

# BIOSECURITY IN ANIMAL PRODUCTION

Prof. Jeroen Dewulf

# Bio-what ?

## BIOSECURITY

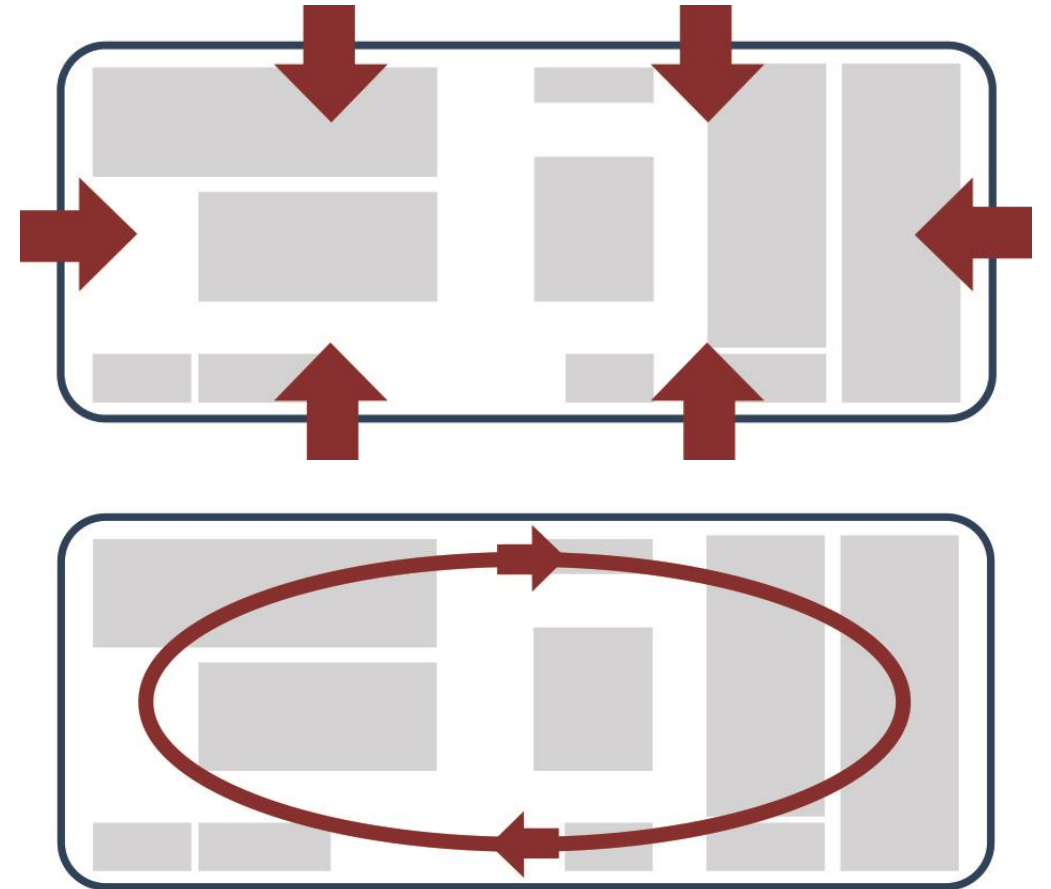
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The application of a set of **management, behavioural and physical** measures designed to reduce the risk of **introduction, establishment and spread** of pathogenic agents **to, within and from** an animal population.



**EXTERNAL** biosecurity  
= reduce introduction

**INTERNAL** biosecurity  
= reduce spread

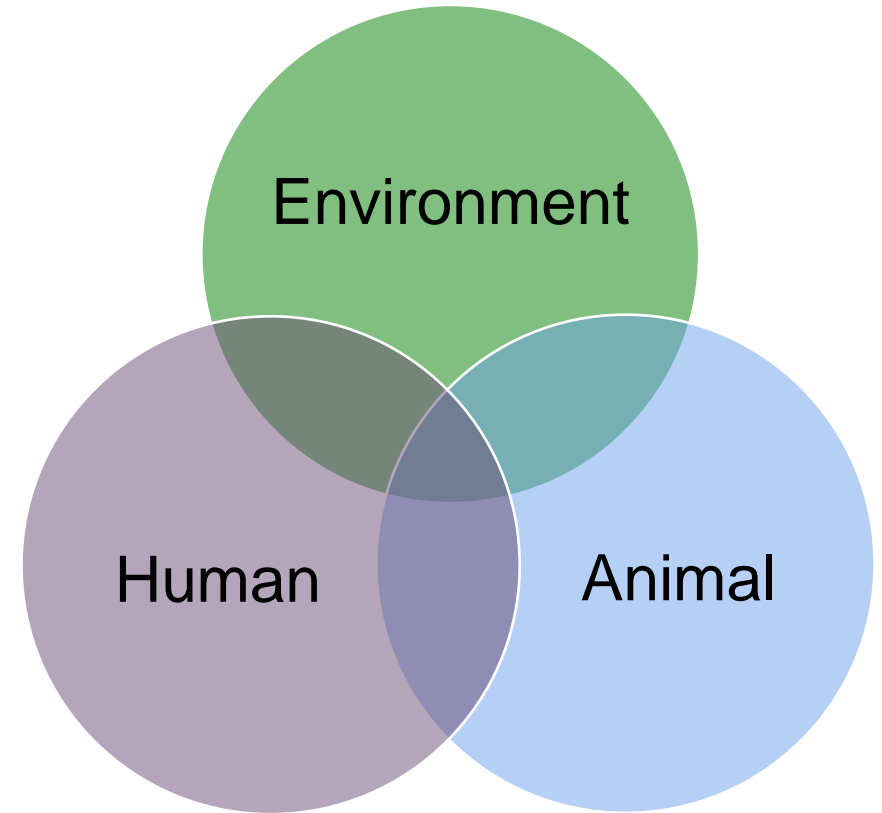


# WHAT IS BIOSECURITY?

Animal ↔ Animal

Human ↔ Animal

One Health



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



# Is biosecurity important?

31.3.2016

EN

Official Journal of the European Union

L 84/1

## REGULATION (EU) 2016/429 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 9 March 2016

on transmissible animal diseases and amending and repealing certain acts in the area of animal health (‘Animal Health Law’)

(Text with EEA relevance)

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

- The word “veterinarian” is mentioned **49 times**
- The word “biosecurity” is mentioned **70 times**



# Principles of biosecurity

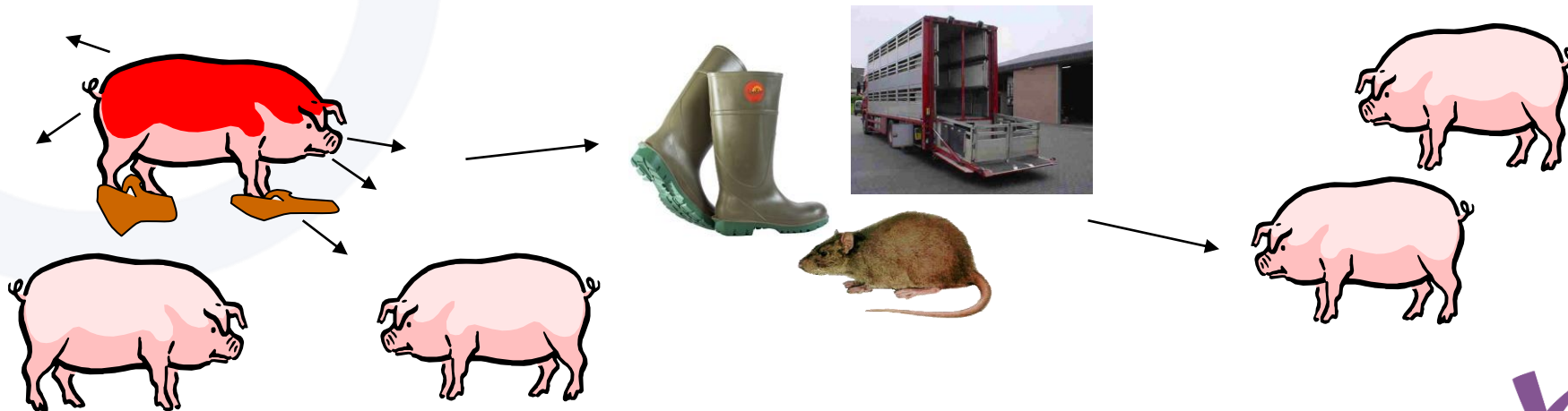


# PRINCIPLES OF BIOSECURITY

## 1) Separation of infectious and susceptible animals

→ avoid both direct and indirect contact!

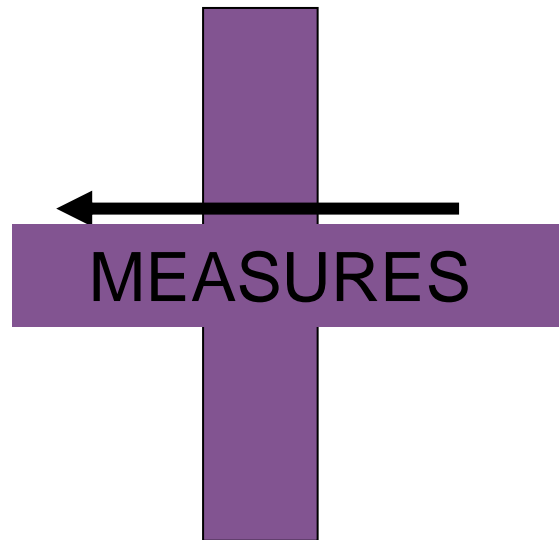
*(all-in/all-out, working lines, hospital pen, ...)*





# PRINCIPLES OF BIOSECURITY

CLEAN  
(susceptible animals)

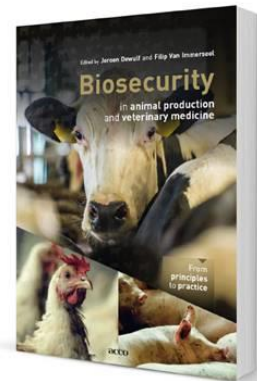


DIRTY  
(direct and indirect  
sources of infection)

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

	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	

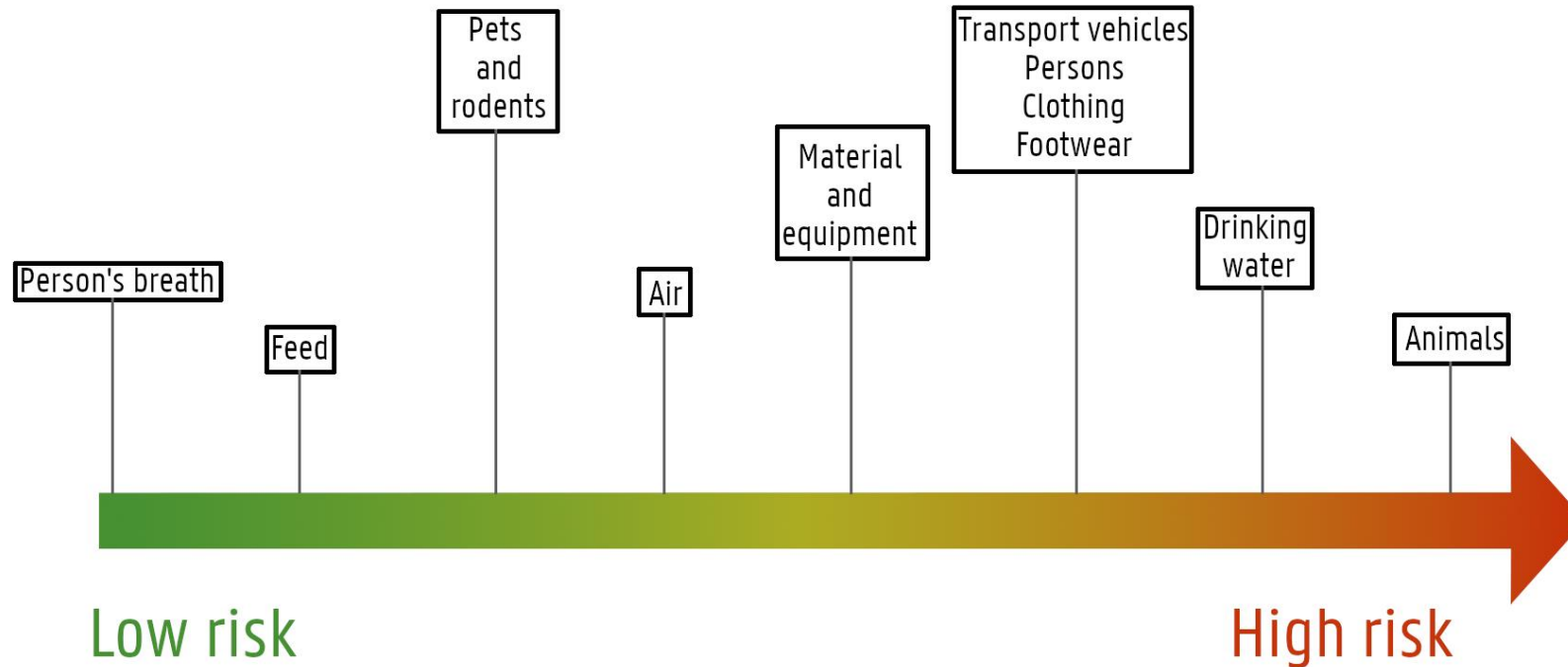
	Direct contact	Indirect contact									
		People	Semen	Manure	Domestic/feral animals	Rodents	Insects (Vectors)	Aerosol	Animal feed	Water	Fomites
Porcine Epidemic diarrhea virus*	X	X		X	X			X	X		X
Porcine parvovirus	X		X	X	X	X				X	X
Porcine Reproductive and Respiratory Syndrome virus	X	X	X	X	X	X	X	X	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

# PRINCIPLES OF BIOSECURITY

## 2) Not every transmission route is equally important



# PRINCIPLES OF BIOSECURITY

## 3) Reduction of the general infection pressure

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



# PRINCIPLES OF BIOSECURITY

## 4 ) Size matters



## 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%=  $1 - (1-0.001)^{52}$**



# Biosecurity = complex

- No protocol suitable for every herd
- Balance biosecurity – management
- Tool?

→ **Scoring System**





# 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.

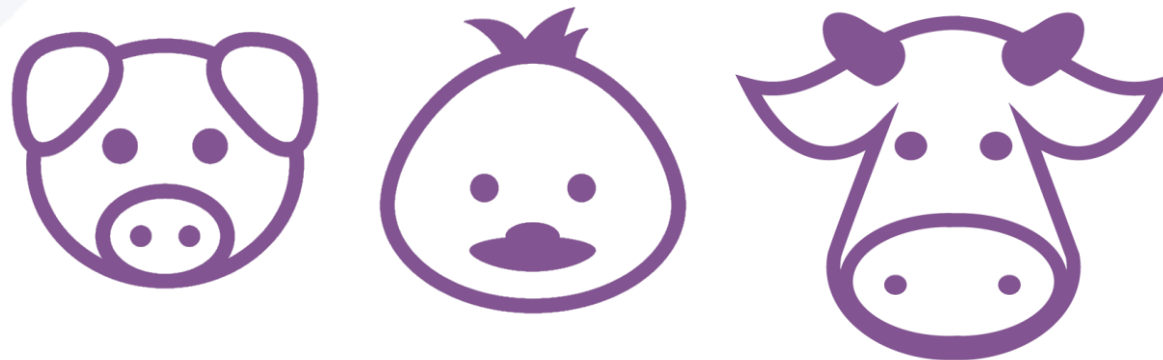
Quantify your biosecurity level right now!

# BIOCHECK.UGENT

→ Biosecurity scoring system

Different animal species, different languages

Free online application: [www.biocheckgent.com](http://www.biocheckgent.com)



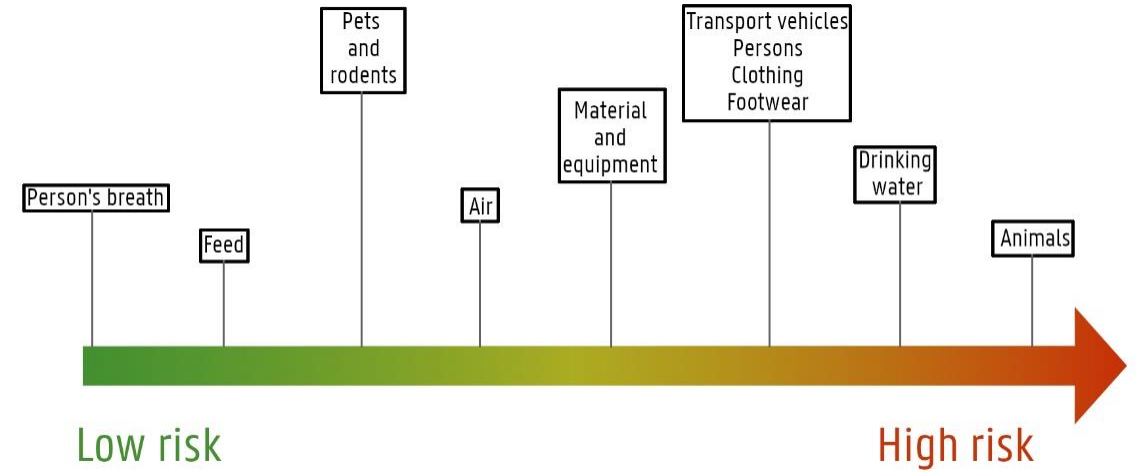
# BIOCHECK.UGENT

## Risk based scoring system

Weighted scores

Based on scientific research

Risk for transmission: direct vs. indirect contact





ID: 20388/691653/v/2\_1/F

Entry date: 2019-03-10 13:22:08

Identification:

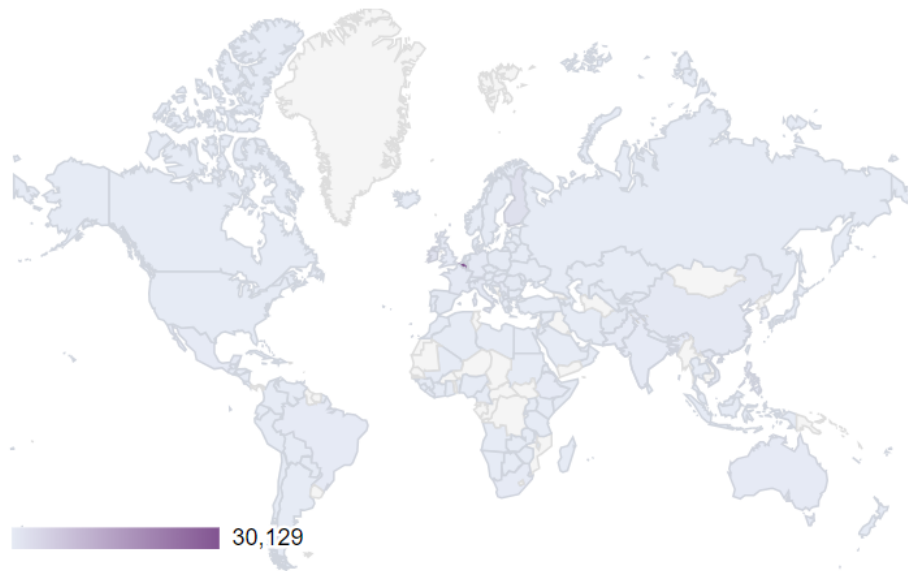
PIG

Nr	Description	Score	Country average	Global average
<i>External biosecurity</i>				
A	<u>Purchase of animals and semen</u>	100 %	88 %	89 %
B	<u>Transport of animals, removal of manure and dead animals</u>	41 %	70 %	70 %
C	<u>Feed, water and equipment supply</u>	27 %	38 %	50 %
D	<u>Personnel and visitors</u>	41 %	64 %	68 %
E	<u>Vermin and bird control</u>	50 %	64 %	67 %
F	<u>Environment and region</u>	60 %	53 %	64 %
<b>Subtotal External biosecurity:</b>		<b>57 %</b>	<b>66 %</b>	<b>70 %</b>
<i>Internal biosecurity</i>				
A	<u>Disease management</u>	40 %	56 %	67 %
B	<u>Farrowing and suckling period</u>	64 %	59 %	56 %
C	<u>Nursery unit</u>	36 %	65 %	66 %
D	<u>Fattening unit</u>	N/A	72 %	67 %
E	<u>Measures between compartments and the use of equipment</u>	39 %	44 %	48 %
F	<u>Cleaning and disinfection</u>	20 %	48 %	59 %
<b>Subtotal Internal biosecurity:</b>		<b>38 %</b>	<b>55 %</b>	<b>58 %</b>
<b>Total:</b>		<b>48 %</b>	<b>61 %</b>	<b>64 %</b>

N/A = Not applicable

## Quantification of biosecurity status on farm level

- ↳ Comparing scores between different herds
- ↳ Comparing scores between different countries
- ↳ Comparing scores in time
- ↳ Taking different risks into account



## Worldwide usage of Biocheck.UGent

The Biocheck.UGent has already been used **54060** times to evaluate the biosecurity in farms worldwide.

→ Worldwide statistics



42757



7742



3561



## Quantification of biosecurity status on farm level

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# SURVEYS

External and internal biosecurity

Different subcategories

Multiple questions per subcategories

Available in multiple languages (dependent on animal species)

## A. Purchase

1. What is the duration of one production cycle (including the empty period) on your farm (in months)? *(required)*

..... months

2. What is the maximum duration between the start and finalisation of filling one stable for one production cycle in weeks? *(required)*

*One stable is equal to one compartment in which the animals can't come into contact with animals from another compartment.*

..... weeks

3. How many transports does it take on average to fill one compartment for one production cycle? *(required)*

*One compartment is equal to one unit in which the animals can't come into contact with animals from another compartment.*

..... transports

4. Are your cattle always bought from the same original source (during the past 2 years)? *(required)*

*The same original source: the same farm of origin, where the cattle are born.*

*Select one option.*

- Yes
- No, I buy from the veal company, salesman or on the market
- No, I buy from multiple sources



## C. Feed and water

11. Is the farm site divided into a clean and dirty area? \*



- Yes
- No
- I don't know

The clean road/area is the area of the production site with restricted access, i.e. this is the area where only animals from the farm, persons after they have applied the hygienic measures in the hygiene lock, and farm-specific materials and vehicles are allowed. The dirty area comprises all other parts of the farm where visitors, external vehicles, ... have access to. The dirty area also includes the carcass storage facility.

14. Does the feed supplier have access to the houses where direct contact with the poultry is possible? \*



- Always
- Sometimes
- Never

15. Are the feed silos or the feed storage rooms (storage of complete feed or





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*antibiotics*

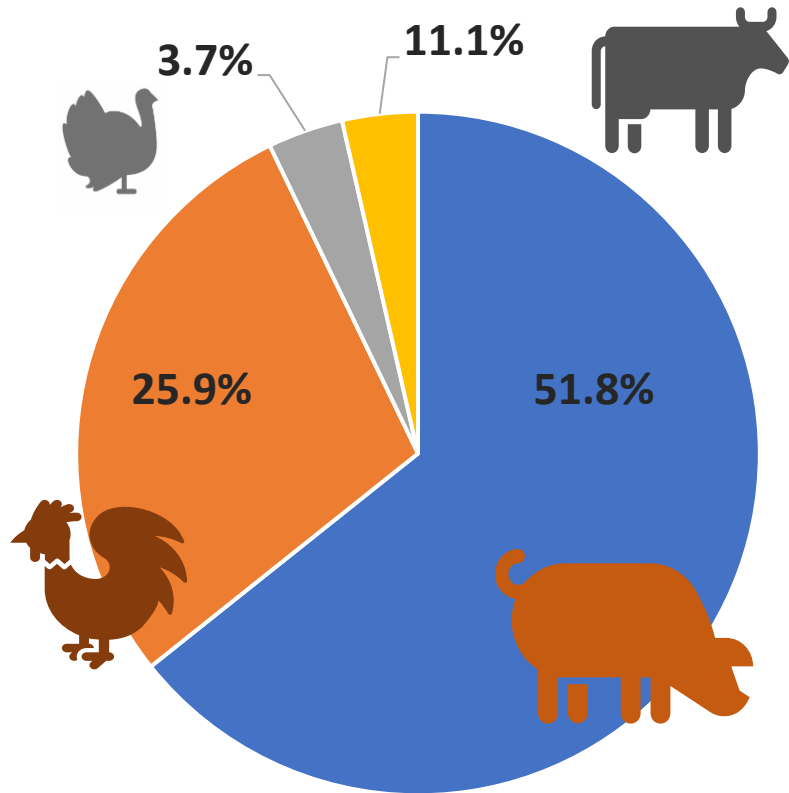


*Review*

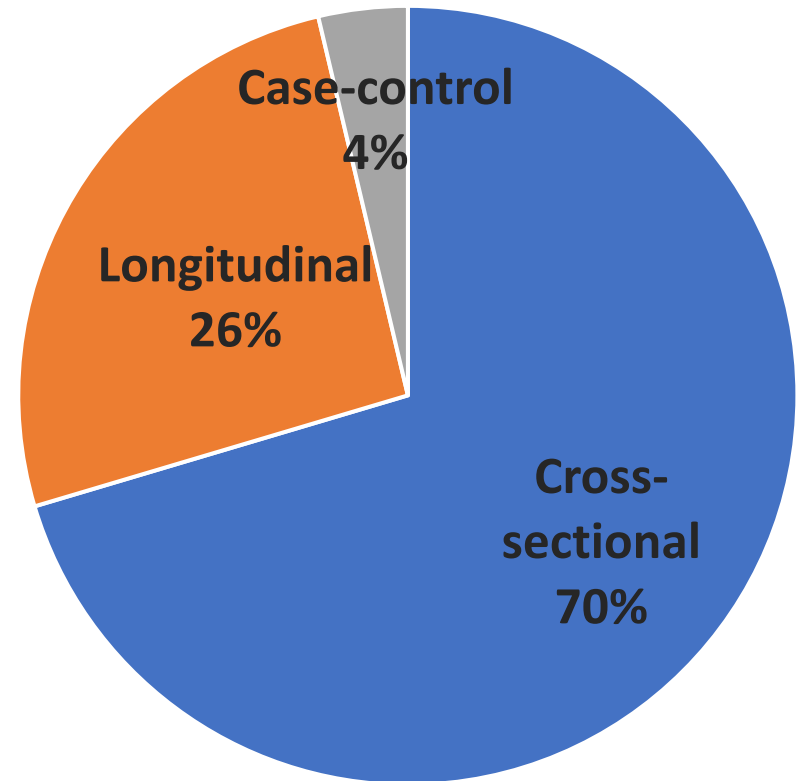
# Can improved farm biosecurity reduce the need for antimicrobials in food animals? A Scoping Review

Pankaj Dhaka <sup>1,2,\*</sup>, Ilias Chantziaras <sup>1,\*</sup>, Deepthi Vijay <sup>3</sup>, Jasbir Singh Bedi <sup>2</sup>, Iryna Makovska <sup>1</sup>, Evelien Biebaut <sup>1</sup> and Jeroen Dewulf <sup>1</sup>

# Species distribution



# Study types



Two studies included both pigs and poultry farms

# 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





“An ounce of prevention,  
is worth a pound of cure”

- Benjamin Franklin -

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## Full Professor

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