Medicine, University of Liege, Belgium
[c] Department of Large Animal Internal Medicine, Faculty of Veterinary Medicine, Ghent University, Salisburylaan 133, 9820 17 Merelbeke, Belgium

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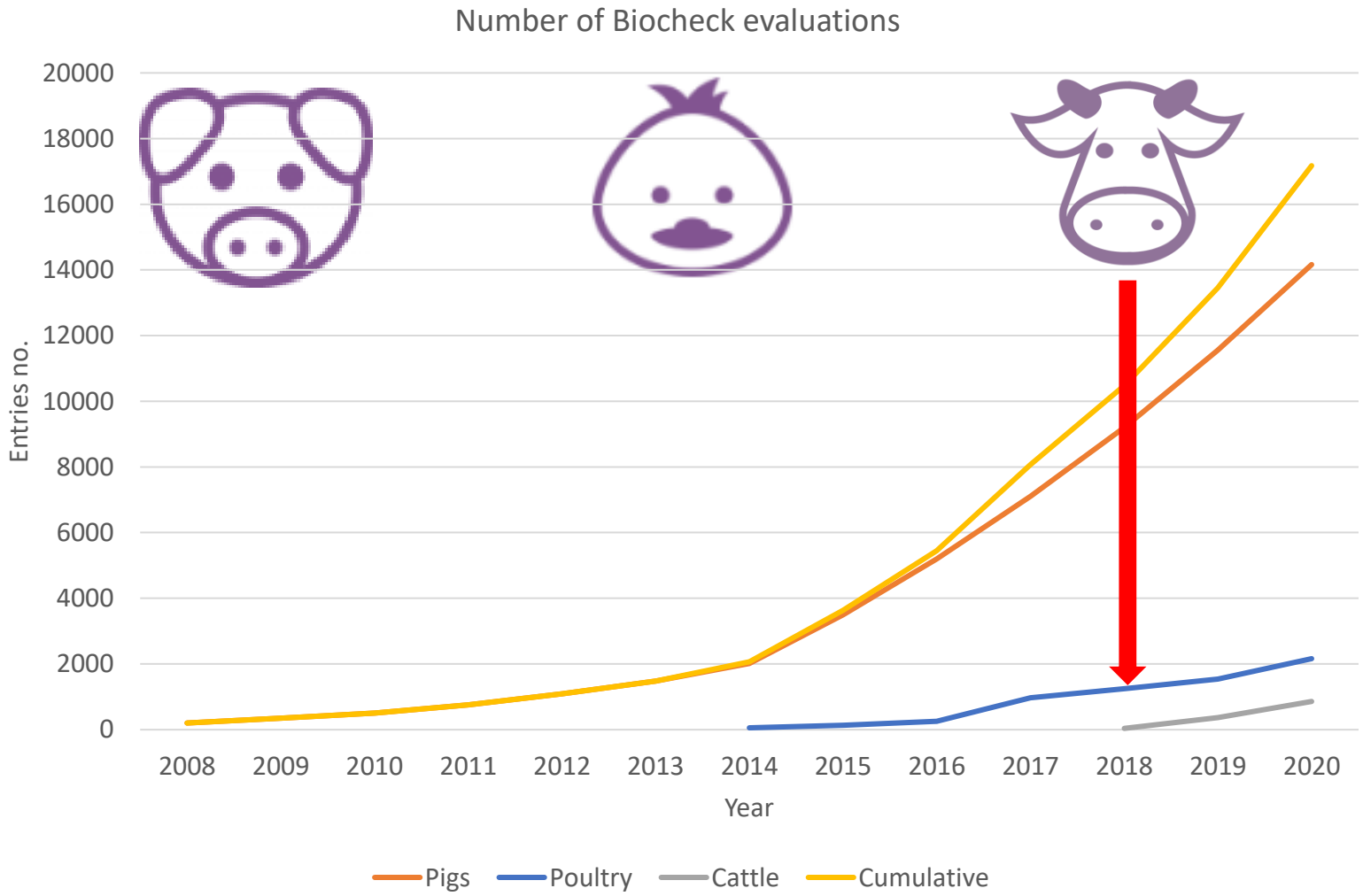
TOWARDS A BIOSECURITY SCORING SYSTEM



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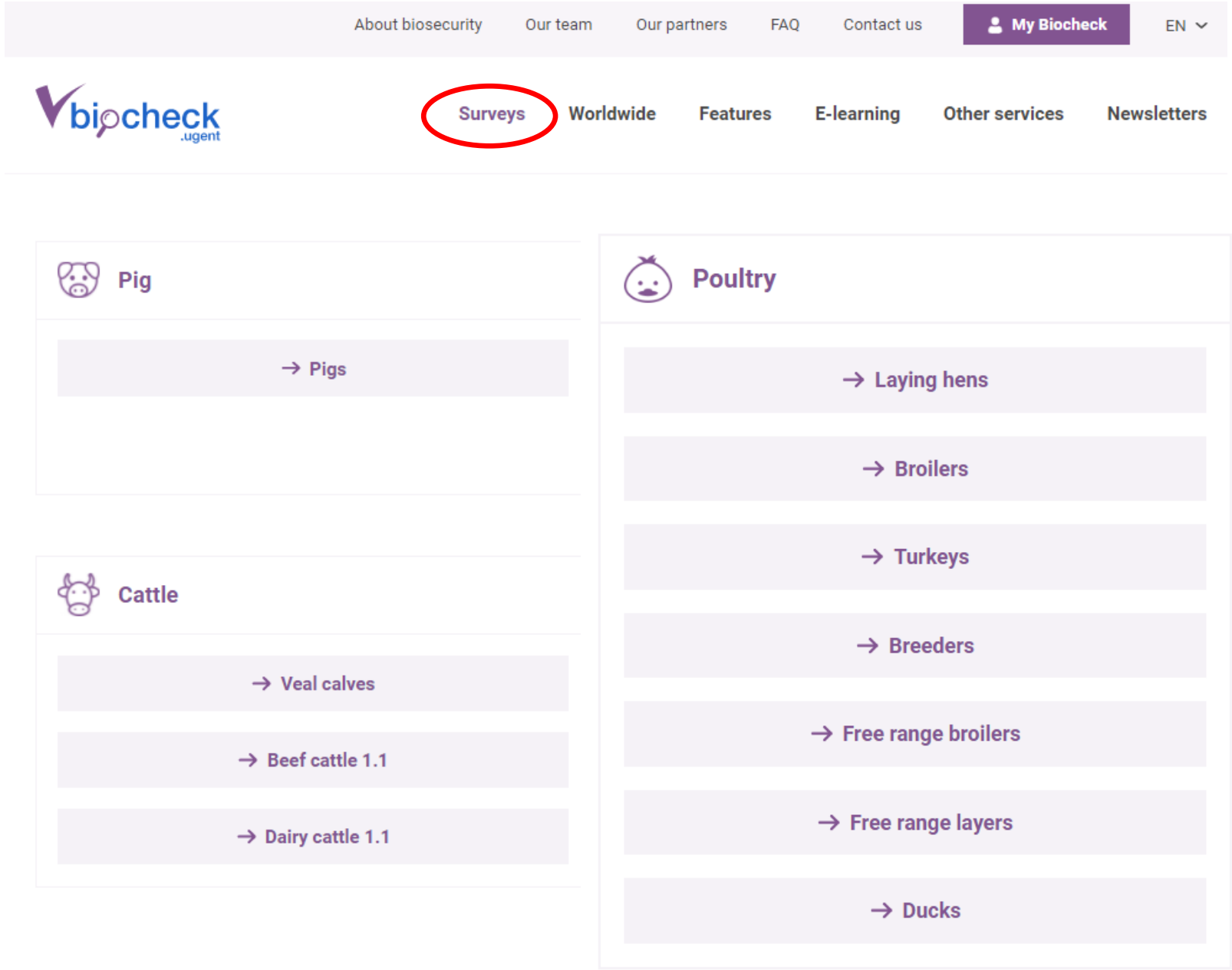

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BIOCHECK USAGE IN BIOSECURITY ASSESSMENT OF DAIRY CATTLE FARMS

Asst. Prof. Miroslav Kjosevski, PhD, DVM

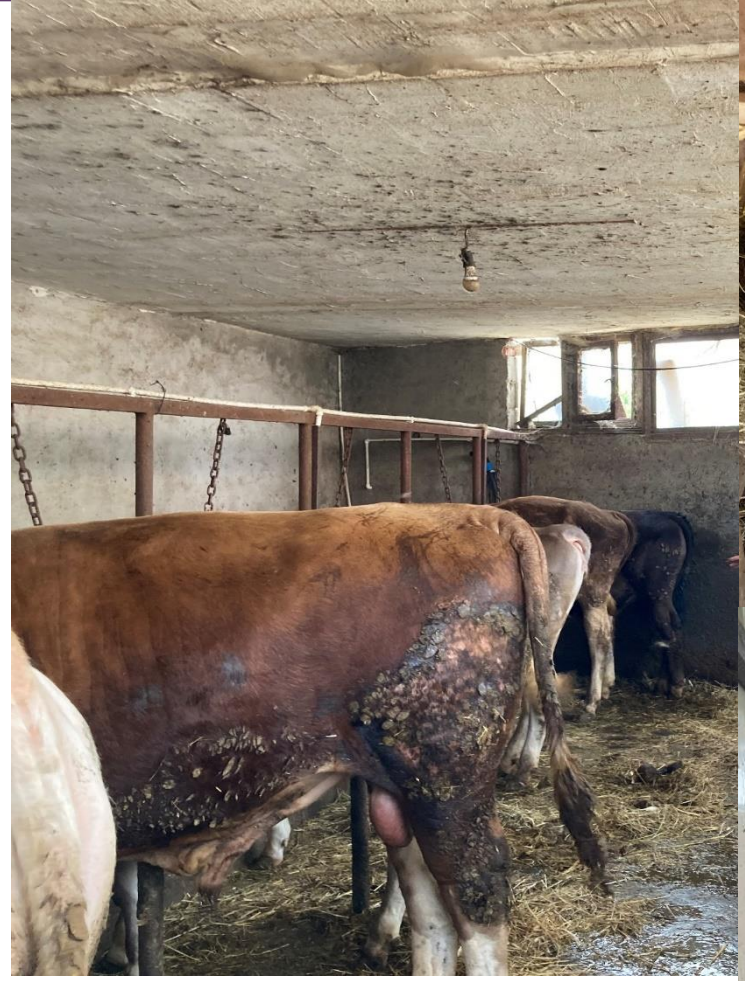
miro@fvm.ukim.edu.mk

Department for Animal Hygiene and Environmental Protection, Faculty of veterinary medicine – Skopje, Macedonia

Macedonian Dairy Farms:

- Individual households
- Small scale farms
- Tie stall system

- What are the risks of outbreaks and spreading of animal diseases?



Objective:

to assess the biosecurity level of dairy farms in Macedonia and

to identify the critical points from the biosecurity perspective

National Platform for Improving Biosecurity in Dairy Cattle Farms (NAPIB)

II ON-FARM BIOSECURITY ASSESSMENT

Review existing biosecurity assessment protocol
Biocheck® Ugent Cattle Biosecurity Survey

Testing the reliability of the survey
- *expert 's opinions (via opinion questionnaire)*
- *on-farm testing – 30 farms survey compared with other parameters*
- *reliability findings presented at NAPIB*

Training workshop
assessors

National biosecurity assessment
FVA & Vet practitioners – 1000 farms

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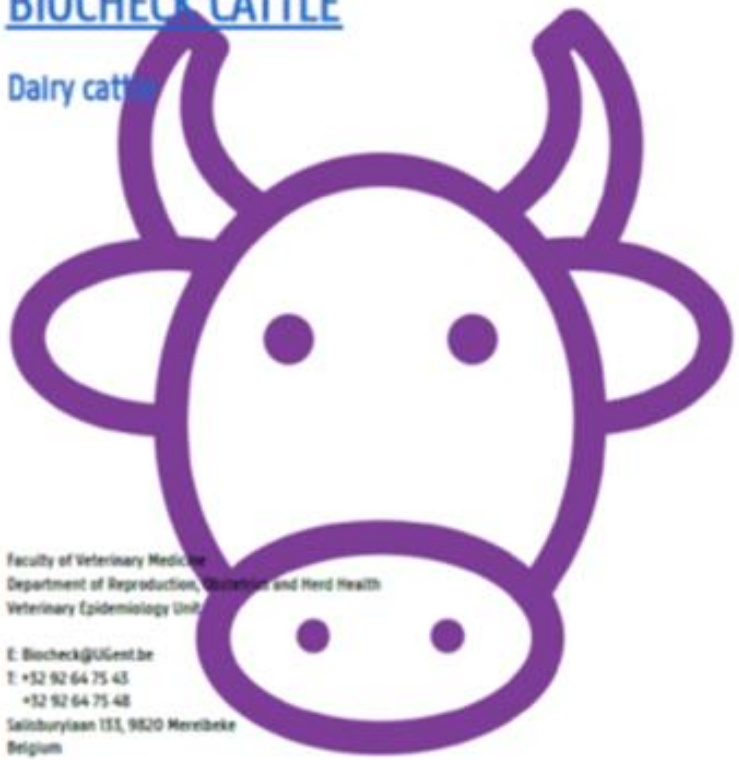
BIOCHECK CATTLE

Dairy cattle



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Veterinary Epidemiology Unit

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Salisburylaan 133, 9820 Merelbeke
Belgium

www.biocheck.ugent.be

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C. Feed and water

31. Are the feed storage facilities (e.g. ensilaged feed, feed mixer, concentrates, ...) protected from pets and vermin? *(required)*

Select one option.
- Yes, but only from pets
- Yes, from both pets and ve
- No

32. Are feeding utensils

Select one
- Always
- Sometim
- Never

33. Is the by means

Select one
- Yes
- No, but I'
- No

34. Is the cattle drir

Select one
- Yes
- No

Scoring

Range: 0 (bad) – 100 (good)

Weight factors cattle

uired)

Dairy

External biosecurity	Weight (%)	Internal biosecurity	Weight (%)
Purchase and reproduction	39	Health management	29
Transport and carcass removal	17	Calving management	20
Feed and water	10	Calf management	21
Visitors and farmworkers	20	Dairy management	13
Vermin control and other animals	14	Adult cattle management	7
		Working organisation and equipment	10

- Translation of the Survey

- Applicability and Reliability testing - on-farm and 16 national experts

  - Median and Interquartile range (Q1 – Q3)
  - Rate from 1 – 10, acceptable criterion Median > 5

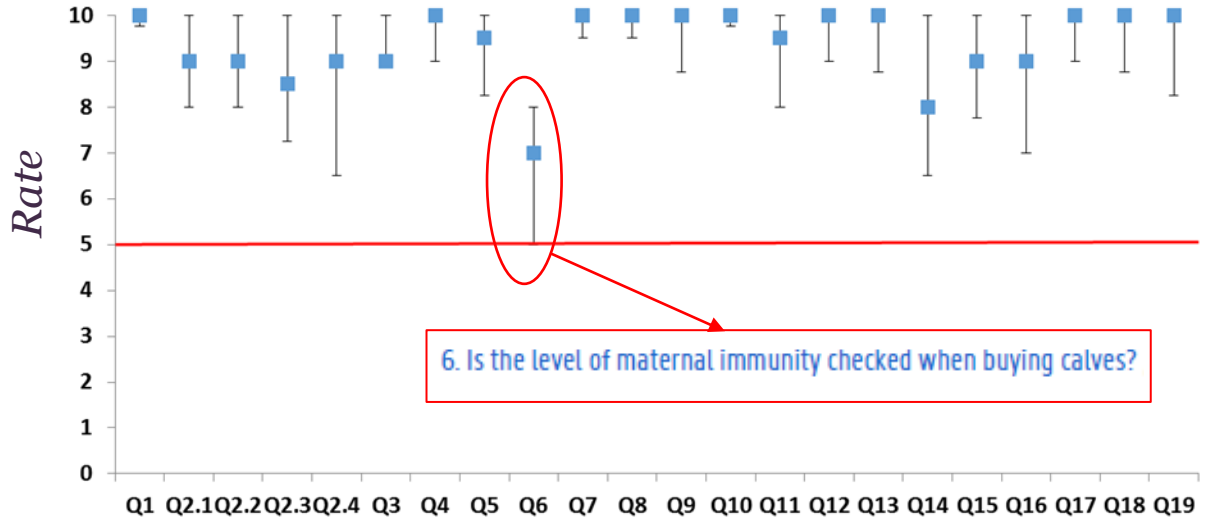
- Biosecurity assessment:
  - training of >80 assessors
  - 1000 randomly selected dairy farms
  - 952 visited farms
  - **723** dairy farms fully assessed

- Data analysis and statistics
  - Descriptive statistics; Median, IQ, Range
  - T-test independent samples

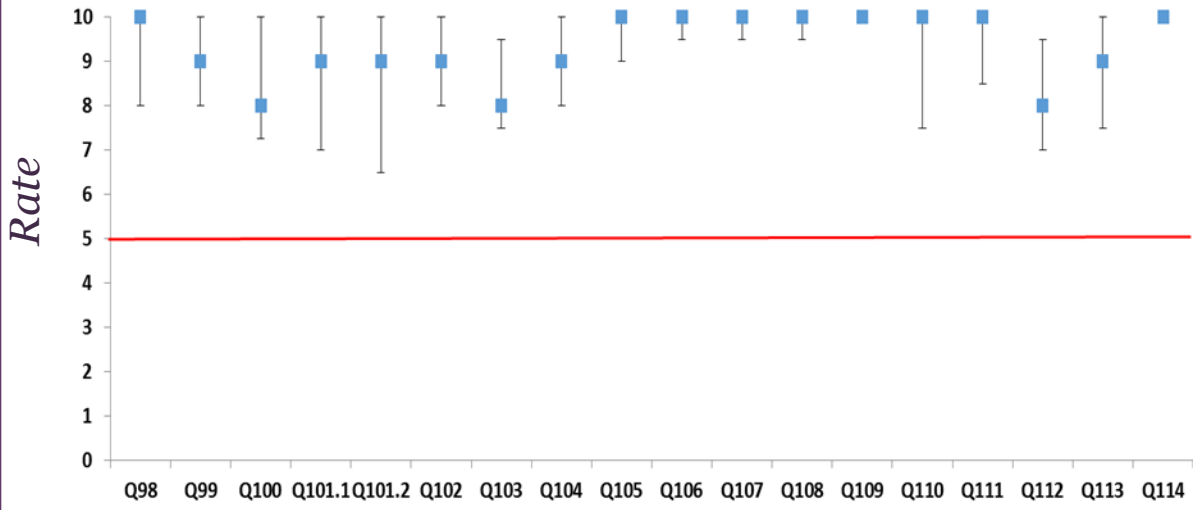
- Opinion of National Experts for the Biocheck Survey:

Highest Median	**10**
Lowest Median	**7**
Median Rate 10 (%)	**72**
Median Rate 9 (%)	**20**
Median Rate 8 (%)	**6**
Median Rate 7 (%)	**2**

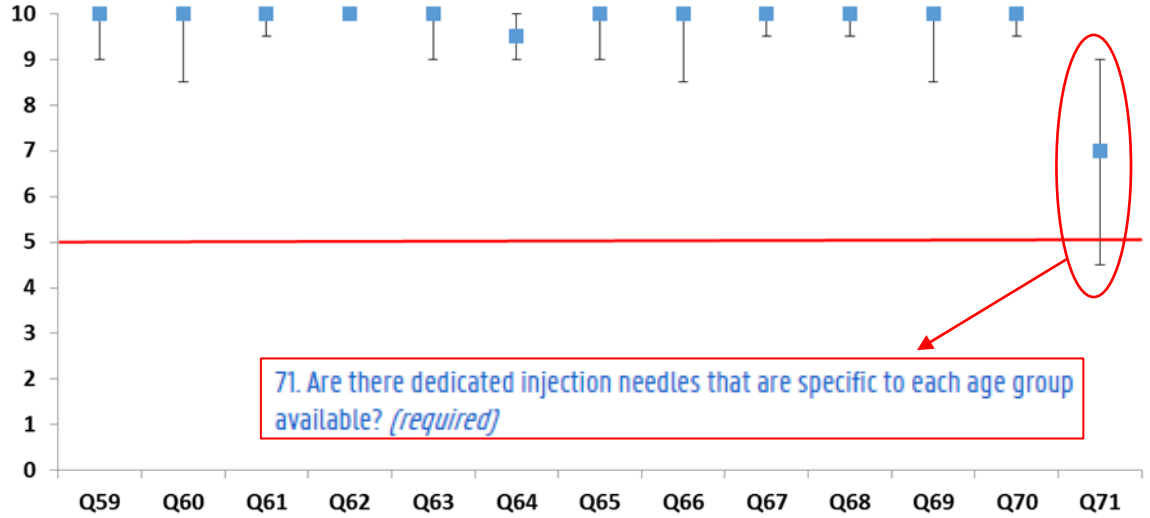
Purchase and Reproduction



Dairy Management

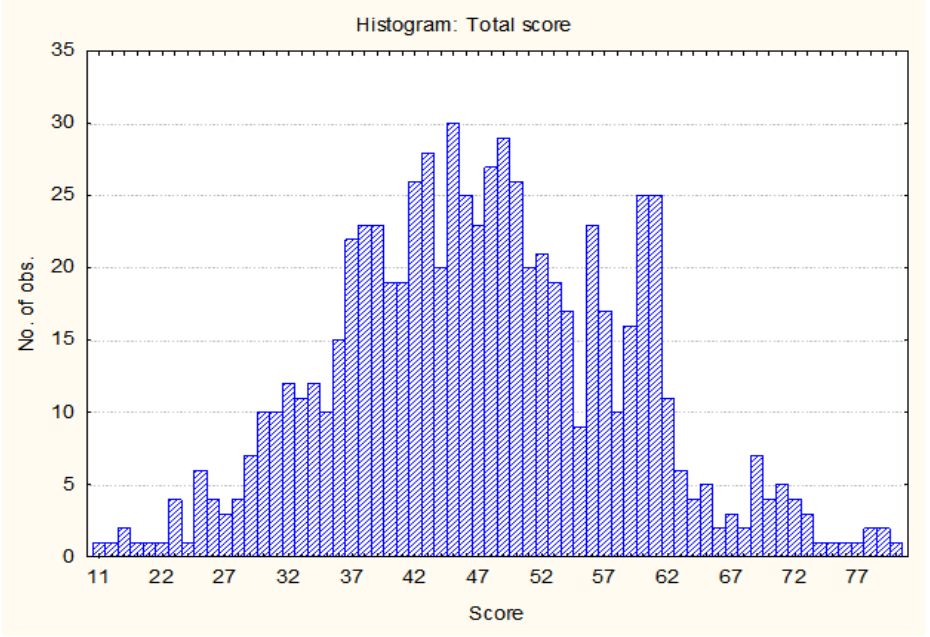


Health Management



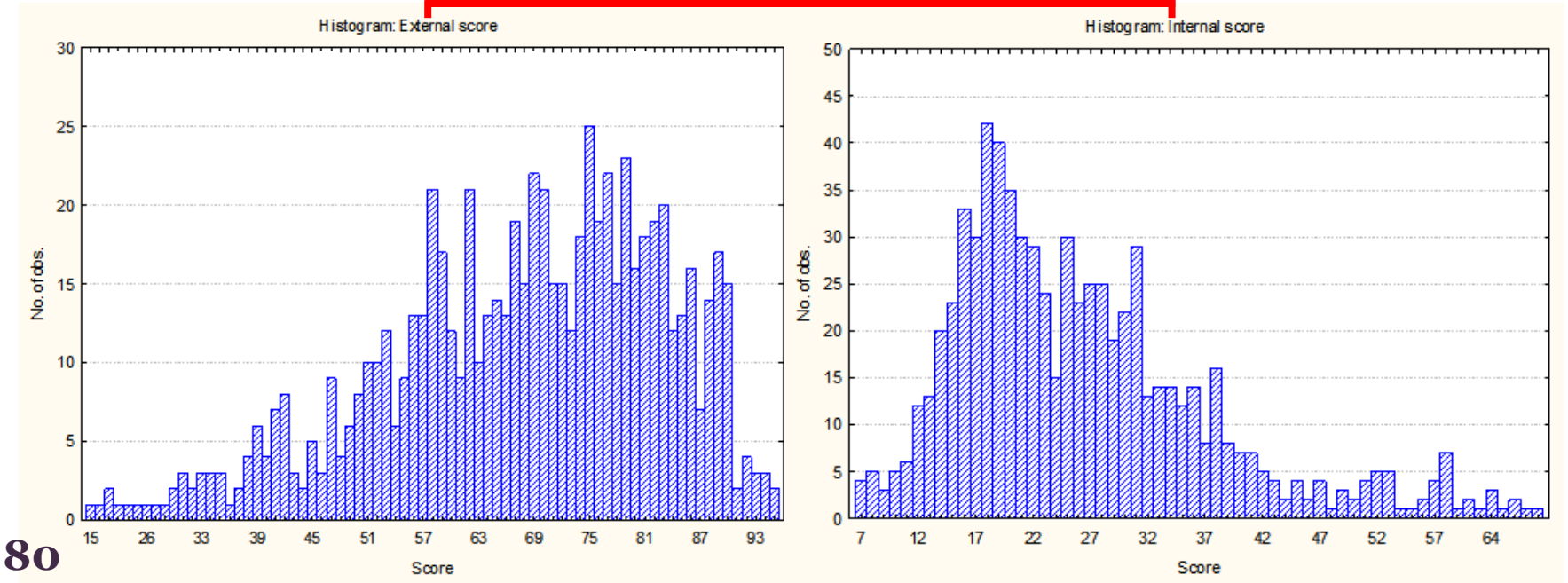
- Total Biosecurity Assessment Score (n=723)

  - **Median Score: 47**
  - **Interquartile range: 39 – 56**
  - **Minimum Score: 11**
  - **Maximum Score: 92**



External vs Internal Biosecurity

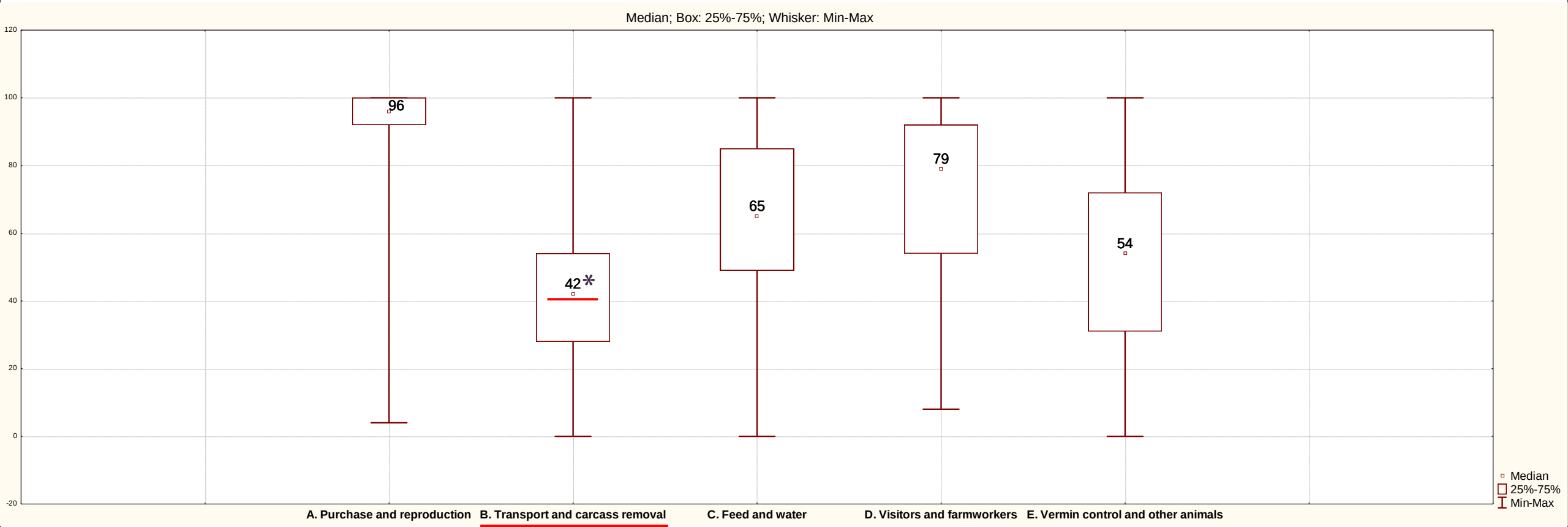
p < 0.0001



Median: 70
IQ range: 58 - 80

Median : 24
IQ range: 18 - 32

- **External Biosecurity scores:**

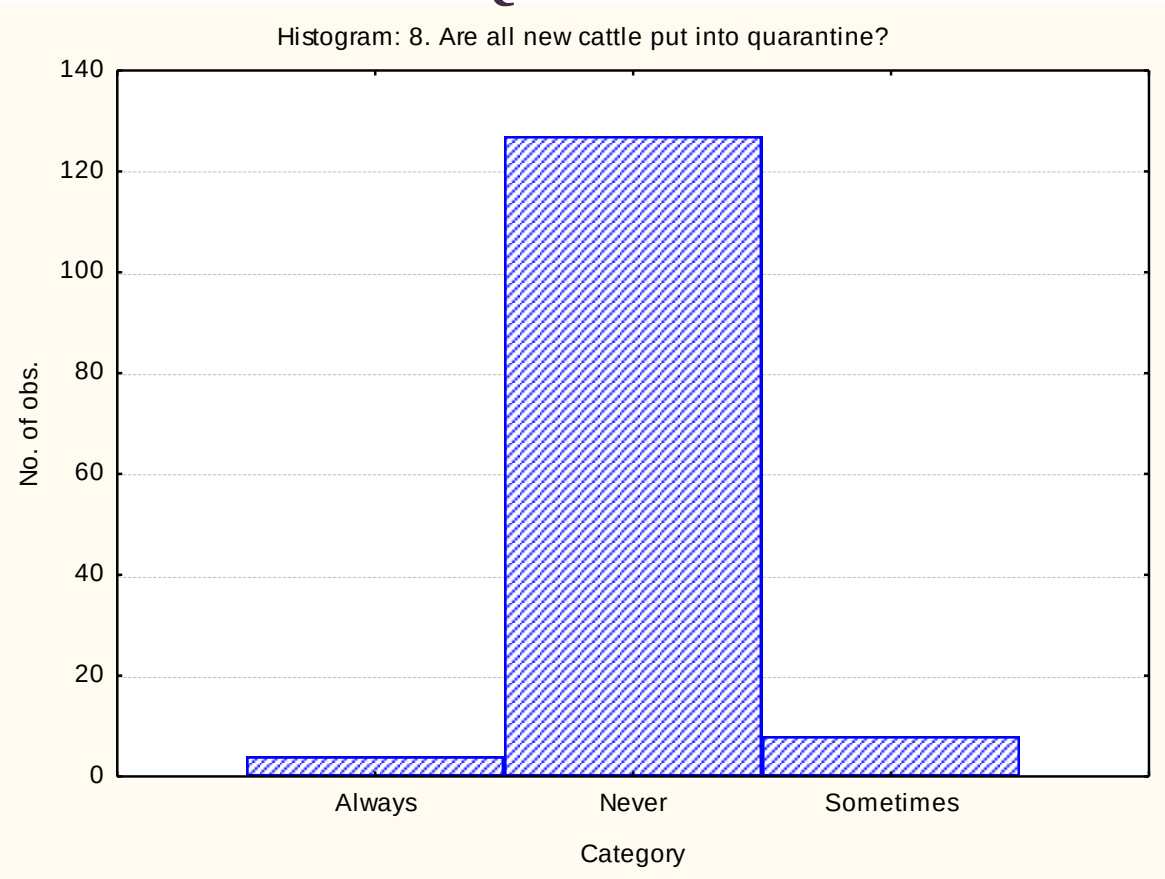


*p<0.0001

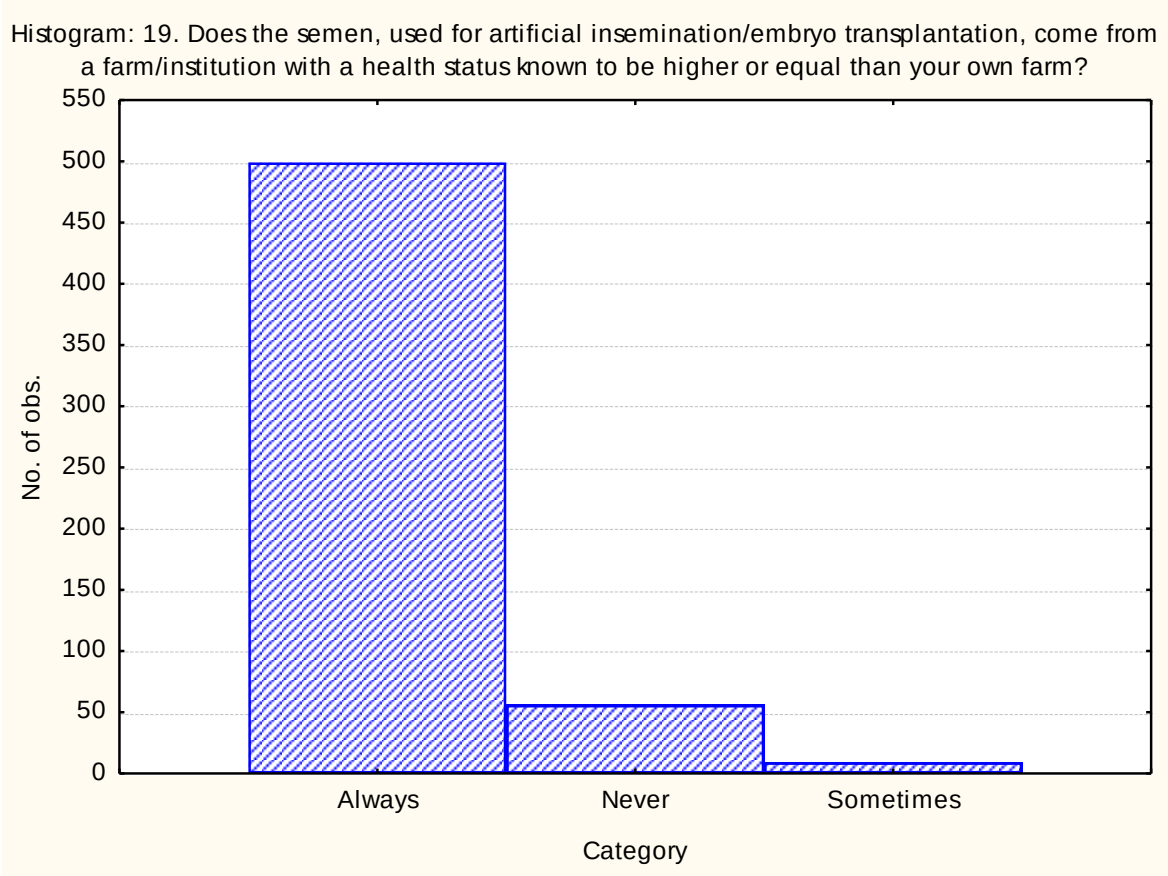
- Purchase and Reproduction (96):

  - **Cattle in the farm were not purchased in 81% farms**

Quarantine

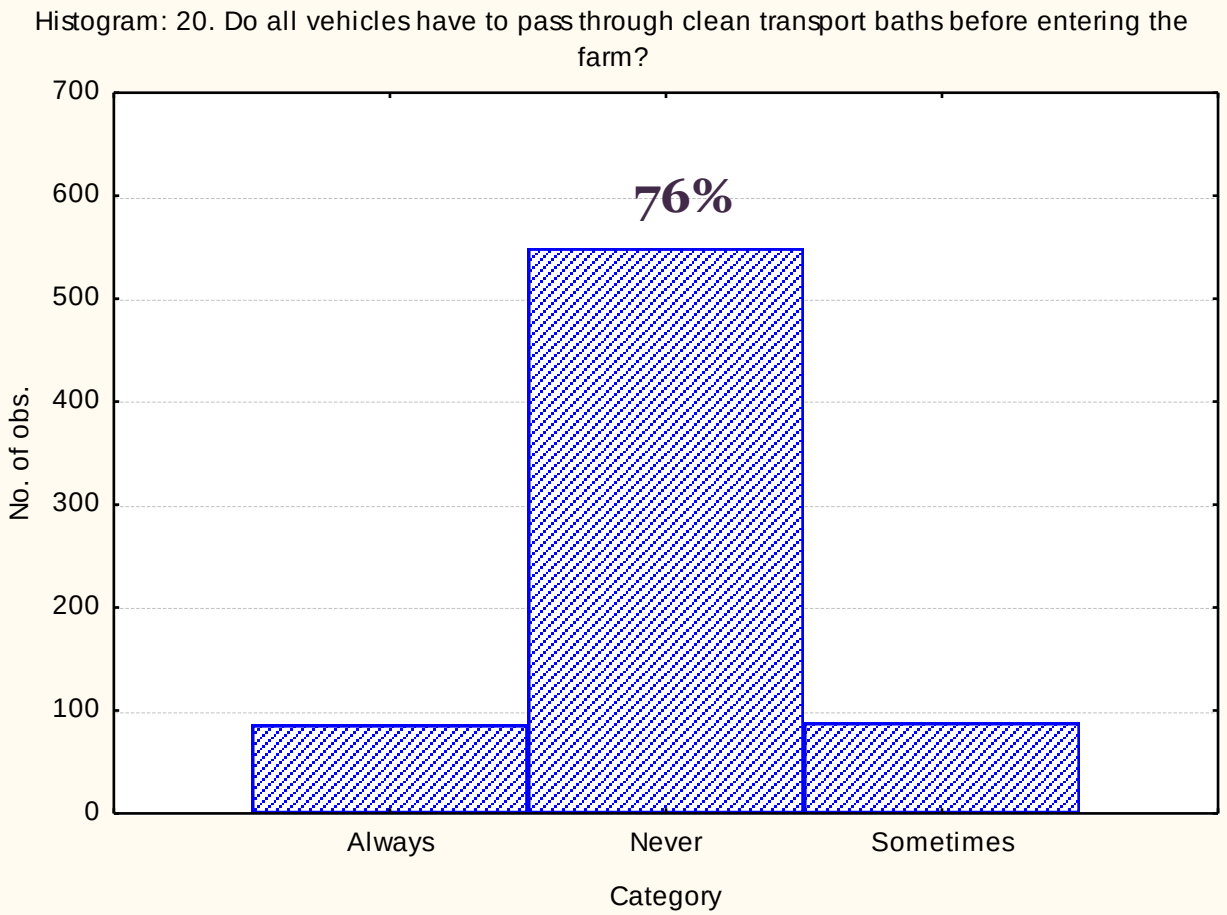


Semen Check

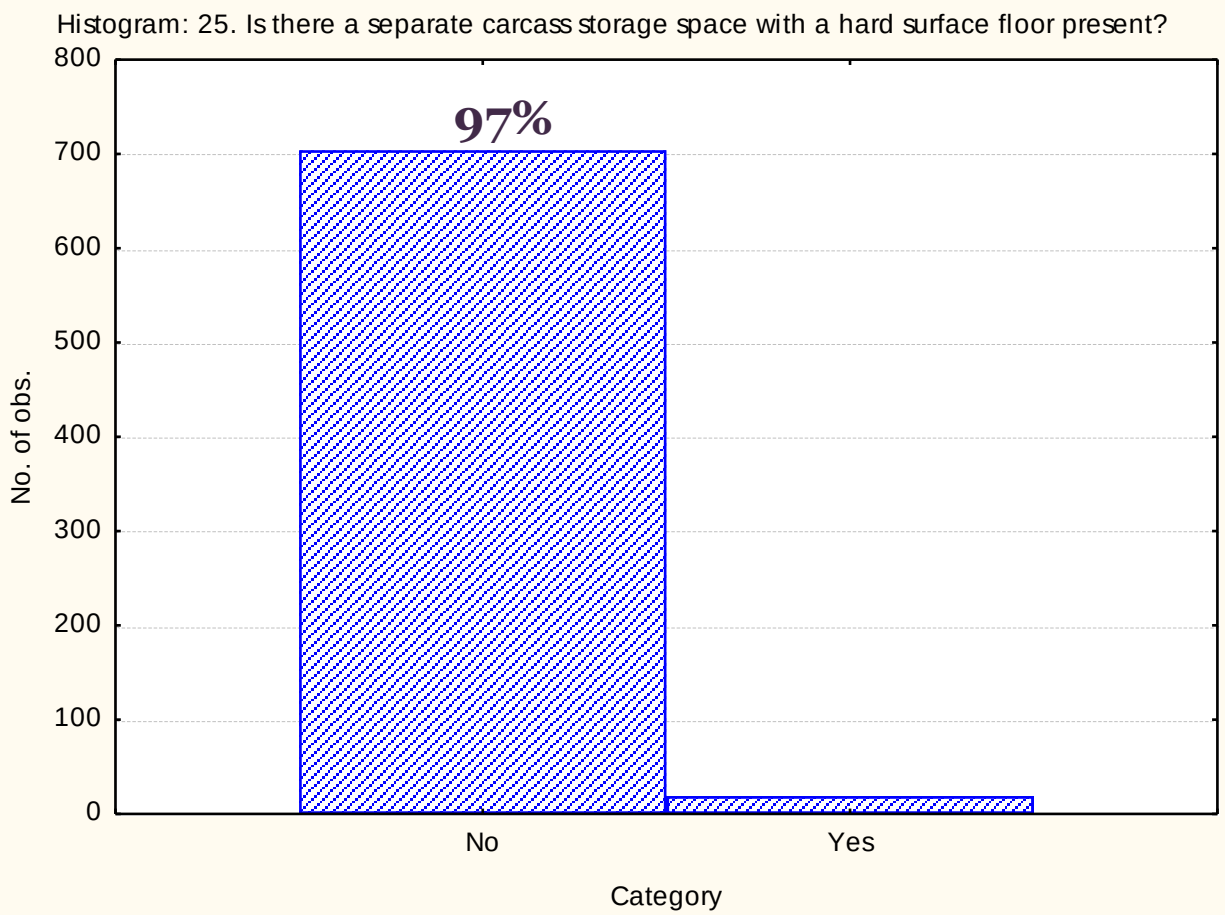


- Transport and Carcass removal (42):

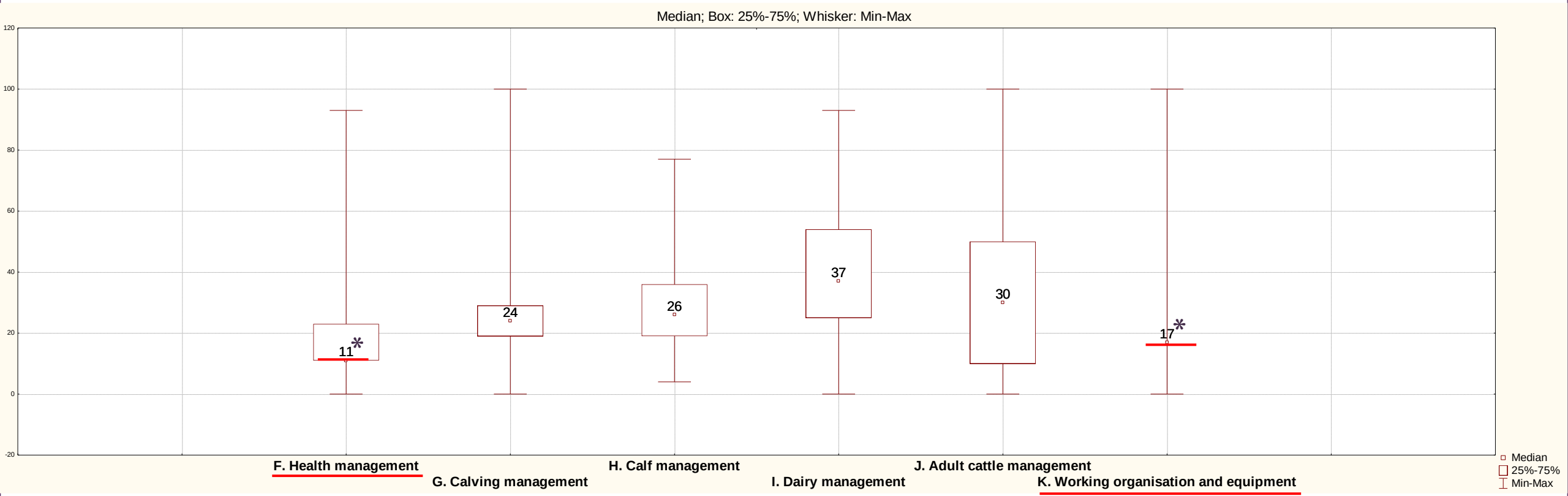
Transport baths at entrance



Carcass Storage Space



- **Internal Biosecurity scores:**

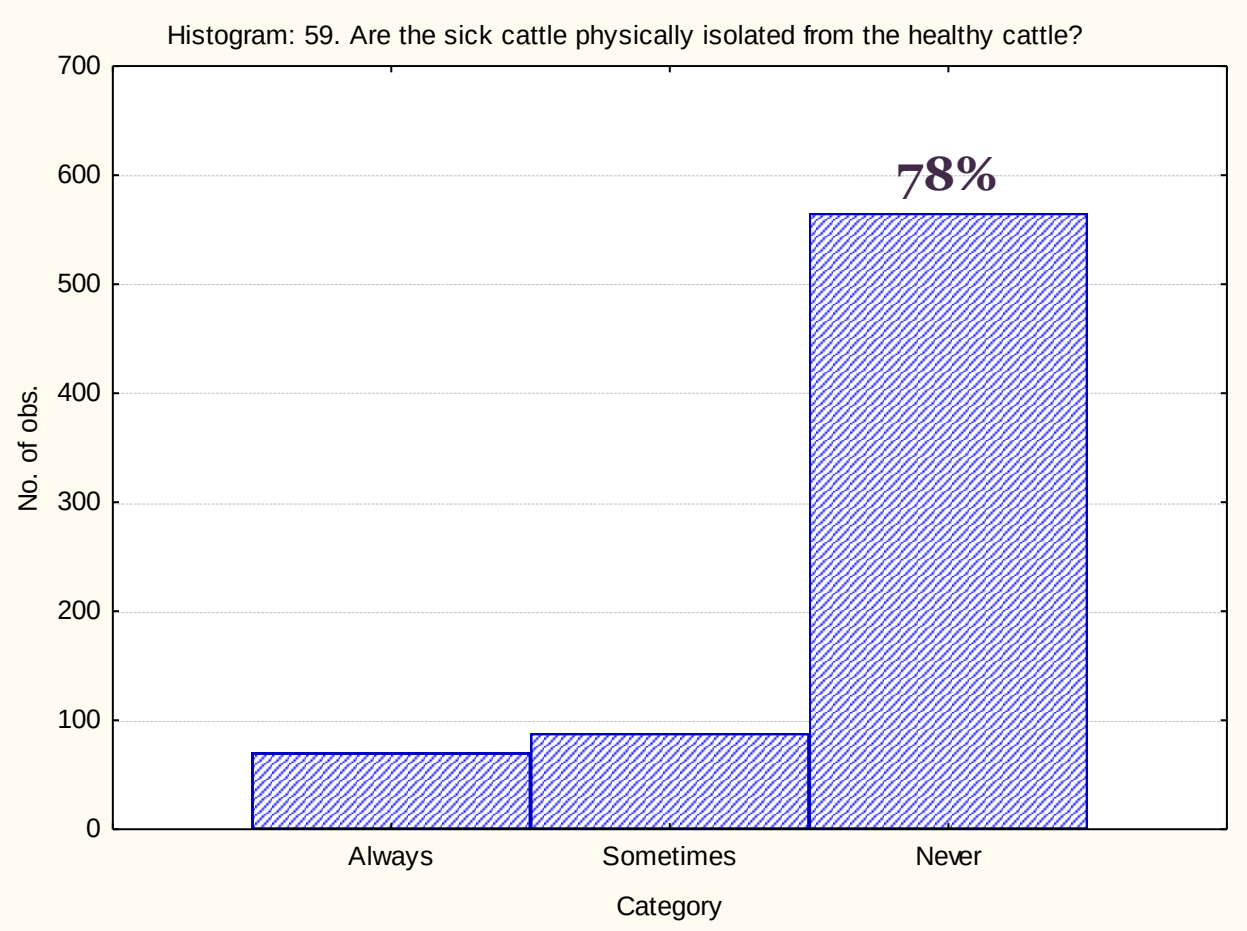


*p<0.0001

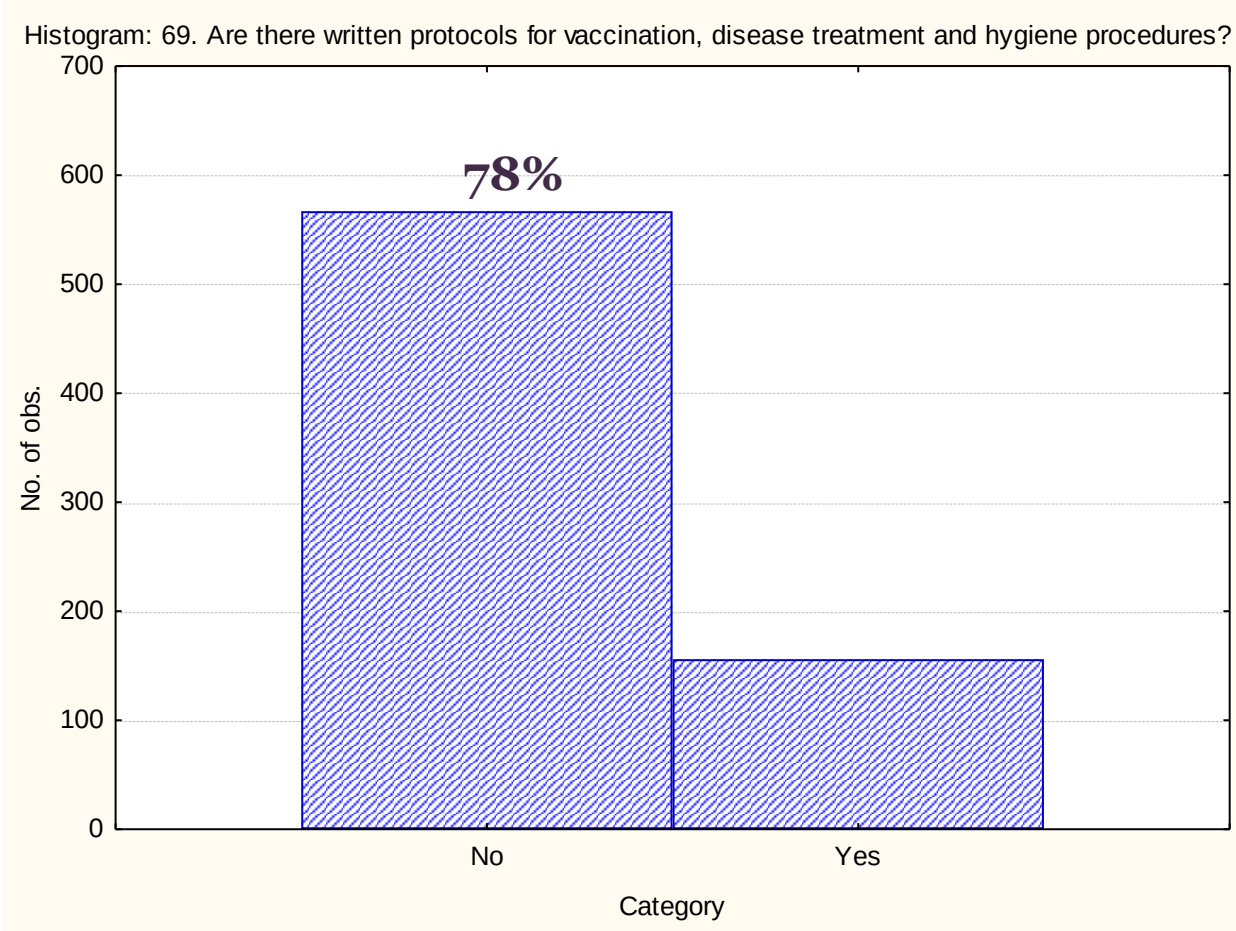
- Health Management (11):

  - **79% Don’t kept register with the animal health data**

Hospital pen

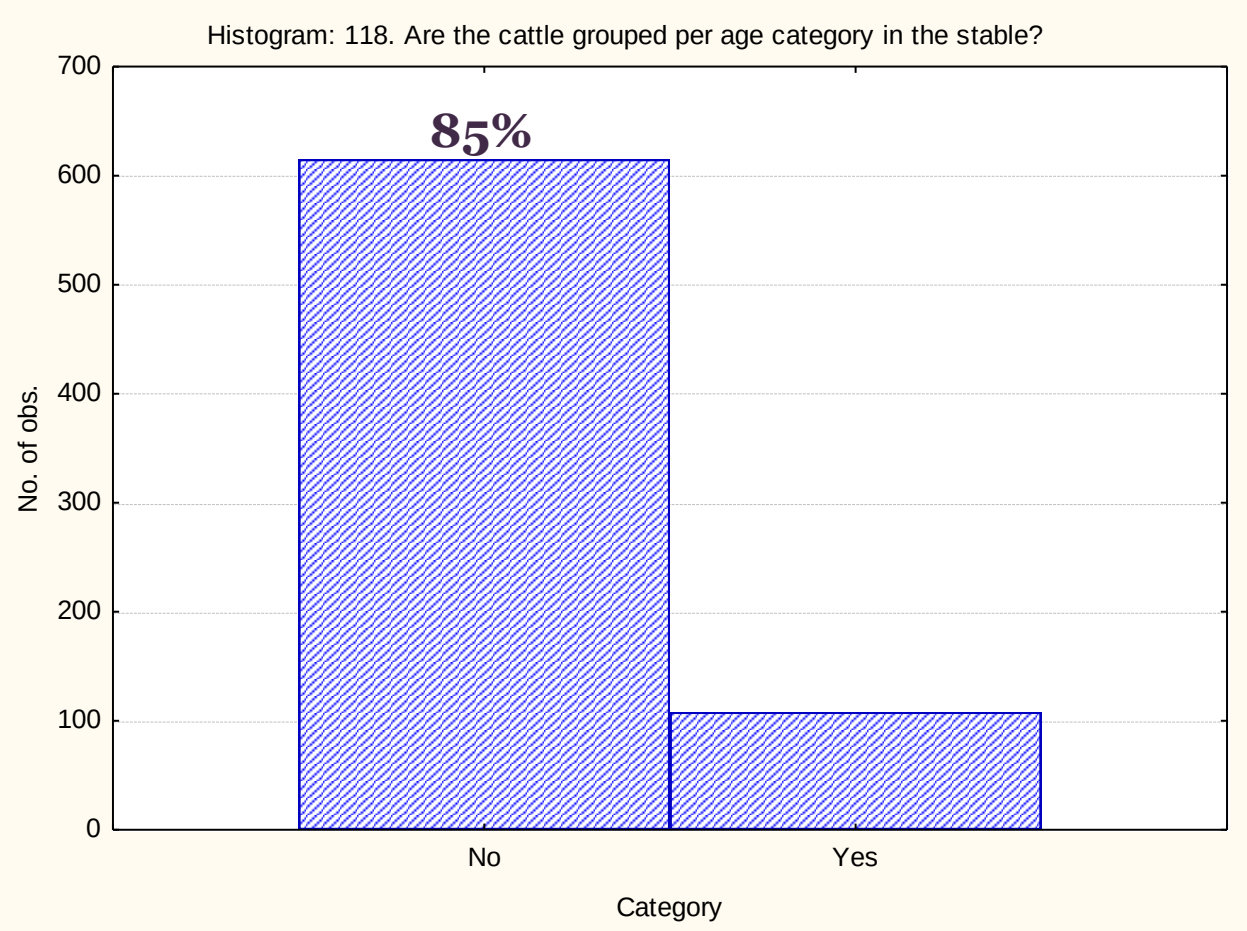


Written protocols and procedures

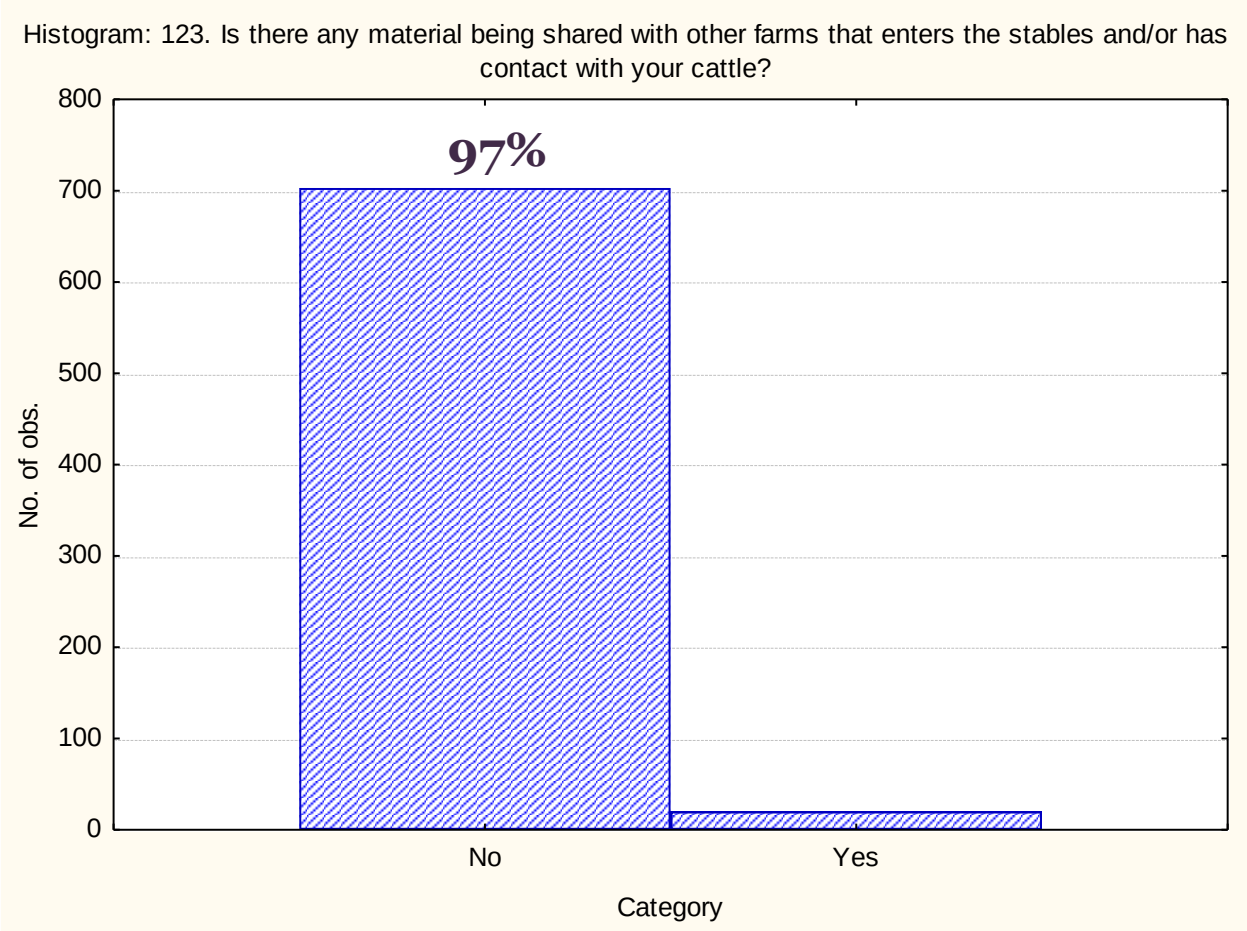


- Working Organization and Equipment (17):

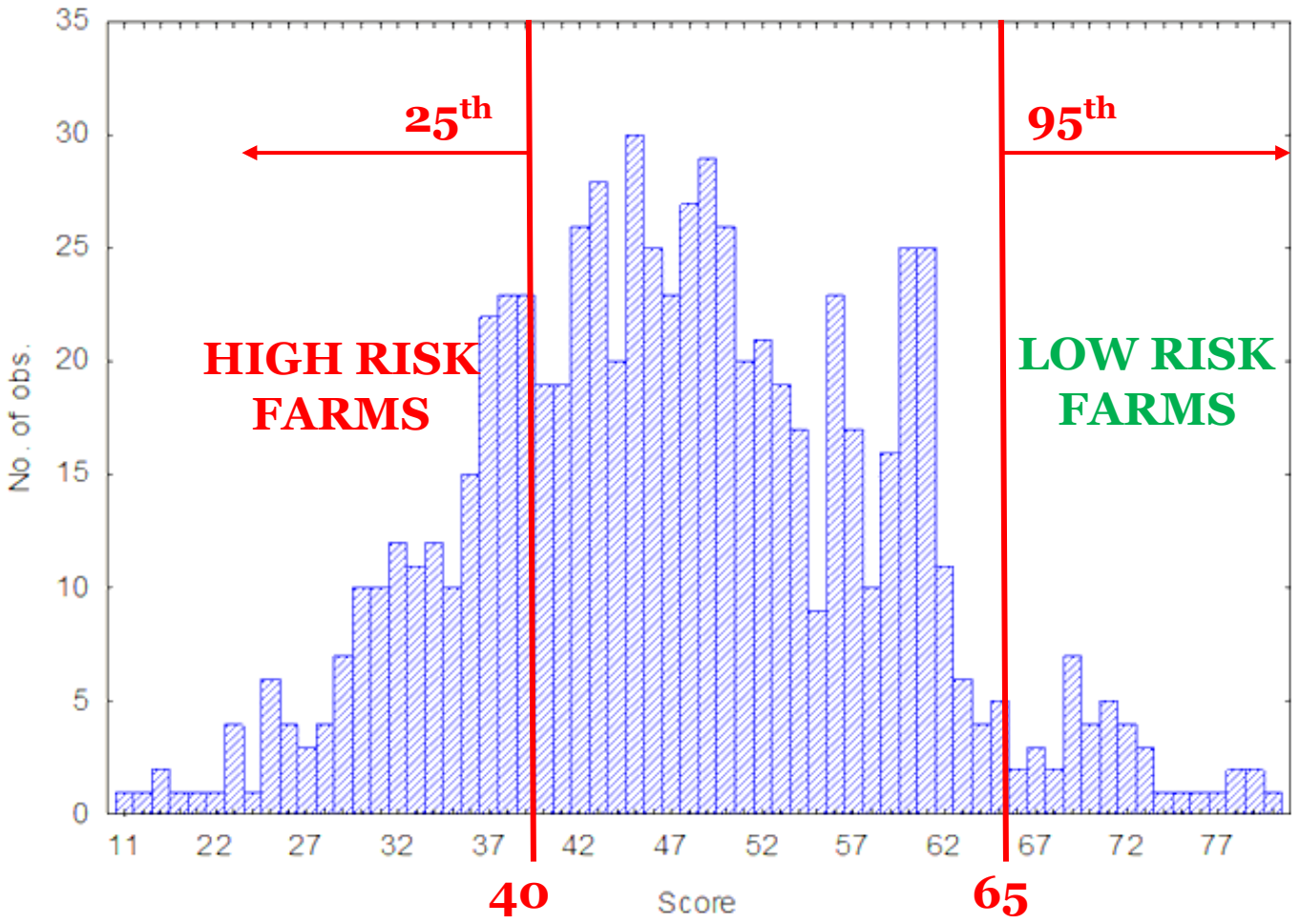
Grouping



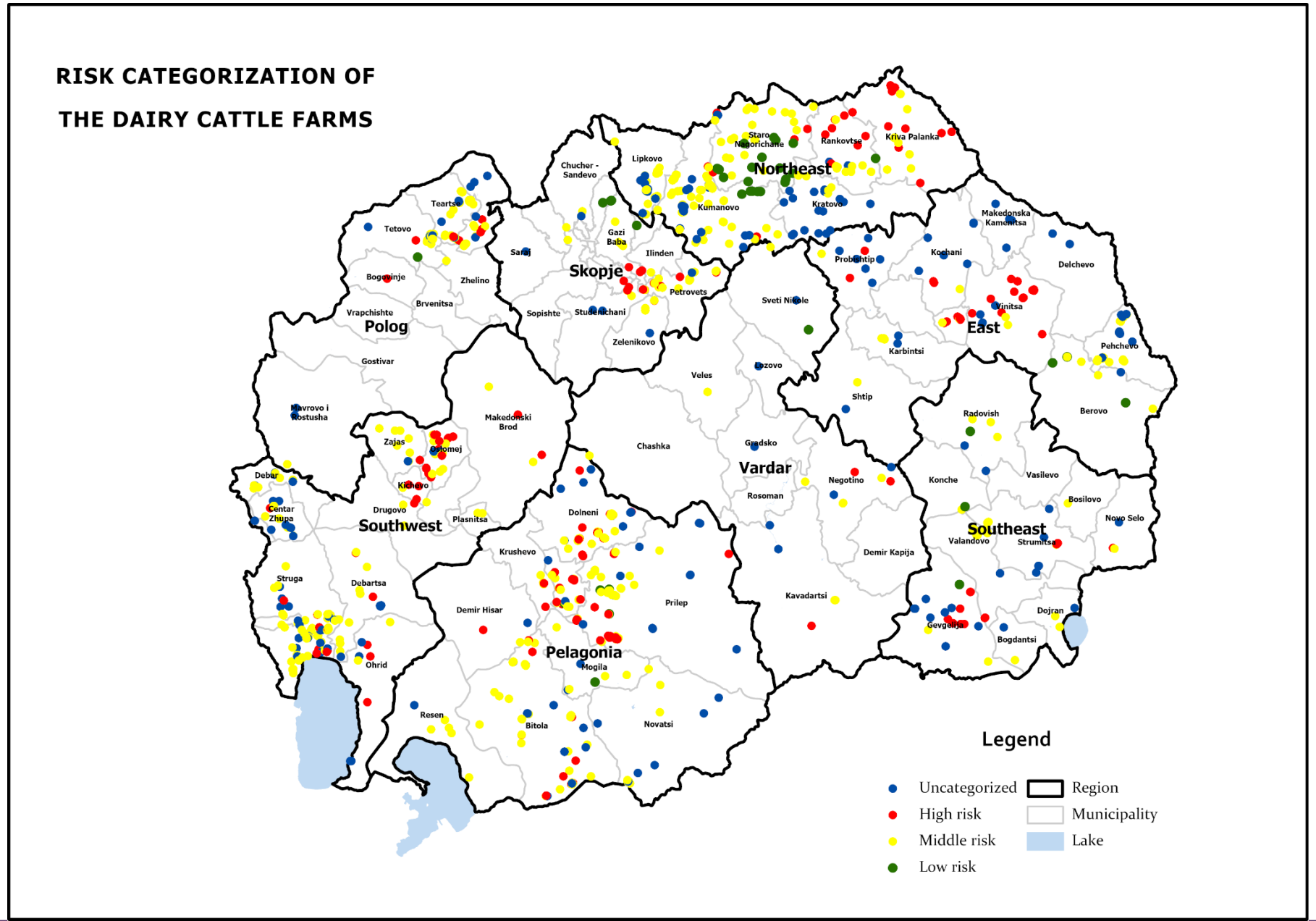
Sharing materials and equipment



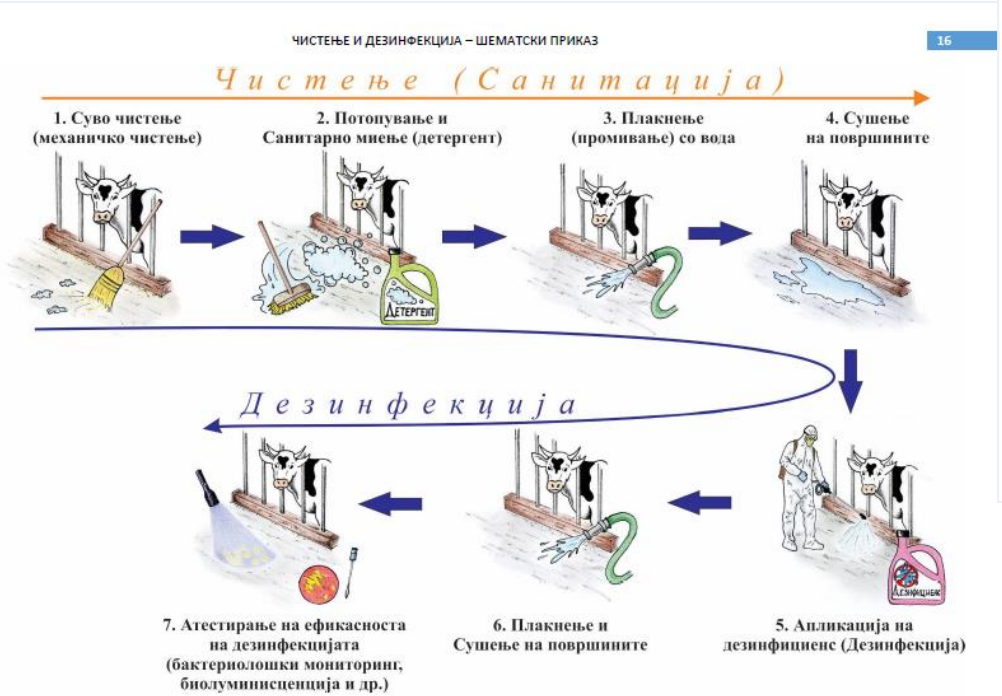
- **FARM CATEGORIZATION**
  - Reflection of reality (representative and stimulative)
  - Big challenge

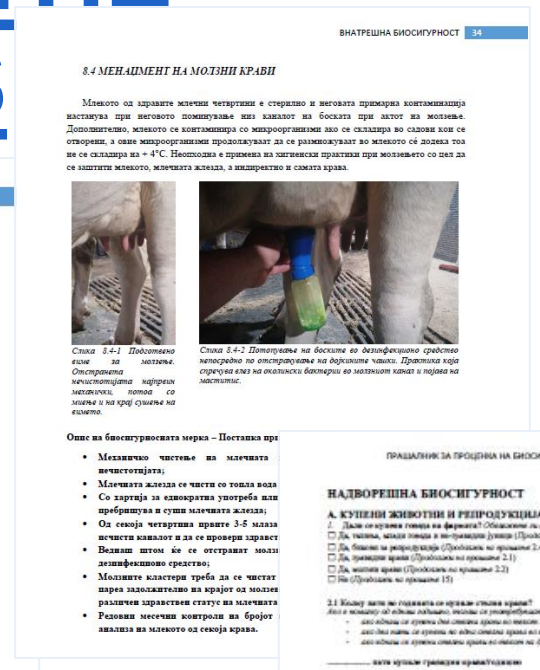


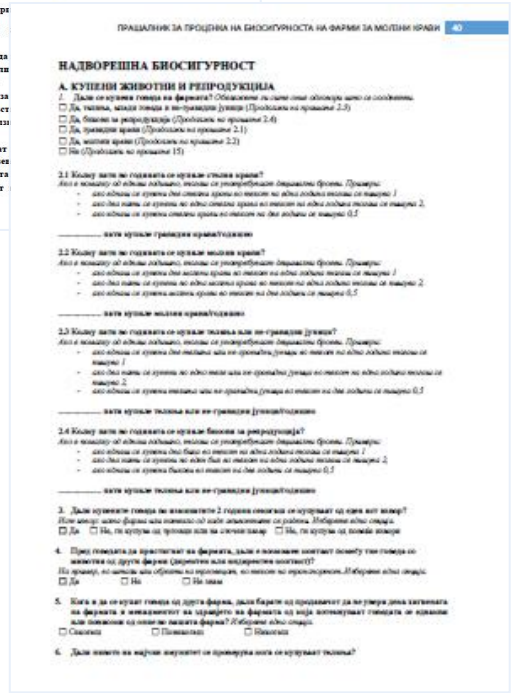
• FARM CATEGORIZATION MAPPING



III HANDBOOK FOR IMPROVING THE BIOSECURITY IN CATTLE FARMS







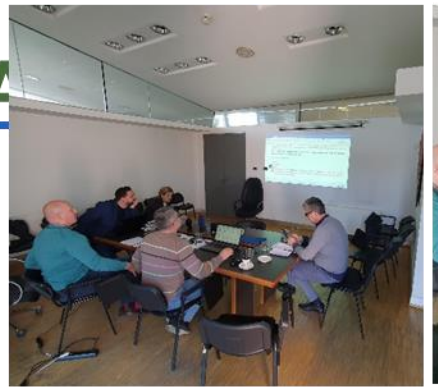
SEE Management Meeting, Online, 15.02.2022

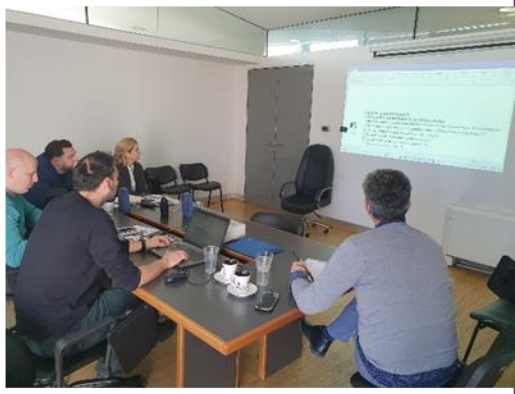
- **CONCLUSIONS**

- BIOCHECK acceptable and fit for the purpose
- External Biosecurity: Transport and carcass removal- high priority
- Internal biosecurity:
    - Health management
    - Farm organization
- Need for Farm Categorization and Scoring

Biosecurity Assessment and Scoring In Cows – Regional Approach (BASIC)

I -BIOSECURITY ASSESSMENT IN DAIRY FA IN MONTENEGRO





- Revision of the survey for assessing biosecurity
- Training workshop - train the future biosecurity assessors in Montenegro
- On-farm biosecurity assessment of at least 50 dairy farms in Montenegro

II-Biosecurity Scoring and Categorization system

- Farm categorization - each assessed farm from NAPIB and BASIC Project will be categorized by the newly developed categorization system.

- **ACKNOWLEDGMENT**

Funded by the European Union

european commission for the control of foot-and-mouth disease

Faculty of Veterinary Medicine

Food and Veterinary Agency

Veterinary Chamber

National Farmers' Federation of Macedonia

Directorate for Food safety, Veterinary and Phytosanitary Affairs Montenegro

THANK YOU FOR YOUR ATTENTION

IMPACT OF BIOSECURITY – PRODUCTION

"It is health that is real wealth and

not pieces of gold and silver."

- Mahatma Gandhi -

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IMPACT OF BIOSECURITY – ECONOMICS

ELSEVIER

Preventive Veterinary Medicine

Volume 129, 1 July 2016, Pages 74-87

Farm-economic analysis of reducing antimicrobial use whilst adopting improved management strategies on farrow-to-finish pig farms

Cristina Rojo-Gimeno [a, b, 1], Merel Postma [b, 1], Jeroen Dewulf [b], Henk Hogeveen [c], Ludwig Lauwers [a, d], Erwin Wauters [a, e]

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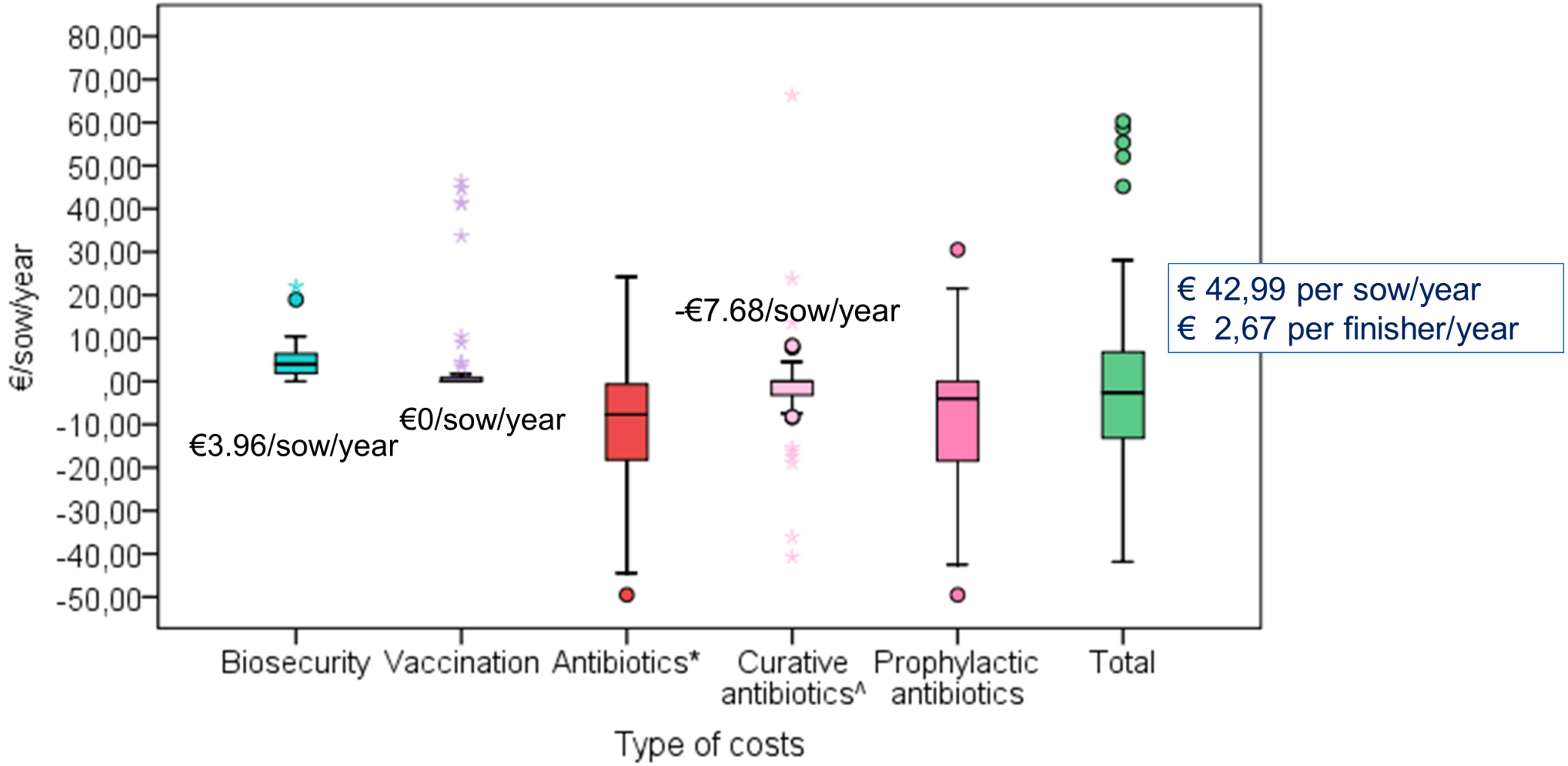
IMPACT OF BIOSECURITY – ECONOMICS



€ 42,99 per sow/year
€ 2,67 per finisher/year

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IMPACT OF BIOSECURITY – ECONOMICS

ELSEVIER

Preventive Veterinary Medicine

Volume 144, 1 September 2017, Pages 167-178

Herd-specific interventions to reduce antimicrobial usage in pig production without jeopardising technical and economic performance

L. Collineau [a, b], C. Rojo-Gimeno [c, d], A. Léger [a], A. Backhans [e], S. Loesken [f], E.Okholm Nielsen [g], M. Postma [d], U. Emanuelson [e], E.grosse Beilage [f], M. Sjölund [e, h], E. Wauters [c], K.D.C Stärk [a], J. Dewulf [d], C. Belloc [b], S. Krebs [b]

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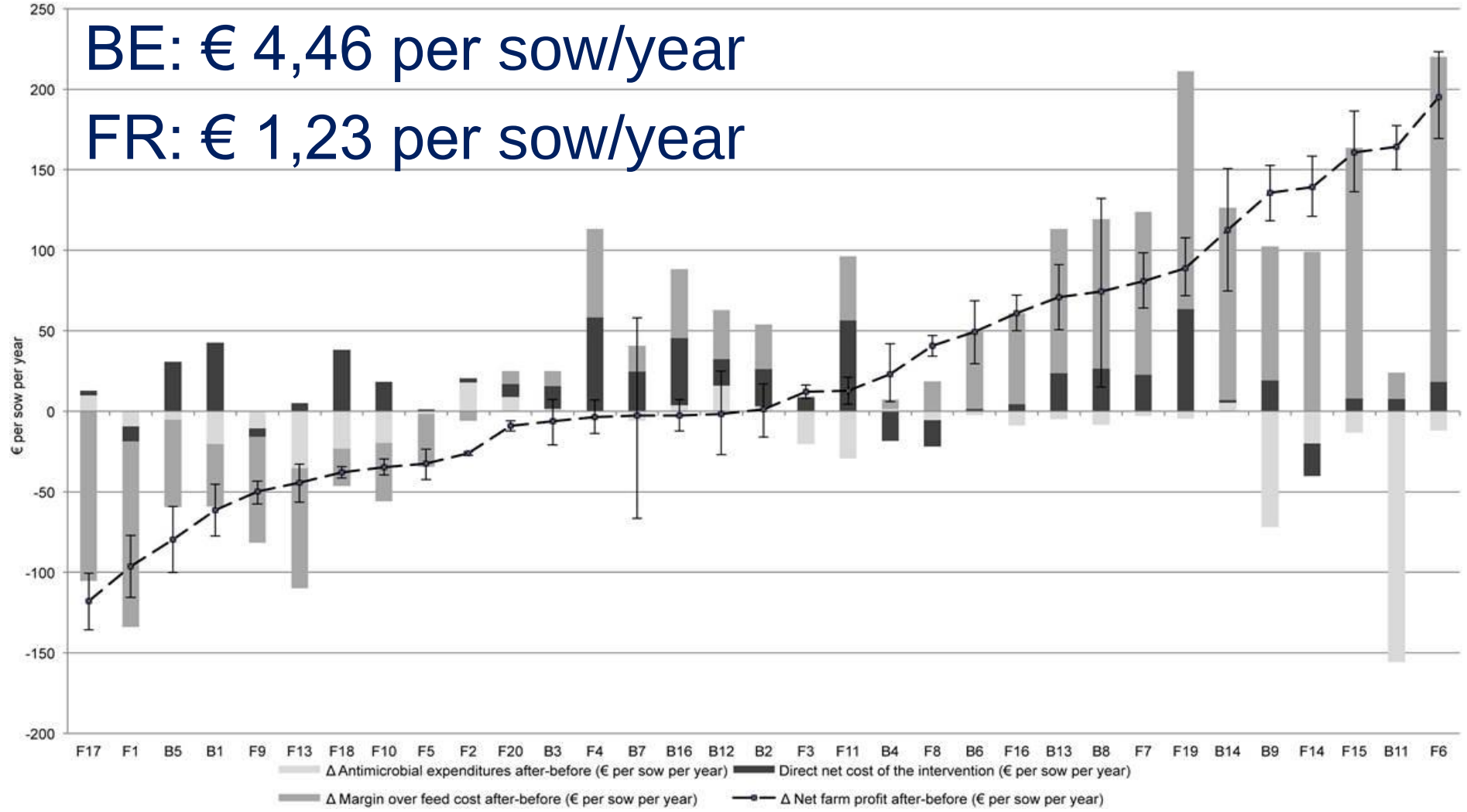
IMPACT OF BIOSECURITY – ECONOMICS

BE: € 4,46 per sow/year

FR: € 1,23 per sow/year



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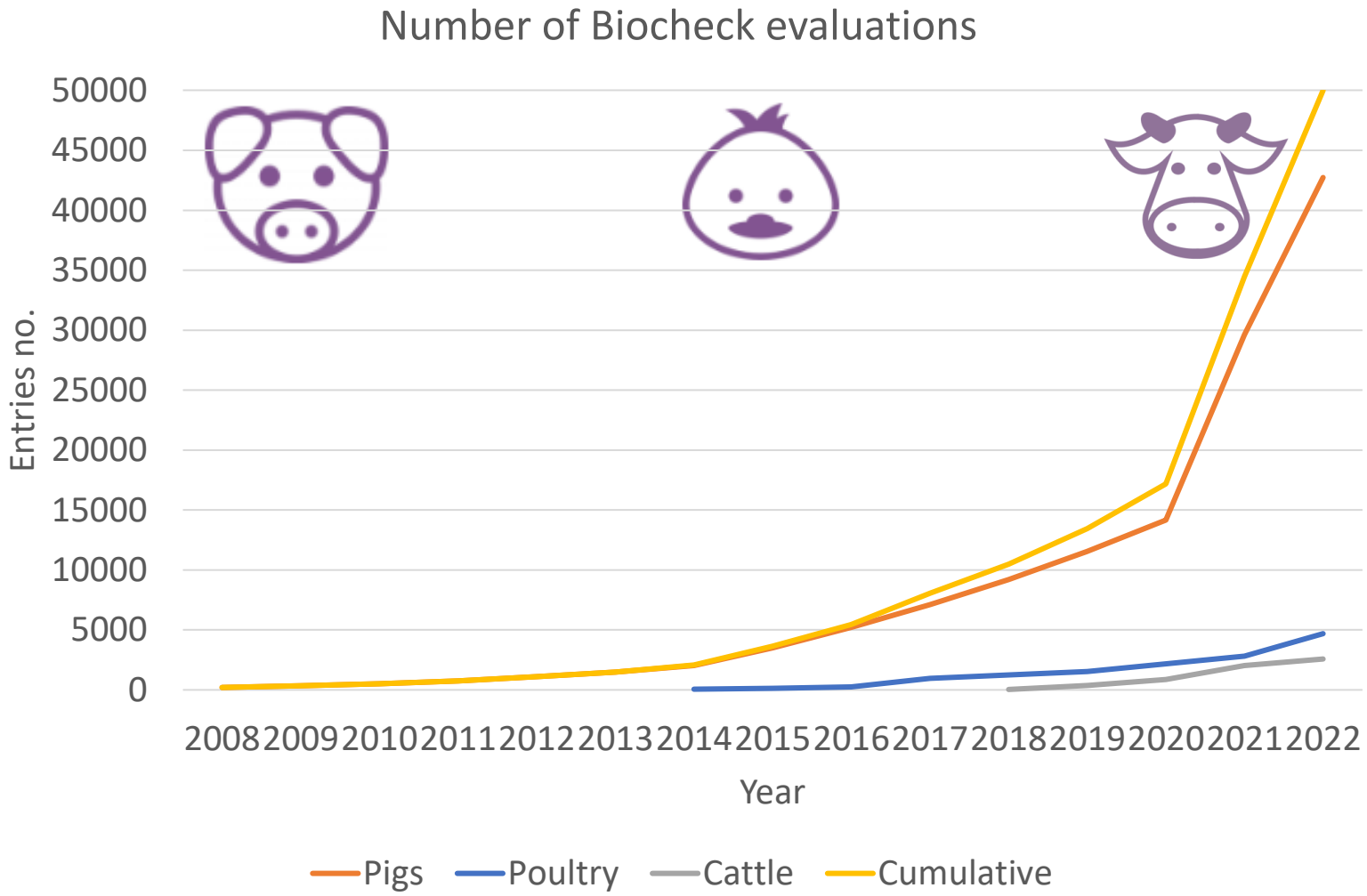
TOWARDS A BIOSECURITY SCORING SYSTEM



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FACULTY OF VETERINARY MEDICINE
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DEPARTMENT OF INTERNAL MEDICINE, REPRODUCTION AND POPULATION MEDICINE
VETERINARY EPIDEMIOLOGY

QUANTIFICATION OF BIOSECURITY MEASURES ON PIG FARMS IN EIGHT EU COUNTRIES

Iryna Makovska, Ilias Chantziaras, Nele Caekebeke, Pankaj Dhaka, Jeroen Dewulf

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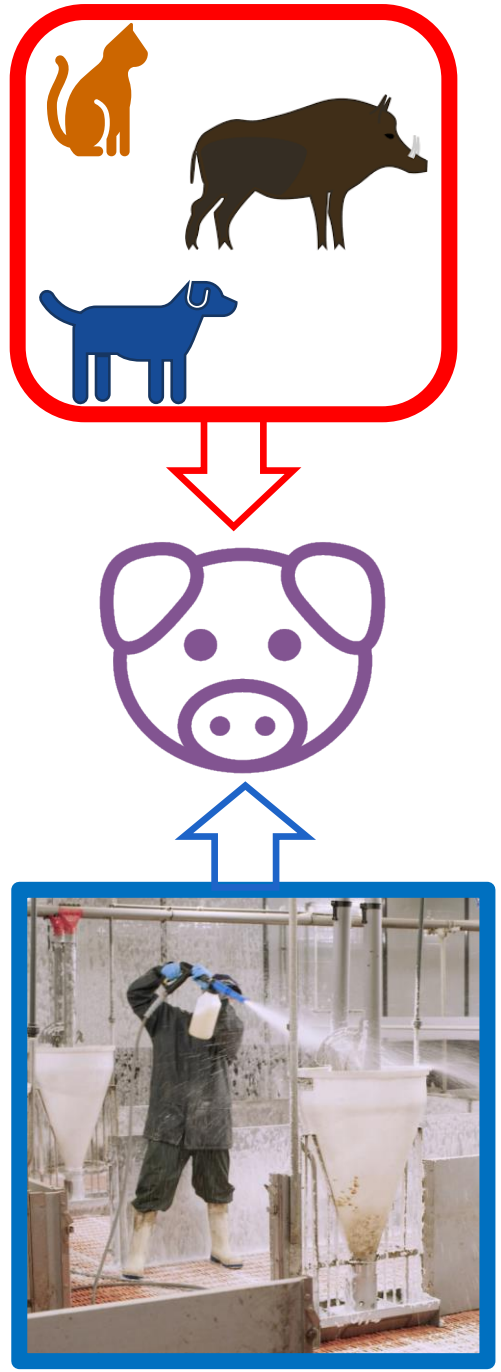
INTRODUCTION

External biosecurity component:

- Contact of farm pigs with wildlife/stray animals/pets
  - ✓ Targeted: 3 parameters in questionnaire

Internal biosecurity component:

- Cleaning and disinfectant procedures
  - ✓ Targeted: 3 parameters in questionnaire



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Contact of farm pigs with wildlife/stray animals/pets

Biocheck.UGent data were analyzed
Questionnaires from **8445** **pig farms*** in 8 EU countries were considered

Countries	No. of farms
Belgium	5726
Finland	1208
Germany	153
Ireland	482
Italy	298
Netherlands	178
Poland	138
Spain	262
Total	**8445**

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(not all the data entries are separate farms as sometimes / often for some countries the same farm can come back every year)

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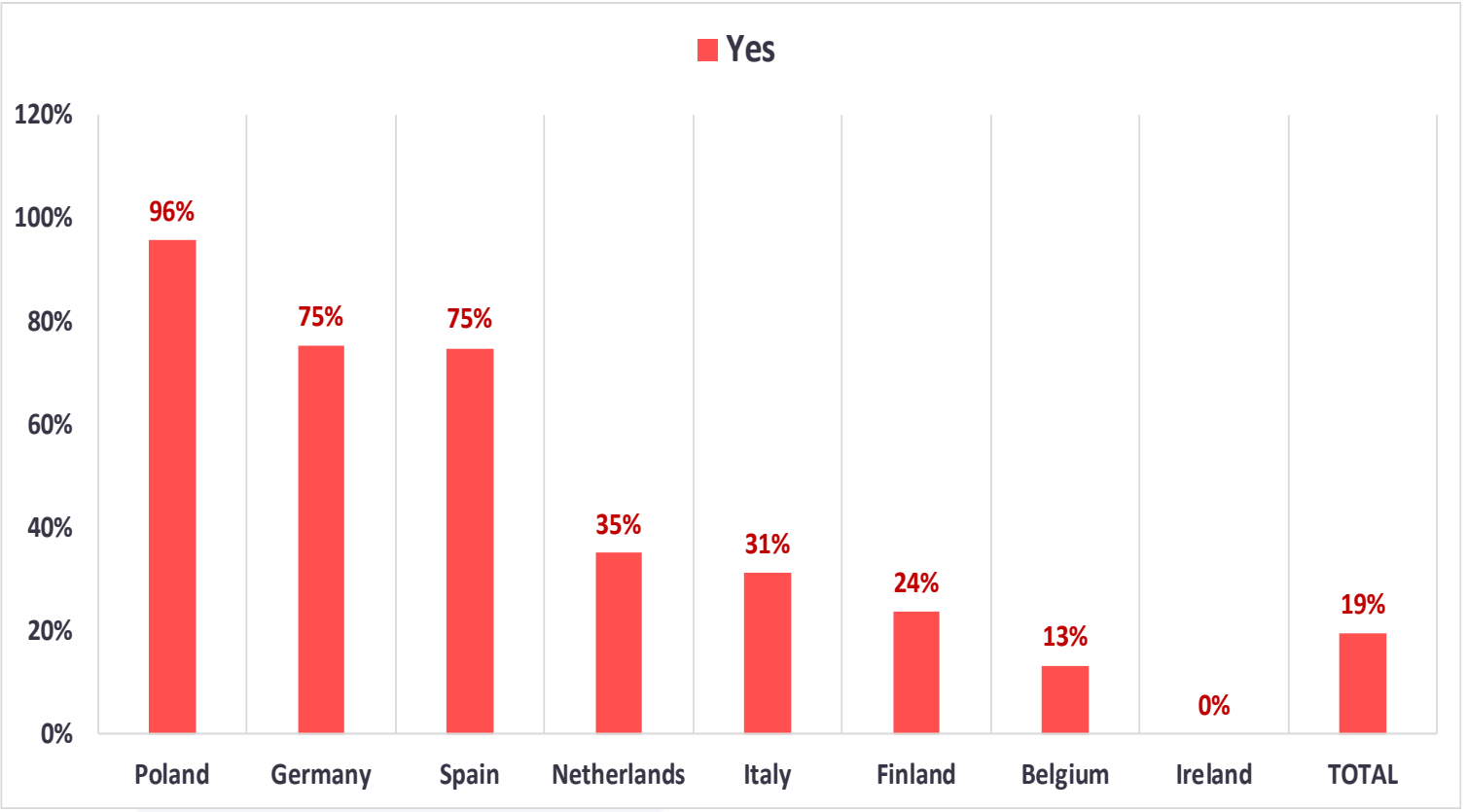
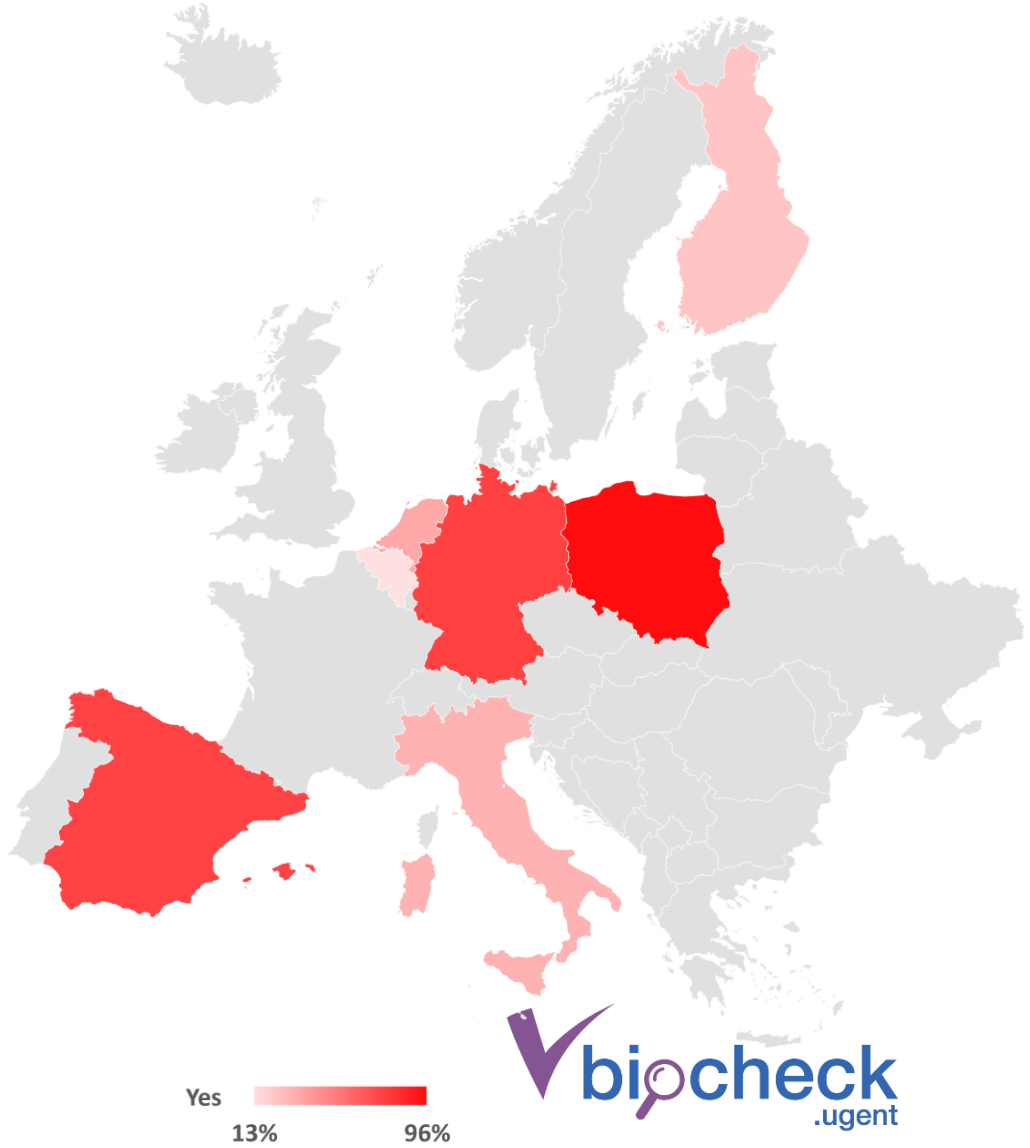
1. HAVE WILD BOARS BEEN SPOTTED WITHIN A 10-KILOMETRES RADIUS (6.2 MILES) OF YOUR FARM?





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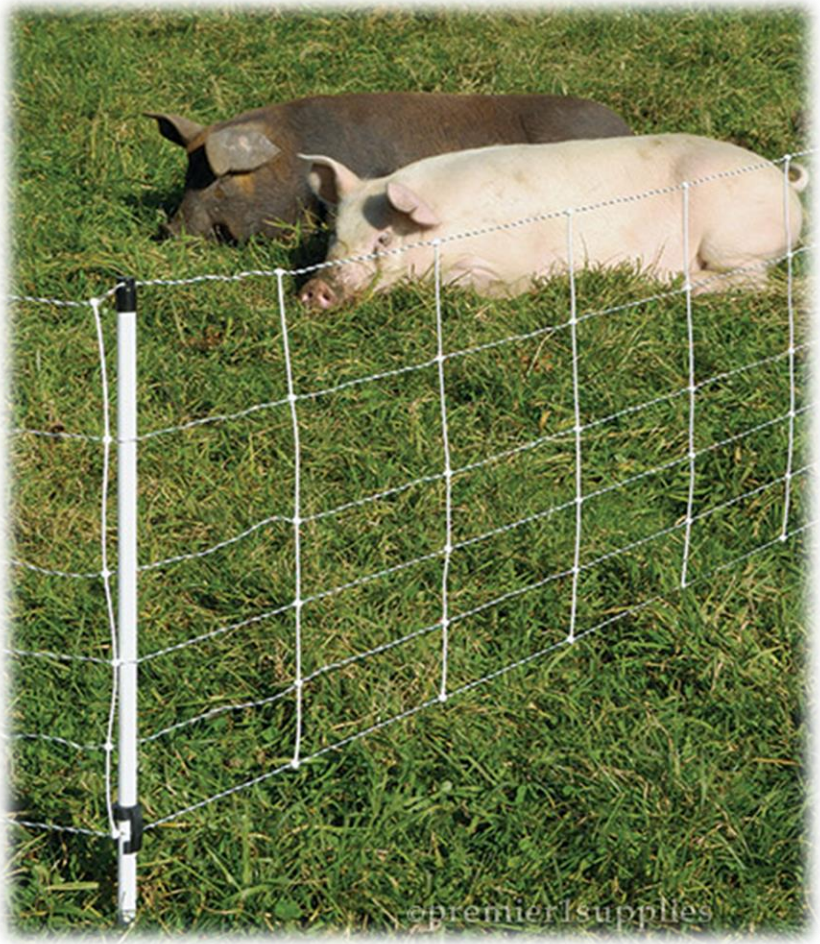
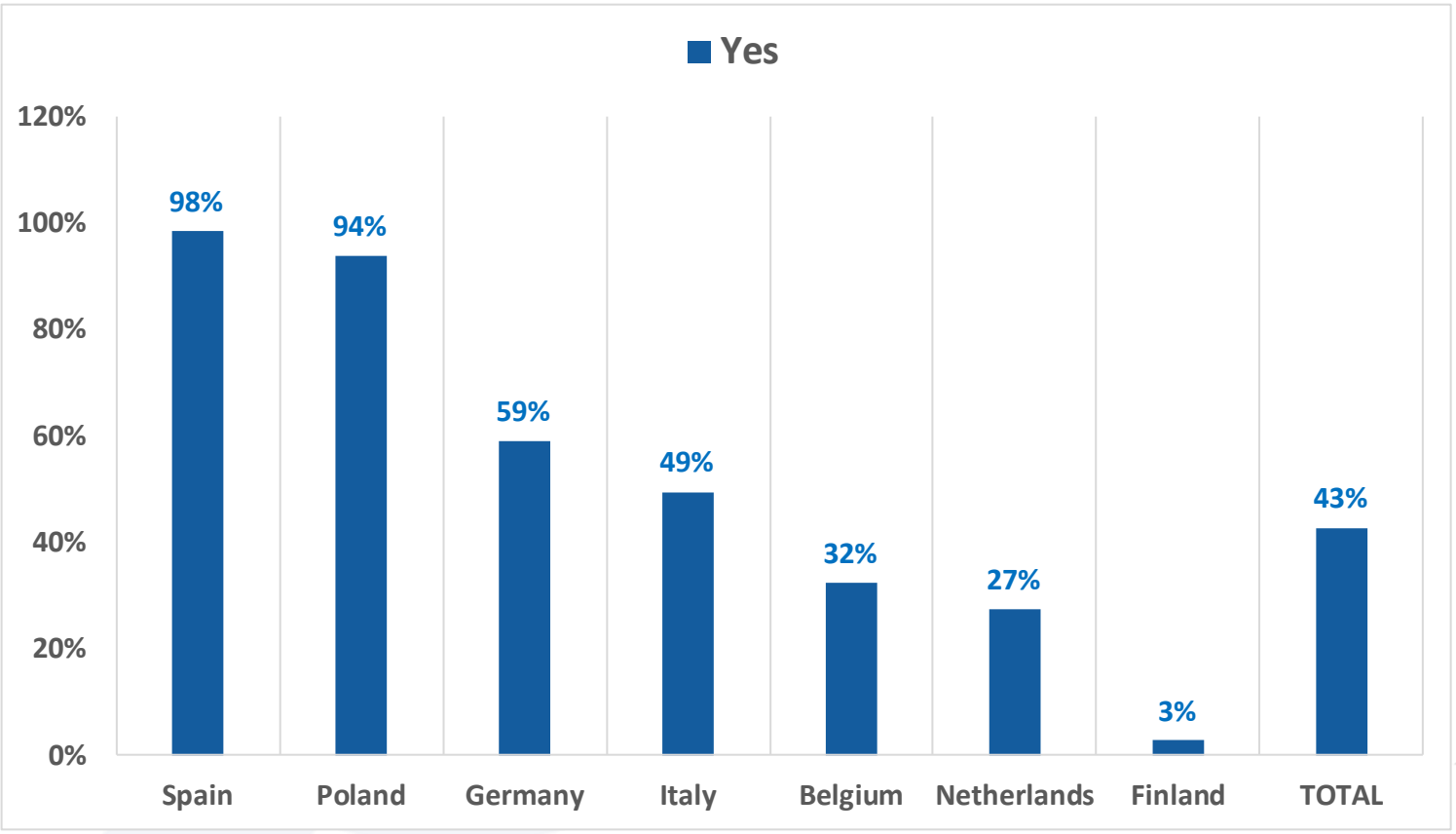
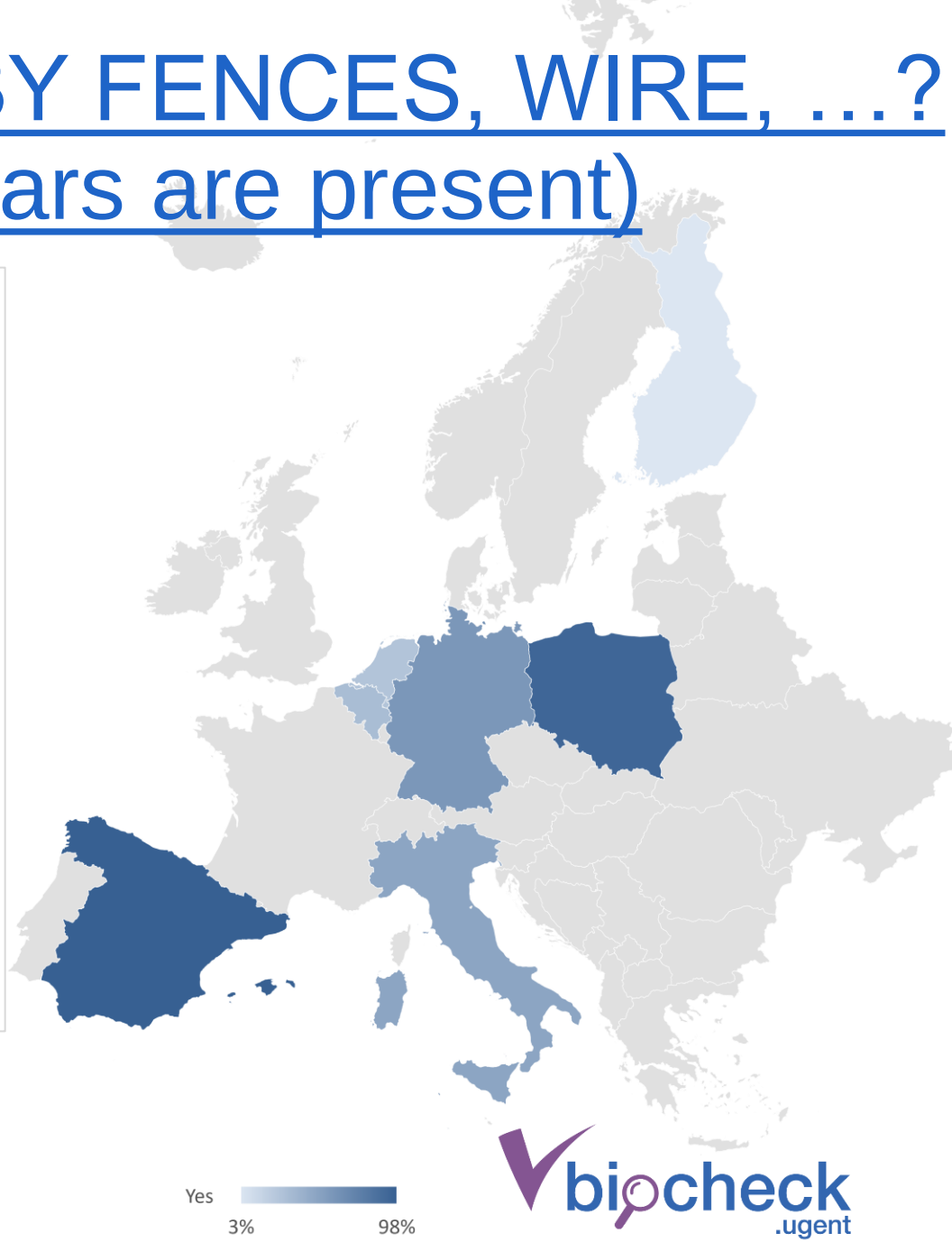
2. IS THE FARM ENCLOSED BY FENCES, WIRE, …?



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





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3. DO PETS HAVE ACCESS TO THE STABLES (INCLUDING THE STORAGE FOR FEED AND BEDDING MATERIAL)?

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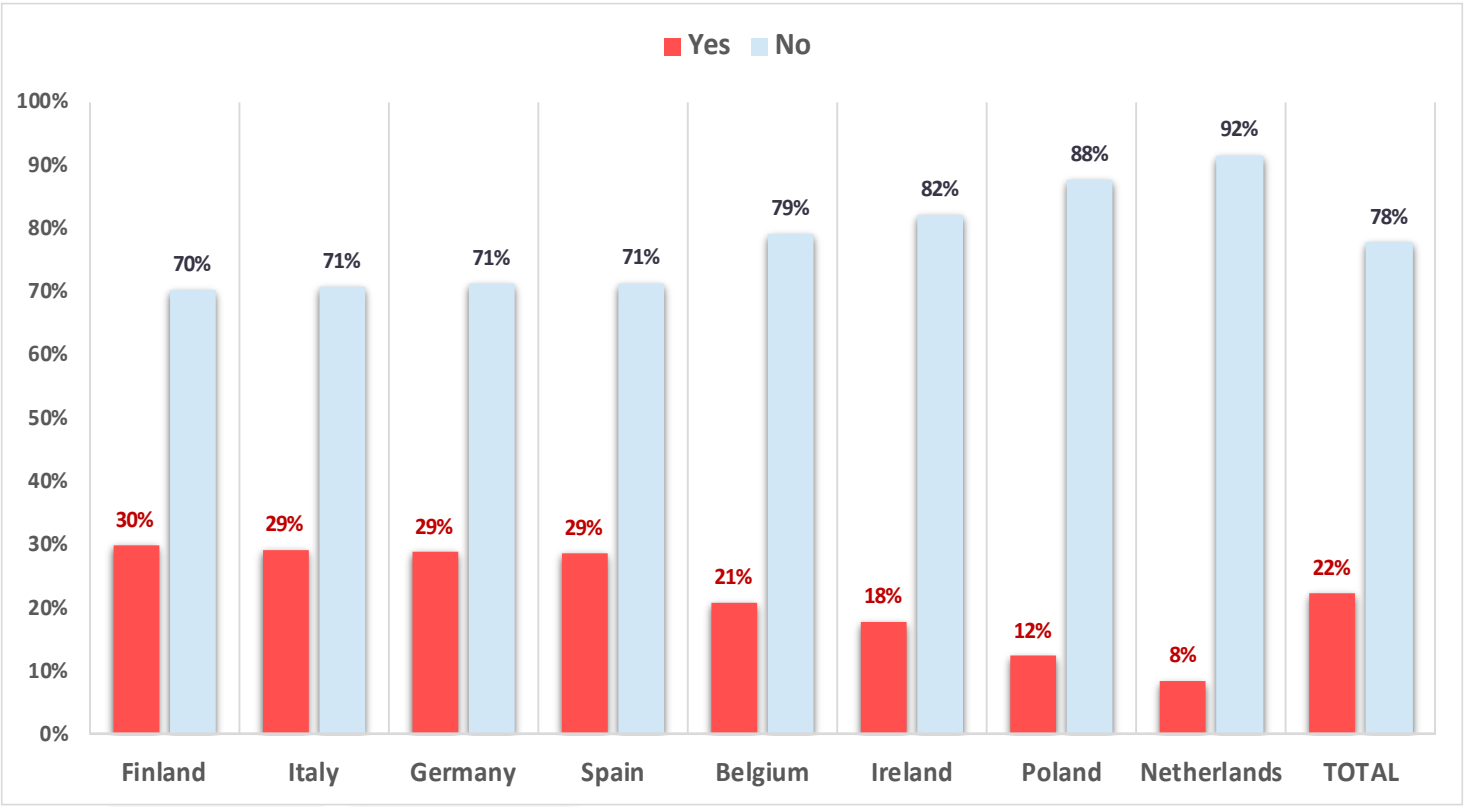

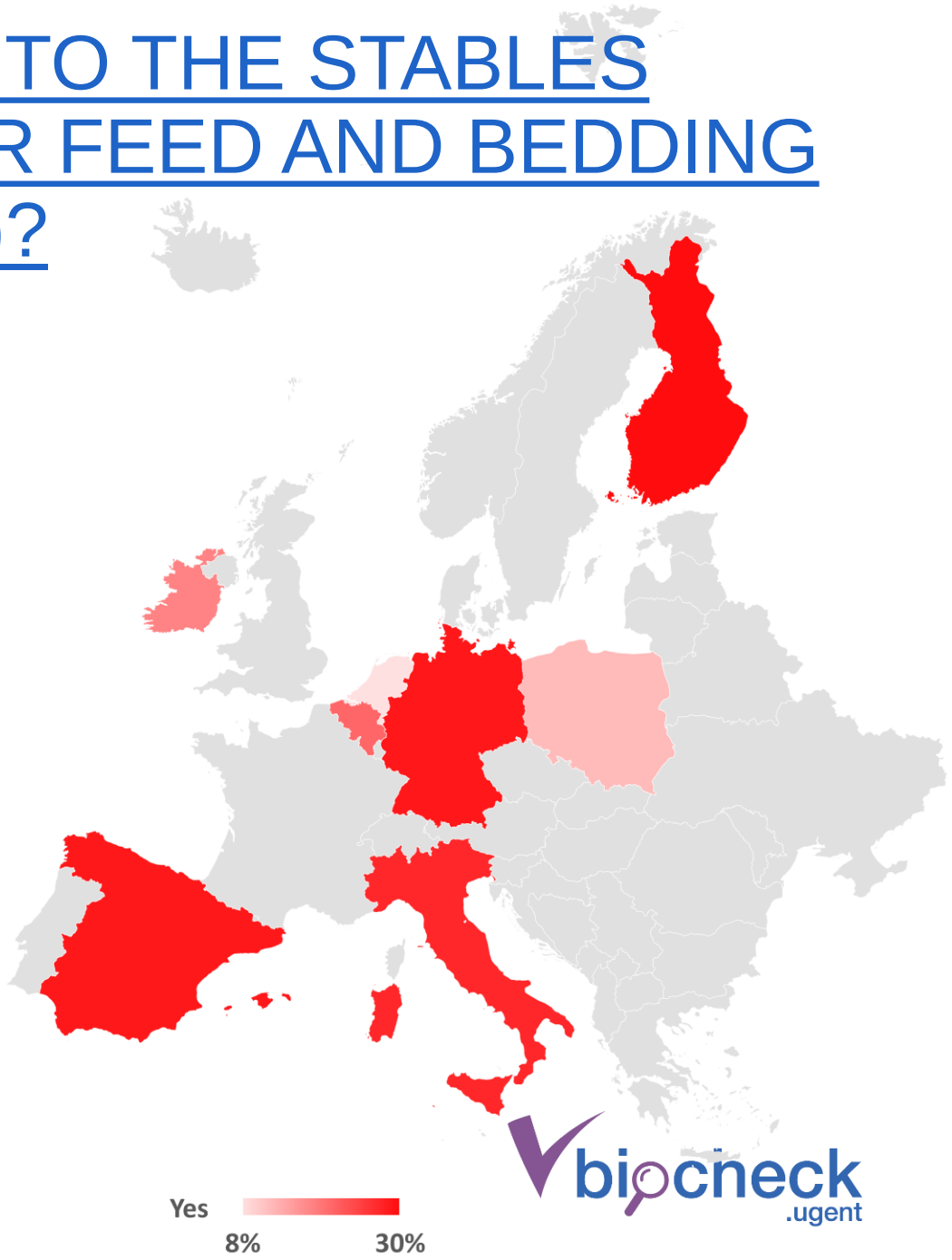

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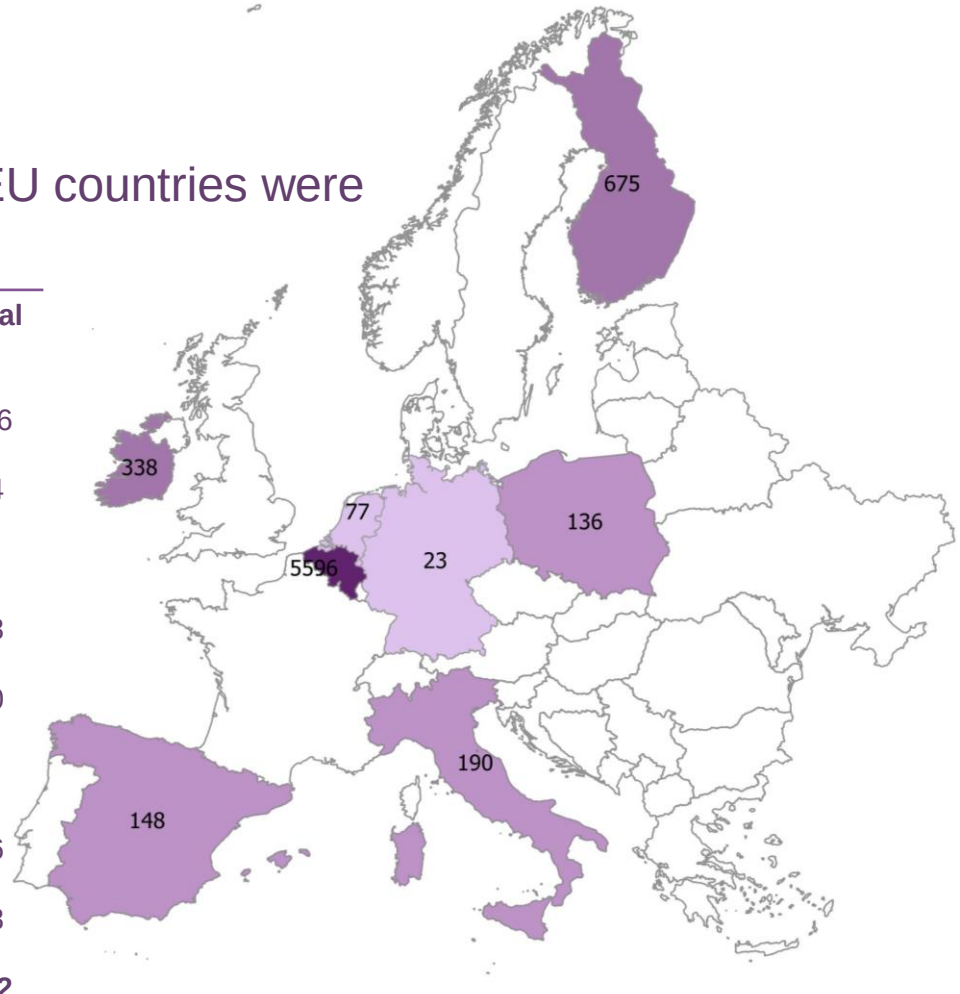
Cleaning and disinfectant procedures

Questionnaires from **7182 pig farms** in 8 EU countries were considered.

Countries	2020	2021	2022 (till June)	Total
Belgium	45	4971	580	5596
Finland	673	1	0	674
Germany	9	9	5	23
Ireland	151	182	5	338
Italy	64	107	19	190
Netherlands	34	27	16	77
Poland	21	108	7	136
Spain	45	87	16	148
Total	**1042**	**5492**	**648**	**7182**



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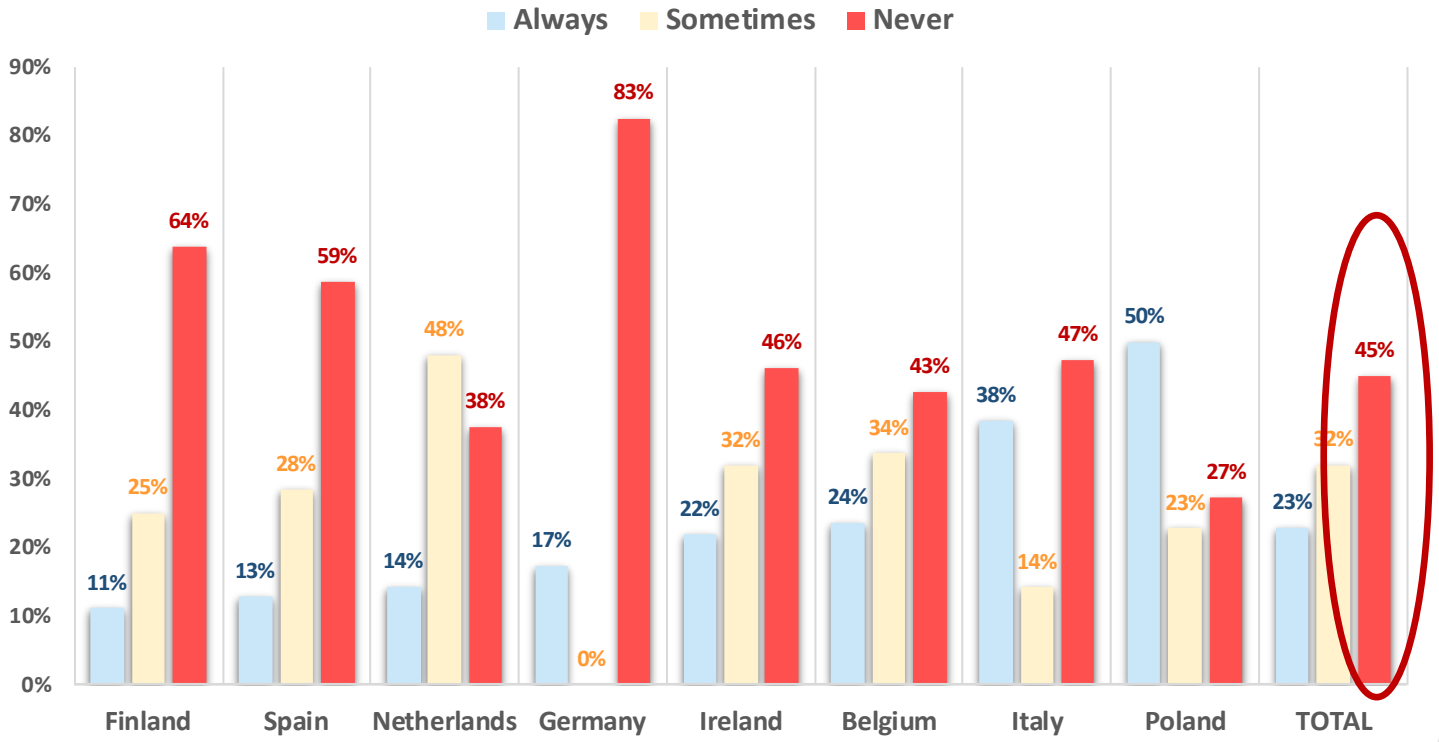
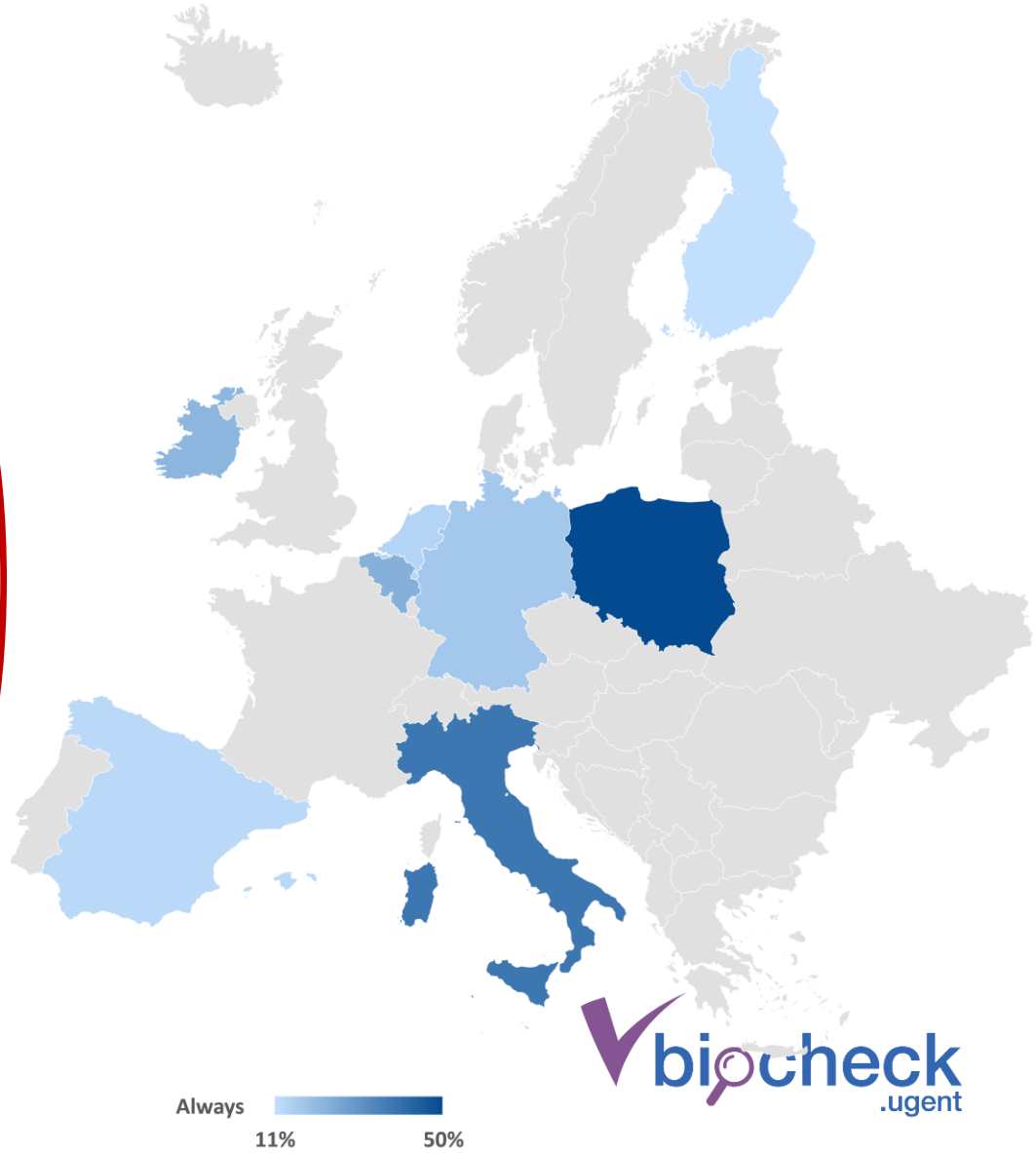
1. ARE HANDS WASHED AND/OR DISINFECTED BETWEEN DIFFERENT

1. Are hands washed and/or disinfected between different compartments/units?





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2. ARE THE STABLES/COMPARTMENTS CLEANED AND DISINFECTED AFTER EACH PRODUCTION CYCLE?

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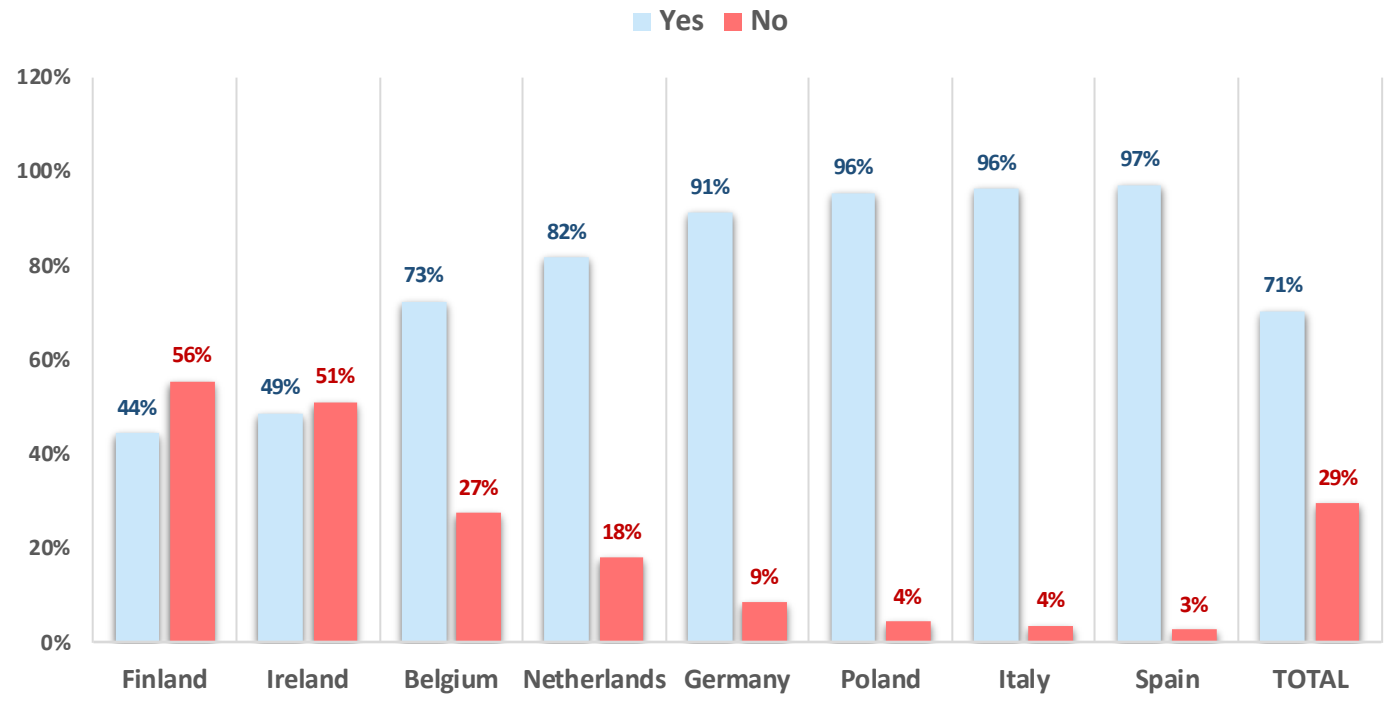
2. Are the stables/compartments cleaned and disinfected after each production cycle?



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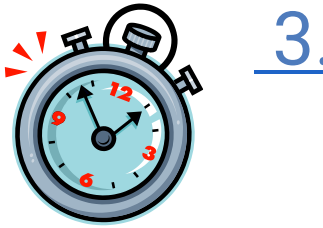
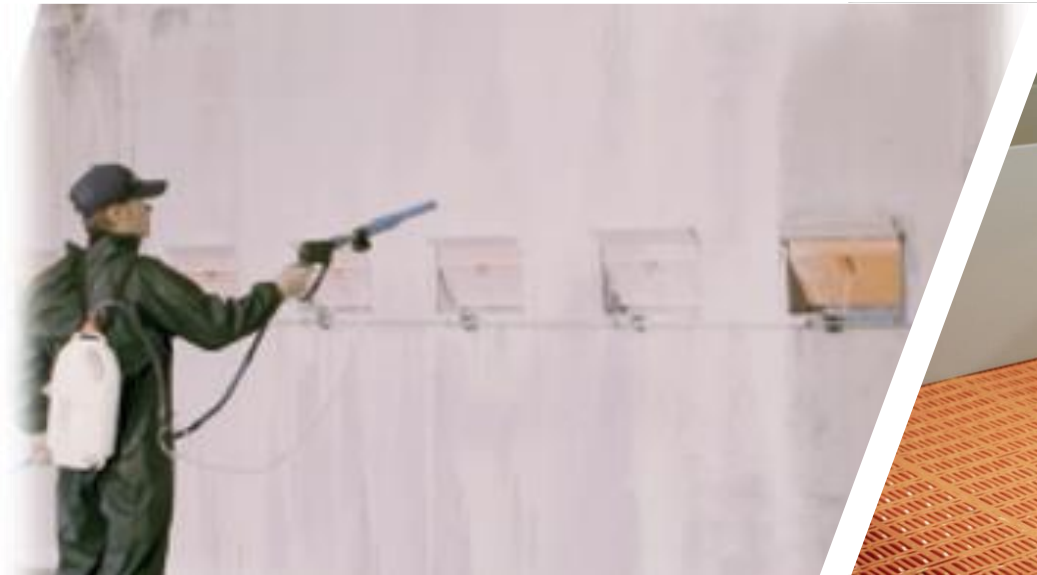
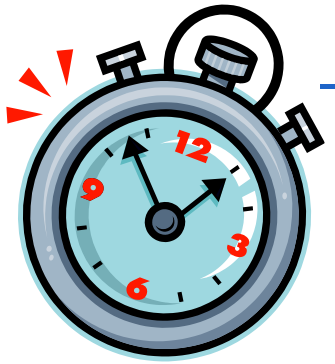
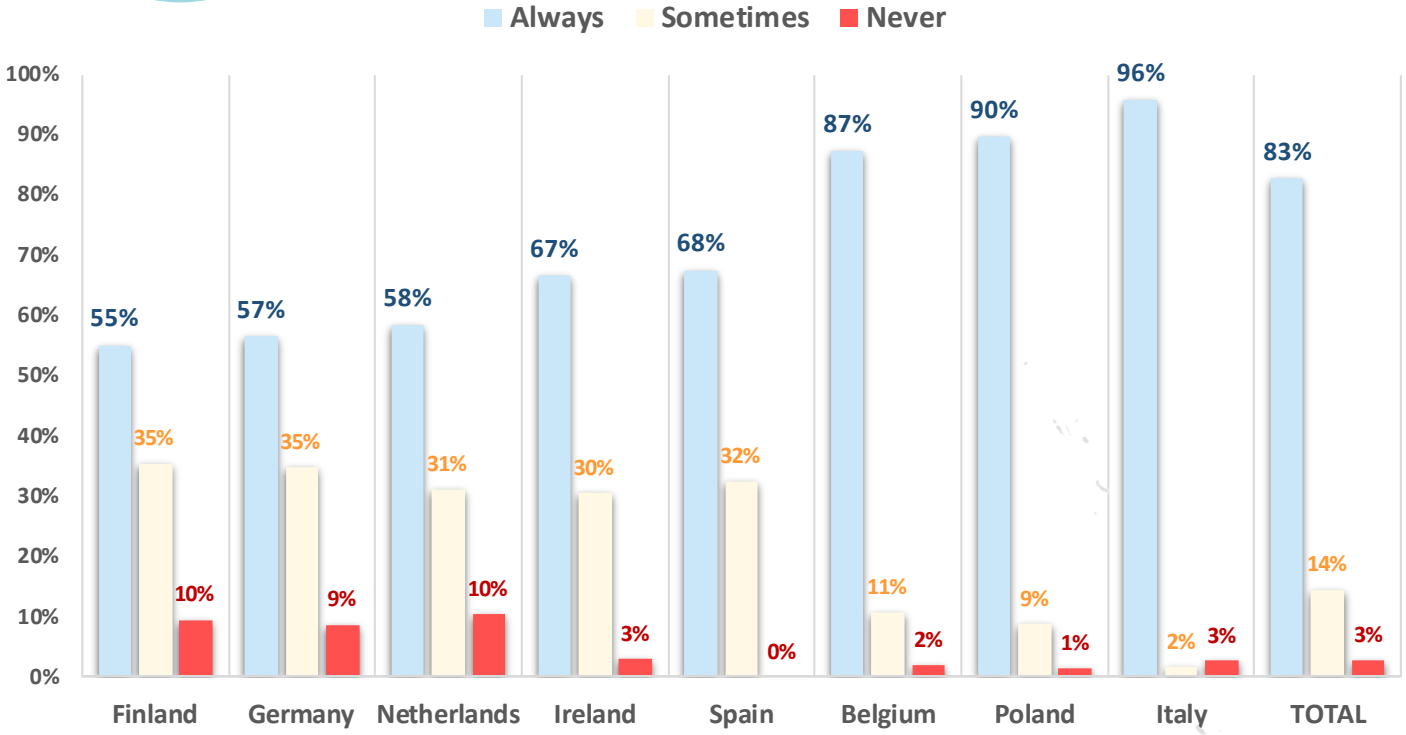


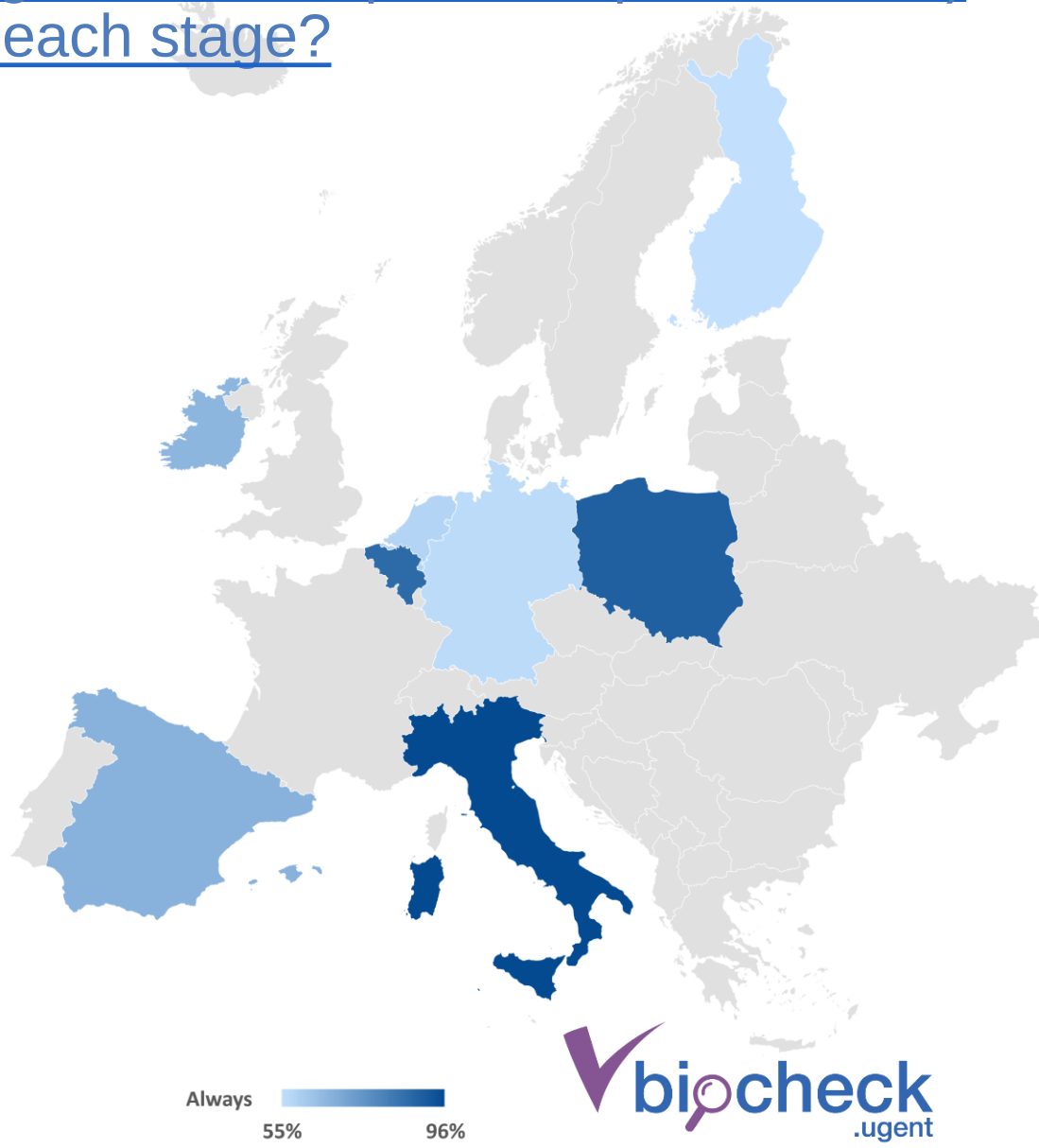
3. Are the different stages in the cleaning and disinfection process respected and is there sufficient time (according to the used product specifications) provided for each stage?





3. Are the different stages in the cleaning and disinfection process respected and is there sufficient time (according to the used product specifications) provided for each stage?





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Overall comparison between countries and components

Country	1	2	3	4	5	6	7	8	9	10	11	12
Belgium	83	87	89	37	24	20	55	73	96	78	87	3
Finland	83	78	57	29	11	17	32	44	89	41	55	0
Germany	91	61	71	48	17	17	52	91	74	65	57	0
Ireland	60	53	93	37	22	15	49	49	88	51	67	1
Italy	72	31	97	39	38	9	54	96	96	82	96	2
Netherlands	95	66	73	61	14	21	48	82	69	60	58	1
Poland	87	74	81	69	50	65	49	96	95	63	90	2
Spain	91	59	78	55	13	23	53	97	93	45	68	1

1. Presence of hygiene lock
2. Presence of disinfection baths/boot washers at the entrance of the farm
3. Appropriate change of fluid of the disinfection baths
4. Presence of disinfection baths &/or boot washers between compartments/units
5. Presence of hands washed and/or disinfected between compartments/units
6. C&D measures taken for the introduction of material
7. Presence of protocol for the C&D of equipment
8. Conducting C&D after each production cycle
9. Long enough sanitary break
10. C&D of corridors and the loading area
11. Provided different stages in the C&D process
12. Checking the efficacy of C&D

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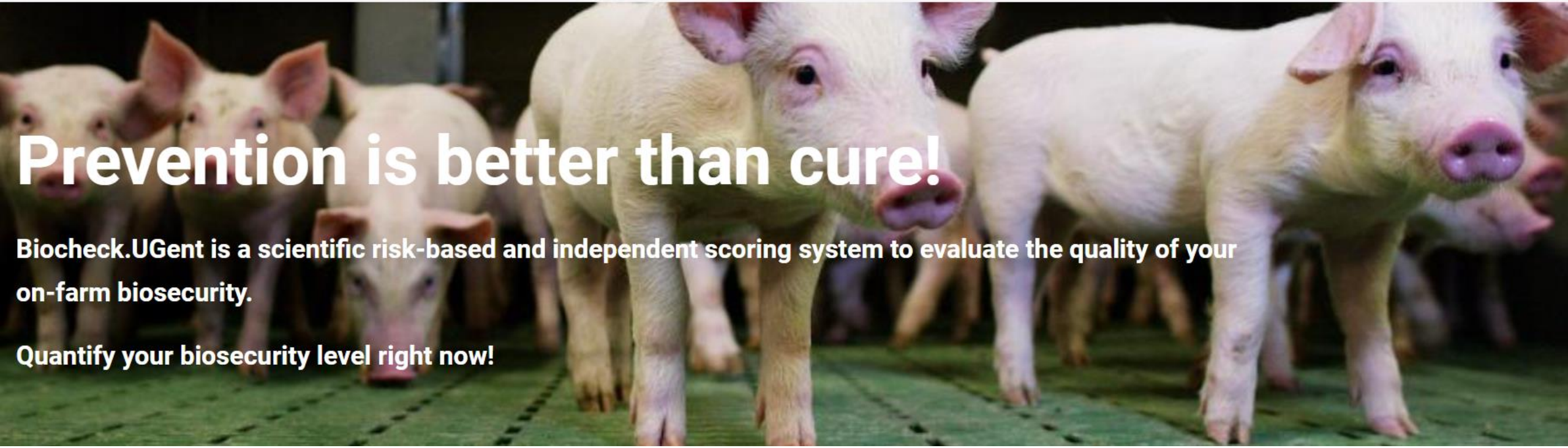

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