

# BIOSECURITY IN PIG PRODUCTION AND THE EFFECT ON AMU AND PROFITABILITY

Prof. Jeroen Dewulf

## VETERINARY SCIENCES



# Biosecurity ?

## BIOSECURITY

=

The combination of all measures taken to reduce the risk of **introduction** and **spread** of infectious diseases at farm level, throughout the region, country or even worldwide.

*'assessing risk and implementing measures to decrease that risk and to safeguard and improve health status on a farm'*



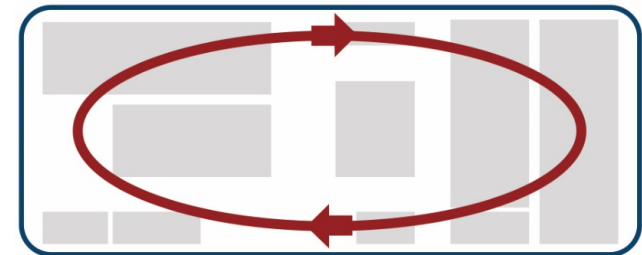
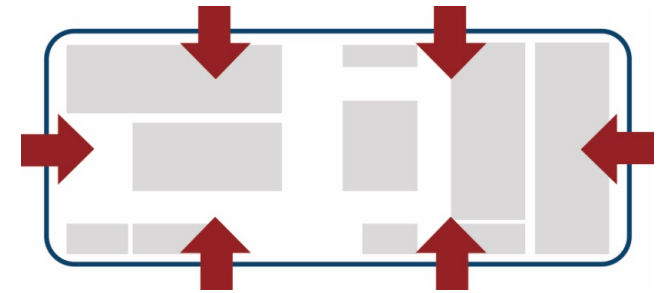
# Biosecurity ?

## EXTERNAL BIOSECURITY

- = Reduce introduction
  - endemic diseases
  - "exotic" diseases

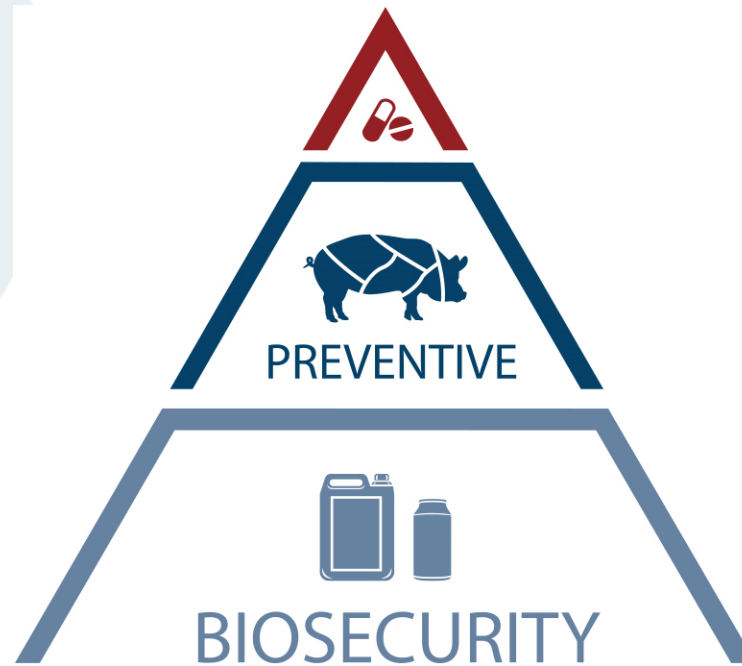
## INTERNAL BIOSECURITY

- = reduce spread



# Why biosecurity?

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



# Why biosecurity?

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

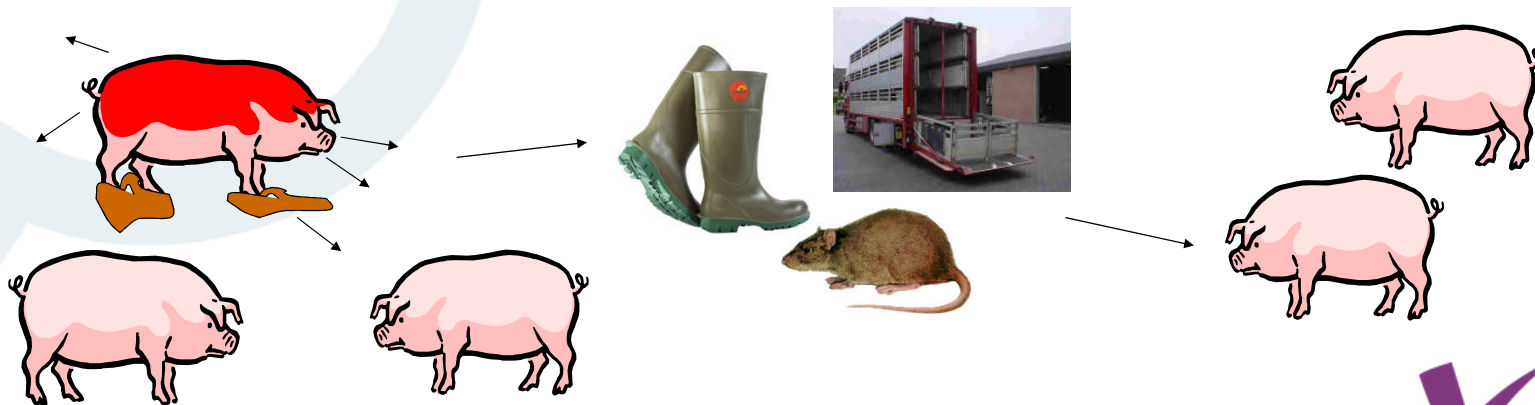
# Why biosecurity?

- Beter biosecurity ↔ less disease
  - Eradication programs ↑
    - Free / Obligated (e.g. *Salmonella*)
  - Risk of exotic diseases
  - Public health, animal welfare, public opinion ('sustainable meat production')
  - Legislation

# PRINCIPLES OF BIOSECURITY

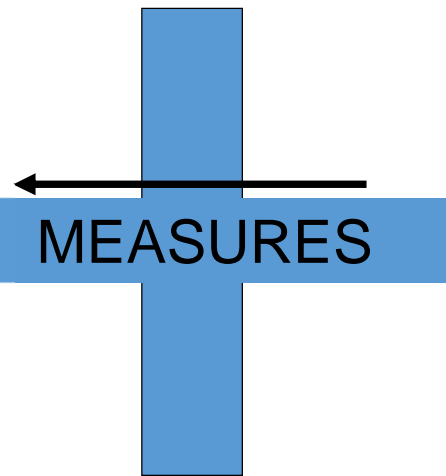
## 1) Separation of infectious and susceptible animals

→ avoid both direct and indirect contact!  
(*all-in/all-out, working lines, hospital pen, ...*)



# PRINCIPLES OF BIOSECURITY

CLEAN  
(susceptible animals)



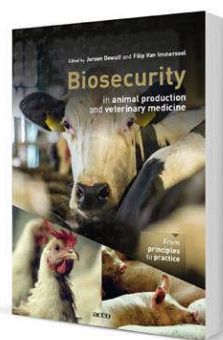
DIRTY  
(direct and indirect  
sources of infection)

- 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
Leptospire	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

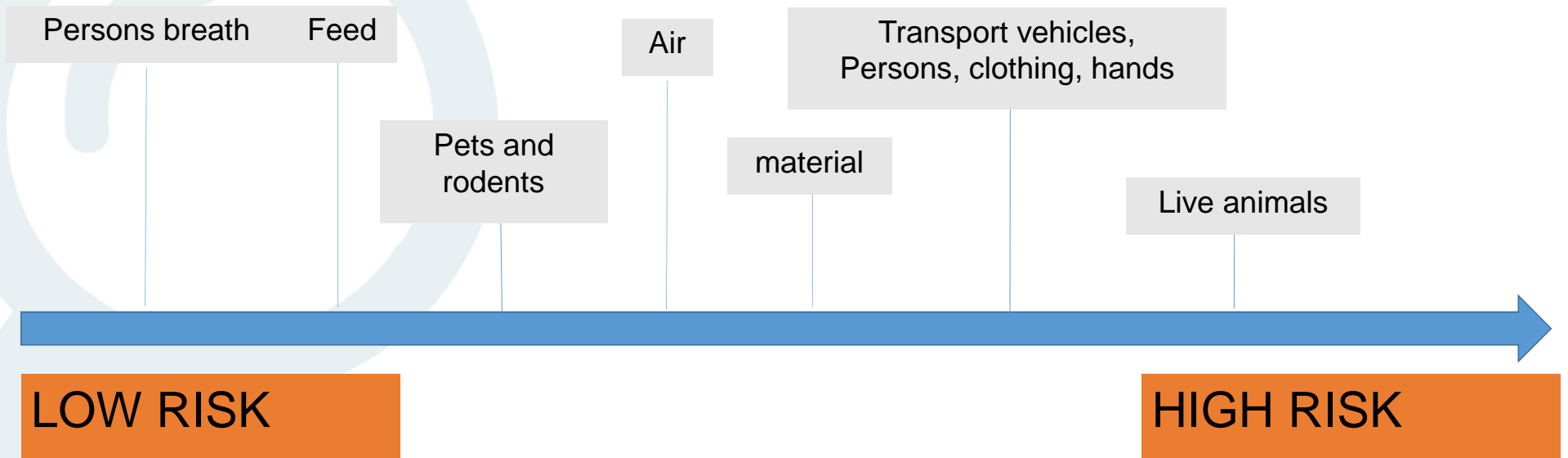


Biosecurity in animal practice and Veterinary Medicine., 2018



# 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↓

*(cleaning, disinfection and empty period, vaccination, ...)*



# PRINCIPLES OF BIOSECURITY

**Where is biosecurity most important**

- A. Large herds
- B. Small herds
- C. Independant of herd size

# PRINCIPLES OF BIOSECURITY

## 4 ) Size matters



## PRINCIPLES OF BIOSECURITY

**Assume: risk of disease introduction on 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%

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





## Scoring system and website Pigs, Poultry and cattle

Biocheck, prevention is better than cure!



[www.biocheck.ugent.be](http://www.biocheck.ugent.be)



ID: 20388/691653/v2\_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



## Statistics for Pigs - Ireland

External biosecurity	
A. Purchase of breeding pigs, piglets and semen	97%
B. Transport of animals, removal of carcasses and manure	79%
C. Feed, water and equipment supply	43%
D. Visitors and farmworkers	67%
E. Vermin and bird control	74%
F. Location of the farm	92%
<b>Subtotal external biosecurity</b>	<b>77%</b>



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### Archive: English

[→ 09/07/2020 - Entrance control](#)[→ 21/04/2020 - Carcass management](#)[→ 21/04/2020 - Launch of the Biocheck Cattle](#)[→ 21/04/2020 - How flexible can we be with weaning age in piglets?](#)[→ 21/04/2020 - African Swine Fever](#)



## Biocheck.UGent newsletter

### Entrance control for visitors

On every farm, there are a lot of persons that access the farm and may come in contact with the animals. Each of them, including the farmer and his/her staff, should take precautionary measures, as they can carry pathogens onto the farm. All unnecessary visitors should be kept out of the stables and away from the animals.



When visiting the animal facilities the following measures should be adhered to:

1. Park your vehicle as far away as possible from the animal housing facilities, on the dedicated parking area. When there is no parking area, leave your vehicle on the public road.
2. Never enter the animal housing facilities without informing the farmer/responsible person.
3. Before entering the animal facilities:
  - Sign the visitors' register.
  - Remove your footwear and overclothing.
  - Wash and disinfect your hands and/or wear disposable gloves.
  - Proceed to the clean zone of the hygiene lock (the side where the animals are present). Showering may be obligatory.
  - Put on farm-specific and clean coveralls/clothing and footwear. Whenever there is no farm-specific clothing or footwear, put on a disposable coverall and overshoes.



## Statistics for Pigs - Ireland

Internal biosecurity	
G. Disease management	70%
H. Farrowing and suckling period	55%
I. Nursery unit	61%
J. Finishing unit	75%
K. Measures between compartments, working lines and use of equipment	47%
L. Cleaning and disinfection	50%
<b>Subtotal internal biosecurity</b>	<b>58%</b>
<b>Total</b>	<b>68%</b>

number of completed surveys: 195

# Check, Improve, Reduce

A SIMPLE AND EFFECTIVE APPROACH

# Herd specific advice






# Substantial reduction antimicrobial usage without jeopardizing production by coaching?

Zoonoses  AND PUBLIC HEALTH  
Explore this journal >

Original Article

**Reducing Antimicrobial Usage in Pig Production  
without Jeopardizing Production Parameters**

M. Postma , W. Vanderhaeghen, S. Sarrazin, D. Maes, J. Dewulf

# Coaching



# Biosecurity & Management

	% ADVISED	% FEASIBLE	% IMPLEMENTED
Registration symptoms & moment mortality for analysis	95	98	66
Hand hygiene, change coverall and clean boots	86	88	59
Change needles often	85	82	62
Hygiene lock per animal/age category	76	58	7
Use strict euthanasia policy	71	90	81
Wash sow before farrowing crate	68	45	20
Analysis drink water 1x/year well/pipes	68	98	80
Keep dog/cat out of the stable	49	34	21
AI / AO, do not return to younger age group	41	54	33
Use dirty road for transport of manure	20	100	75
Change wooden boards for plastic boards	10	67	83

# Diagnosics & vaccination

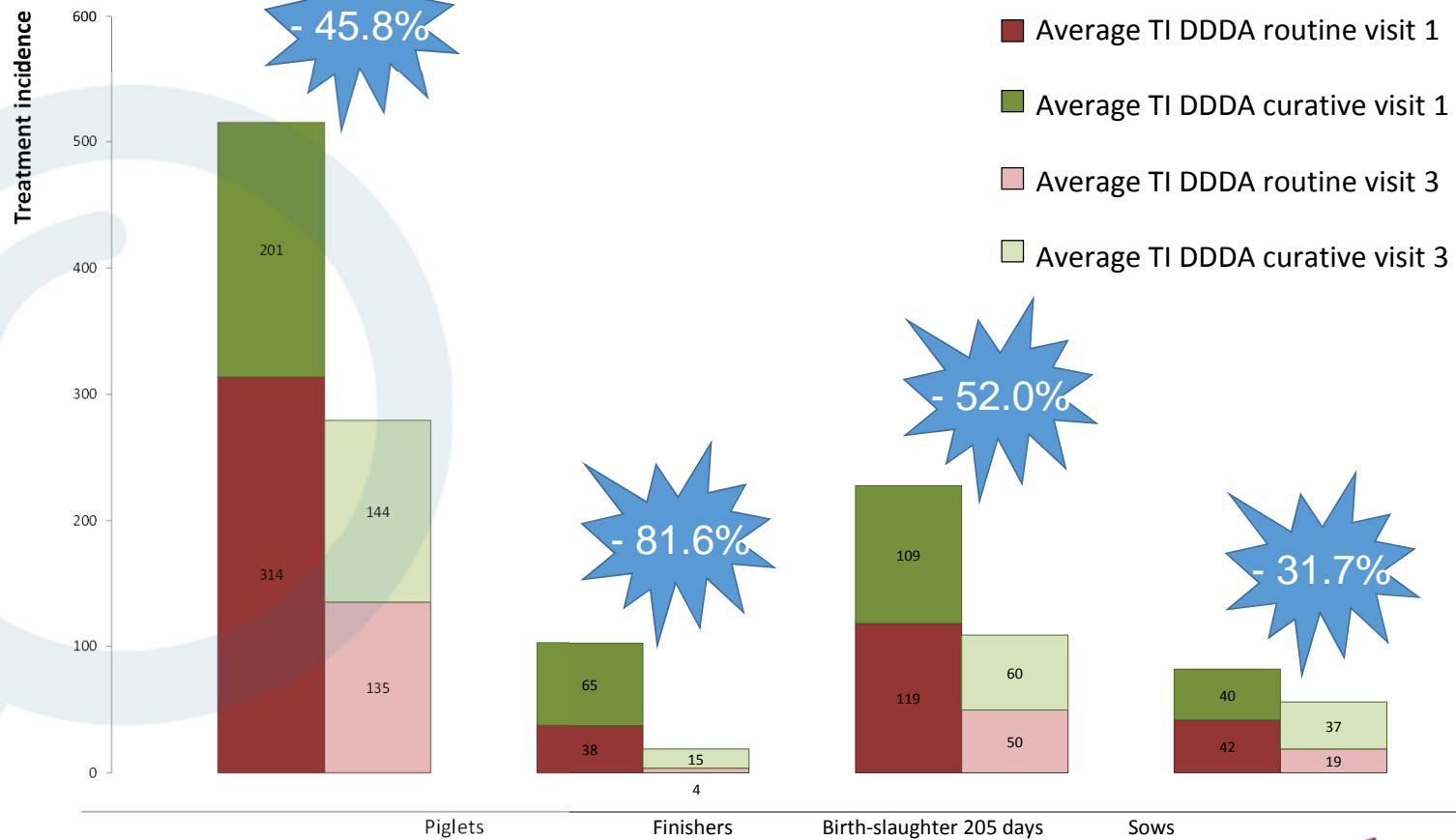
	% ADVISED	% FEASIBLE	% IMPLEMENTED
Request slaughter findings for analysis	75	59	57
Additional vaccinations in general	51	94	81
Additional specific vaccinations: PCV2	16	100	62
Check serology titres in general	33	95	90
Adjustment of vaccination scheme: Atrophic rhinitis	8	100	80

# Prudent antimicrobial usage

	% ADVISED	% FEASIBLE	% IMPLEMENTED
Restrictive use of potent AM	92	72	45
Stop (routine) prophylactic treatment birth until slaughter	88	69	59
Stop prophylactic treatment in sows	24	90	83
Ask for resistance profile/sensitivity testing	7	79	0

# Herd specific advice



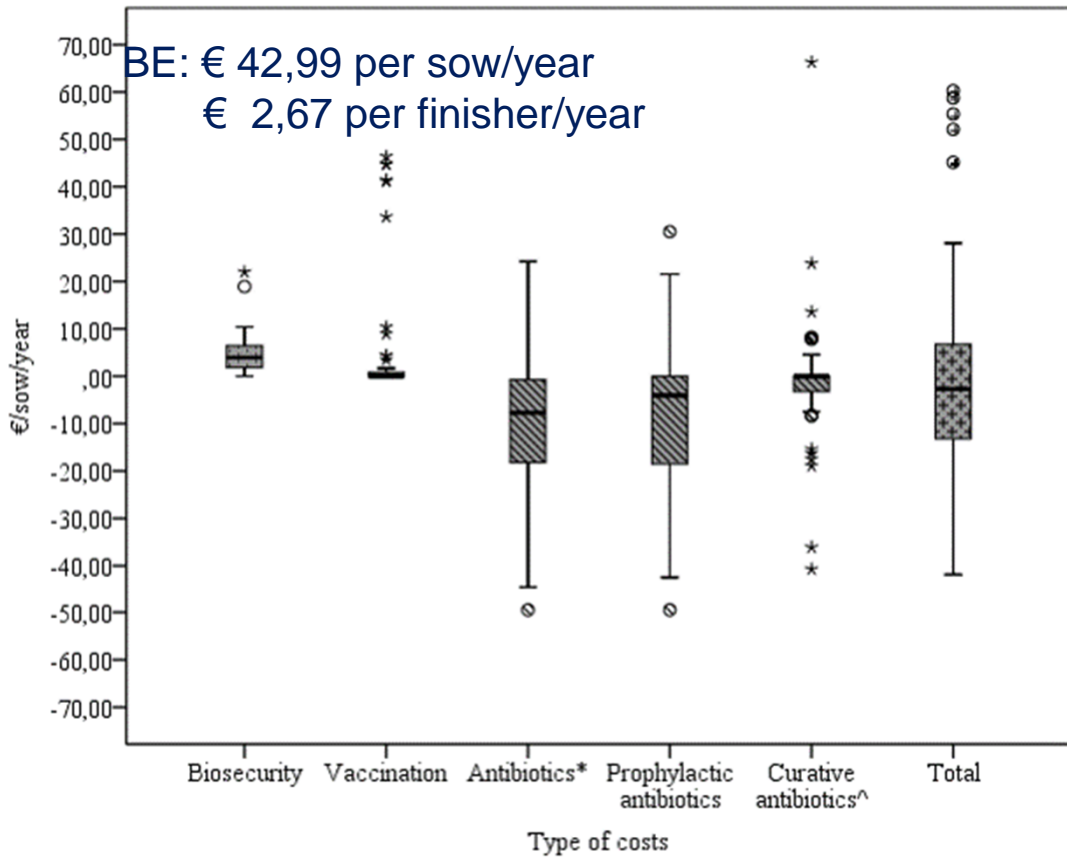


# Production parameters

	VISIT	MEAN	DIFFERENCE	P-VALUE
<b>Number of weaned piglets per sow per year</b>	Initial	26.4		
	Follow up	27.5	+1,1	<0.01
<b>Daily weight gain (g/day) finishers</b>	Initial	667.5		
	Follow up	675.2	+7,7	0.01
<b>Mortality in finisher period (%)</b>	Initial	3.2		
	Follow up	2.6	-0,6	0.04

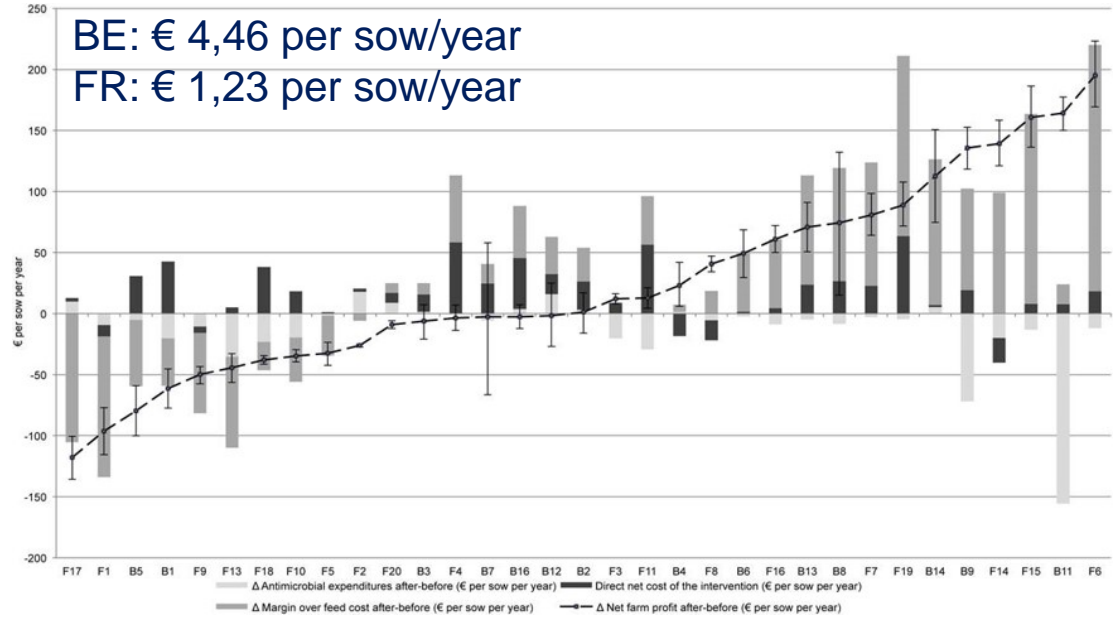


# Benefits - Economics



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

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

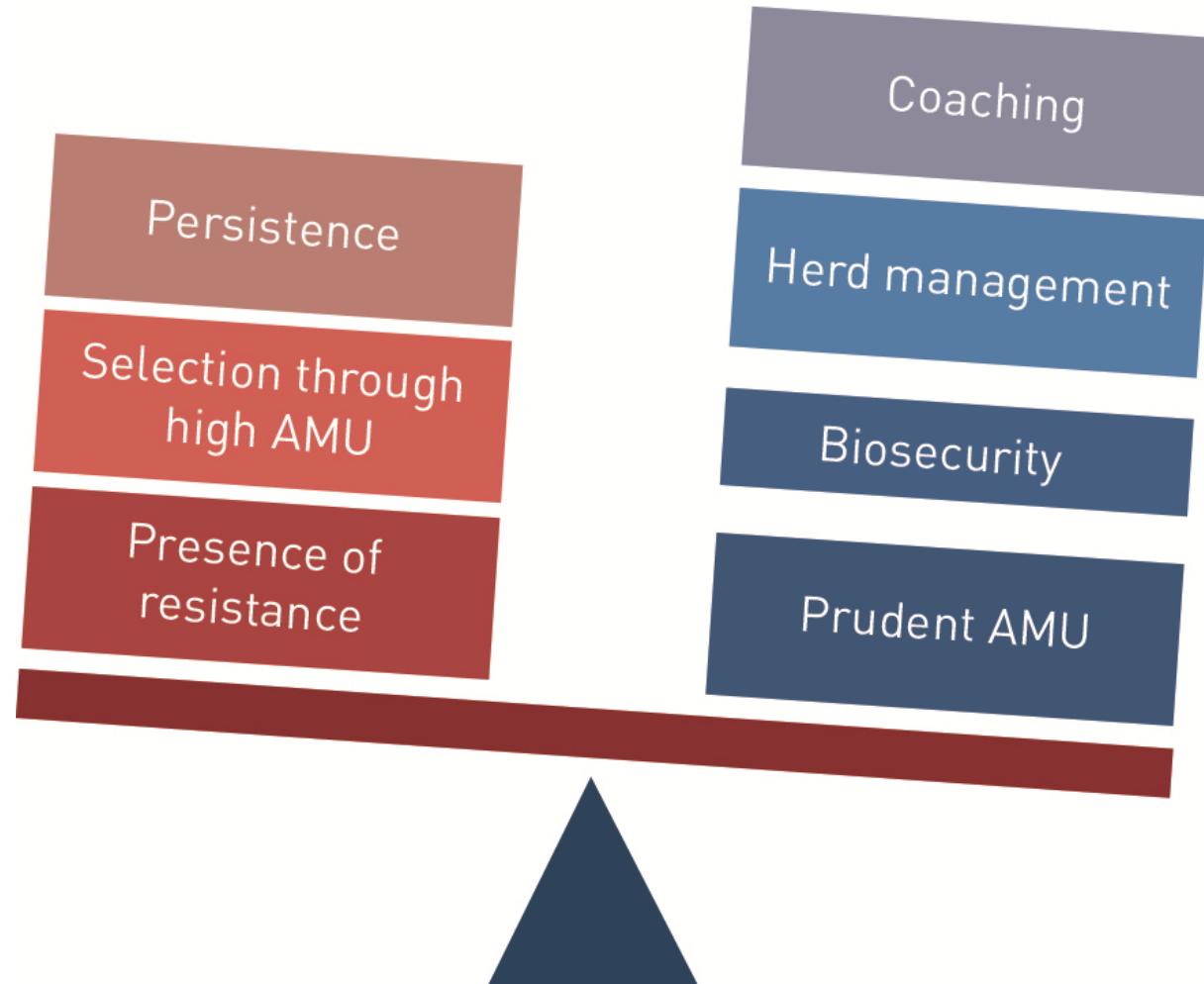


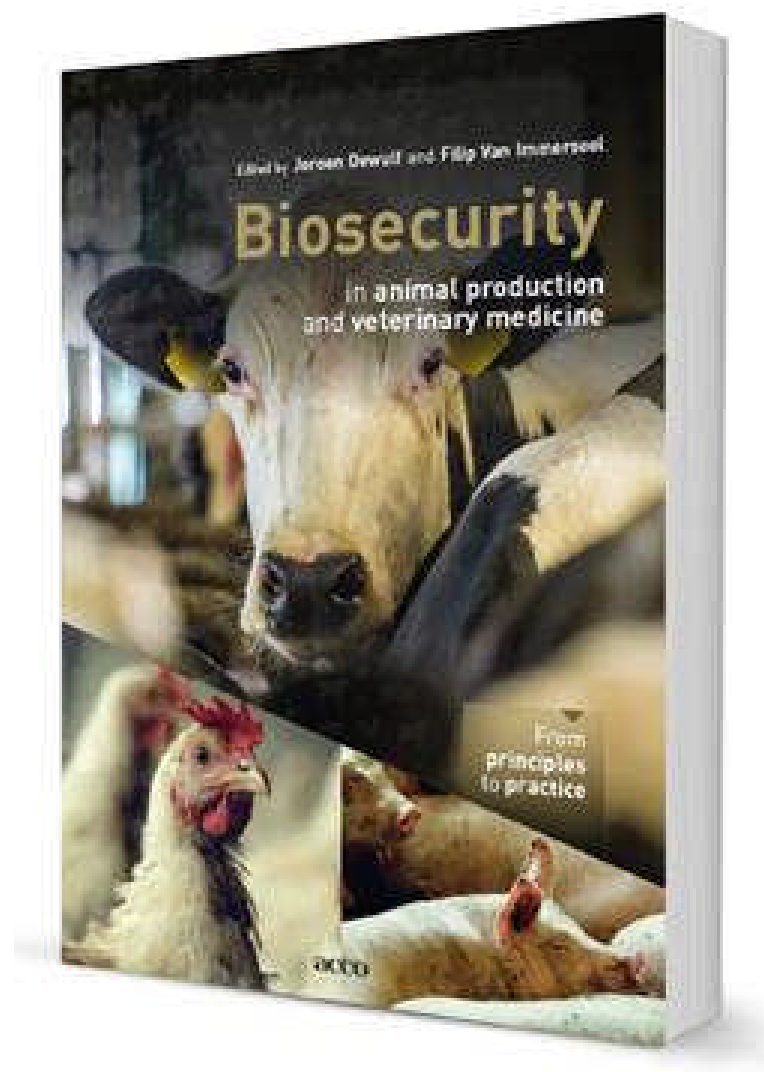
**GHI UNI** Farm-economic analysis of reducing antimicrobial use whilst adopting improved management strategies on farrow-to-finish pig farms

Cristina Rojo-Gimeno<sup>a,b,\*</sup>, Merel Postma<sup>b,1</sup>, Jeroen Dewulf<sup>b</sup>, Henk Hogeveen<sup>c</sup>, Ludwig Lauwers<sup>a,d</sup>, Erwin Wauters<sup>a,e</sup>

## Antimicrobial resistance

## Reversion of antimicrobial resistance







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

*- Benjamin Franklin -*

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## VETERINARY EPIDEMIOLOGY

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