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IMPACT OF A PRRSV-1 STABILIZATION PROGRAM ON REDUCING ANTIMICROBIAL USE IN FARROW-TO-FINISH FARMS

PRRSV **STABILIZATION** **ANTIMICROBIAL USE**

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Porcine Reproductive and Respiratory Syndrome (PRRS)

PRRS virus is the first enemy of the pig industry worldwide

PRRS Stabilization protocols are used to:

⇨ Improve production parameters and economic performances

⇨ Reduce vet costs

⇨ Eradicate the virus by:

- Producing PRRSV-negative piglets at weaning from a seropositive sow herd
- Keeping post-weaning piglets PRRSV-negative until of the end of post-weaning
- Keeping them negative as long as possible in the finishing unit

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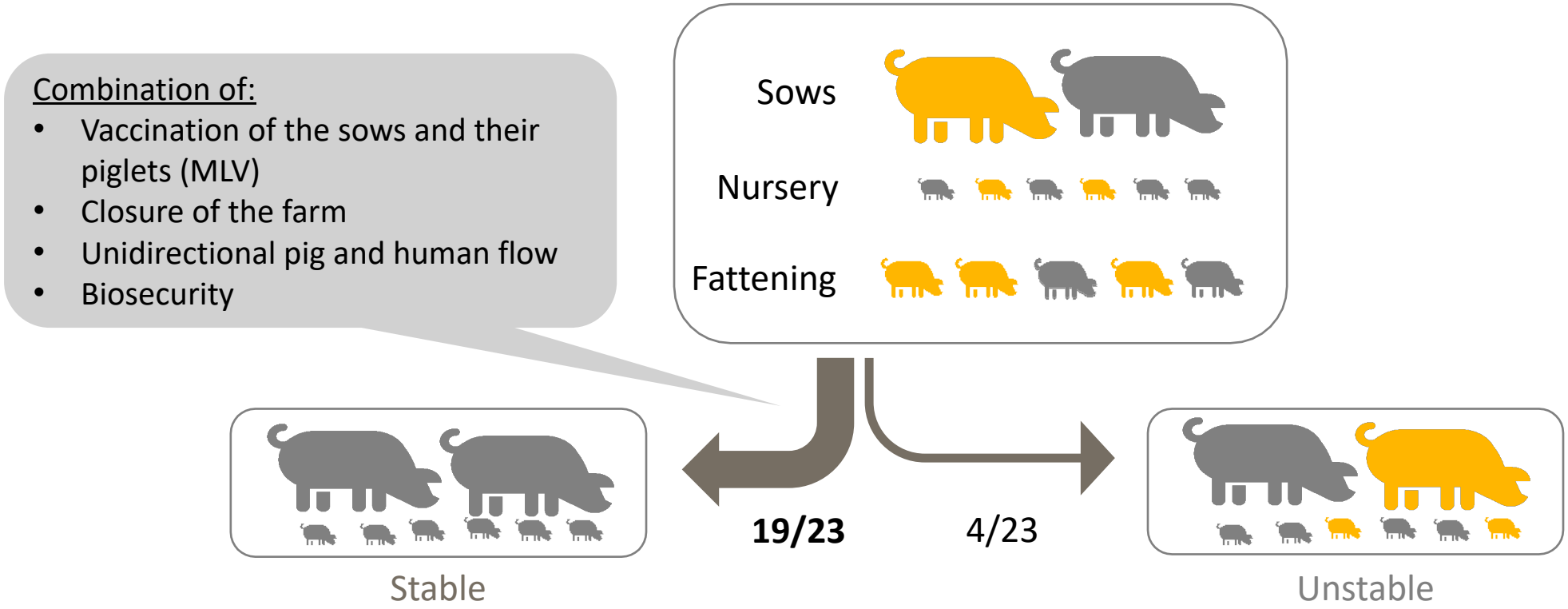
Background

Stabilization protocols applied in 23 French Farrow-to-finish farms located in a high-density swine area (Berton *et al.*, 2017).



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Objective

To assess the impact of PRRSV-1 stabilization program on reducing antimicrobial use

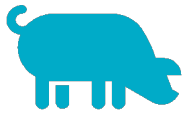
The objective of this study was to **evaluate the impact of a set of PRRSV control strategies** (stabilization protocol) on pig farms

This study has been **realized in Brittany (France)** in farrow-to-finish farms

This case report was **conducted on approximatively 20 farms**. Their **antibiotics use** has been analyzed before and after stabilization program.

Periods analyzed

Antimicrobial use



1 year before
P1

vs.

1 year after
P2

PRRSV-1 STABILIZATION PROGRAM

Inclusion criteria:

- *a successful PRRSV-1 stabilization program in farrow-to-finish farm*
- *all descriptive data of antibiotics for all administration routes*
- *all descriptive data regarding the biomass*
- *Same vets in charge of the prescriptions in all farms (in P1 as in P2)*

P1 : one year before implementation of control measures
P2 : one year following the end of PRRSV-1 monitoring signing the success of the plan

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Some reminders…

Calculation of antimicrobial use

Sum pigs + sows

<u>First step:</u> calculation of denominator

By UNIPORC

C	D	E	F	G	H	I	J	K	L	M
Nombre truies P1	Poids truies P1	Poids truies P1 (ALEA)	Nb porcs abattus P1	Poids porcs abattus P1	Poids porcs abattus P1 (ALEA)	PCU P1	WAP P1	Nombre truies P2	Poids truies P2	Poids truies P2 (
320	80000	96000	7437	483405	780885	563405	876885	320	80000	9
290	72500	87000	6975	453375	732375	525875	819375	290	72500	8
110	27500	33000	3470	225550	364350	253050	397350	110	27500	3
200	50000	60000	4031	262015	423255	312015	483255	200	50000	6
600	150000	180000	16662	1083030	1749510	1233030	1929510	600	150000	18
150	37500	45000	2399	155935	251895	193435	296895	150	37500	4
120	30000	36000	3071	199615	322455	229615	358455	120	30000	3
500	125000	150000	2234	145210	234570	270210	384570	500	125000	15
120	30000	36000	2486	161590	261030	191590	297030	120	30000	3
420	105000	126000	8472	550680						12
170	42500	51000	3289	213785						5
100	25000	30000	1762	114530						3
240	60000	72000	6408	416520						7
240	60000	72000	5433	353145						7
550	137500	165000	14212	923780						16
250	62500	75000	5623	365495						7
300	75000	90000	5529	359385						9

<u>WAP (Weight of Animal Potentially treated)</u>

<u>*(IFIP)*</u>:

105kg for pigs

300kg for sows

<u>PCU (Population Correct Unit) *(ESVAC)*:</u>

65kg for pigs

250kg for sows

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Some reminders…

Calculation of antimicrobial use

One line = one treatment per molecule and per administration route

Second step: calculation of *active ingredients* and WAT

By our software delivery of drugs

D	E	F	G	H	J	K	L	M	N	P	Q	R
No. Elevage	Molécule	Famille	Voie	Traitement	Association	qma/kg/j	Nb jour de tra	qma	WAT	WAP	ALEA	mg/PCU
16	amoxicilline	betalactamine	im	Individual	n	0,015	2	37,5	1250	706050	0,001770413	0,082754055
16	amoxicilline	betalactamine	im	Individual	n	0,015	2	300	10000	706050	0,014163303	0,66203244
16	doxycycline	tetracycline	vo	Collective	n	0,01	5	250	5000	706050	0,007081651	0,5516937
16	florfénicol	phenicol	im	Individual	n	0,015	2	15	500	706050	0,000708165	0,033101622
16	florfénicol	phenicol	im	Individual	n	0,015	2	30	1000	706050	0,00141633	0,066203244
16	tylosine	macrolide	im	Individual	n	0,01	3	50	1667	706050	0,00236055	0,11033874
16	tylosine	macrolide	im	Individual	n	0,01	3	20	667	706050	0,00094422	0,044135496
15	amoxicilline	betalactamine	im	Individual	n	0,015	2	1200	40000	1657260	0,024136225	1,130710086
15	amoxicilline	betalactamine	im	Individual	o	0,01	3	275	9167	1657260	0,005531218	0,259121061
15	amoxicilline	betalactamine	im	Individual						1657260	0,006788313	0,318012212
15	amoxicilline	betalactamine	im	Individual						1657260	0,001508514	0,07066938
15	amoxicilline	betalactamine	im	Individual						1795020	0,002089113	0,098119593
15	amoxicilline	betalactamine	im	Individual						1795020	0,002785484	0,130826123
15	amoxicilline	betalactamine	im	Individual						1795020	0,001392742	0,065413062
15	amoxicilline	betalactamine	im	Individual						1795020	0,041085893	1,92968532
15	amoxicilline	betalactamine	im	Individual						1795020	0,00185699	0,087217416
15	amoxicilline	betalactamine	im	Individual						1795020	0,004178226	0,196239185
15	amoxicilline	betalactamine	im	Individual	n	0,015	2	450	15000	1795020	0,008356453	0,39247837

For ALEA:
WAT (Weight of Animal Treated)
For mg/PCU:
mg (*active ingredients* used)

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Some reminders…

Calculation of antimicrobial use

$$mg/PCU = \frac{mg}{PCU\ in\ kg}$$

$$ALEA = \frac{WAT}{WAP}$$

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Statistical analyses

We compared:

Means of antimicrobial use between P1 and P2

Evolution in antimicrobial usage between P1 and P2 regarding level of antibiotic consumption in P1

Selected farms

- 19 farms selected
- PRRS stabilization protocol implemented between 2007 and 2019
- Size of farms vary between 100 and 500 sows
- Different batch management and age at weaning

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Descriptive results

	ALEA			mg/PCU		
No.	P1	P2	Δ	P1	P2	Δ
1	0,51	1,05	↑	39,59	106,80	↑
2	0,59	0,69	↑	134,88	62,91	↓
3	1,02	0,48	↓	78,49	30,56	↓
4	0,77	0,84	↑	193,43	220,35	↑
5	0,30	0,23	↓	14,07	24,70	↑
6	0,76	1,47	↑	41,36	160,47	↑
7	1,39	0,66	↓	166,26	74,04	↓
8	1,76	2,14	↑	108,53	67,84	↓
9	0,76	1,47	↑	67,73	309,84	↑
10	0,56	0,68	↑	40,58	39,89	↓
11	2,33	0,38	↓	192,09	17,54	↓
12	1,01	0,22	↓	172,75	96,35	↓
13	0,14	0,26	↑	29,45	34,32	↑
14	1,04	0,71	↓	167,09	120,52	↓
15	0,05	0,14	↑	2,24	8,76	↑
16	1,92	0,05	↓	17,21	3,50	↓
17	0,32	0,53	↑	73,21	83,98	↑
18	1,08	0,91	↓	140,76	129,48	↓
19	0,90	0,97	↑	113,68	111,95	↓

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Descriptive results

8/19
42 %

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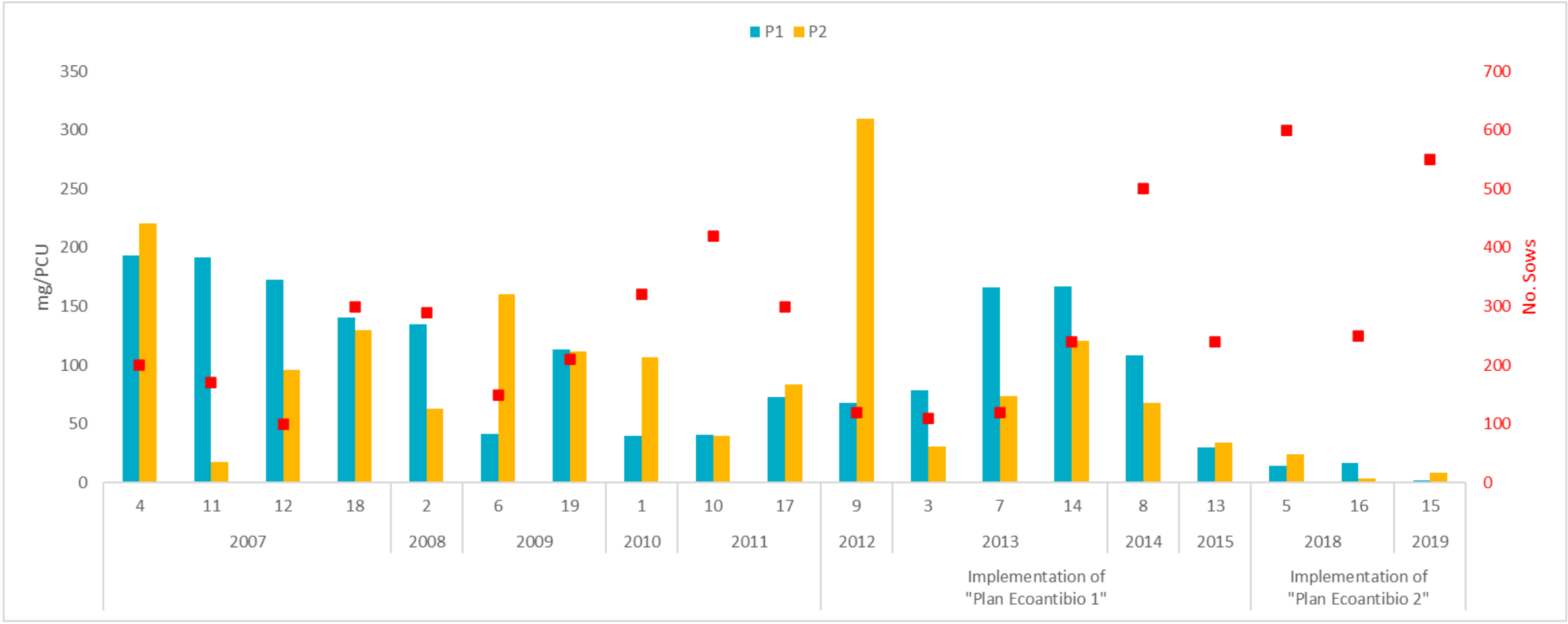
8/19
42 %

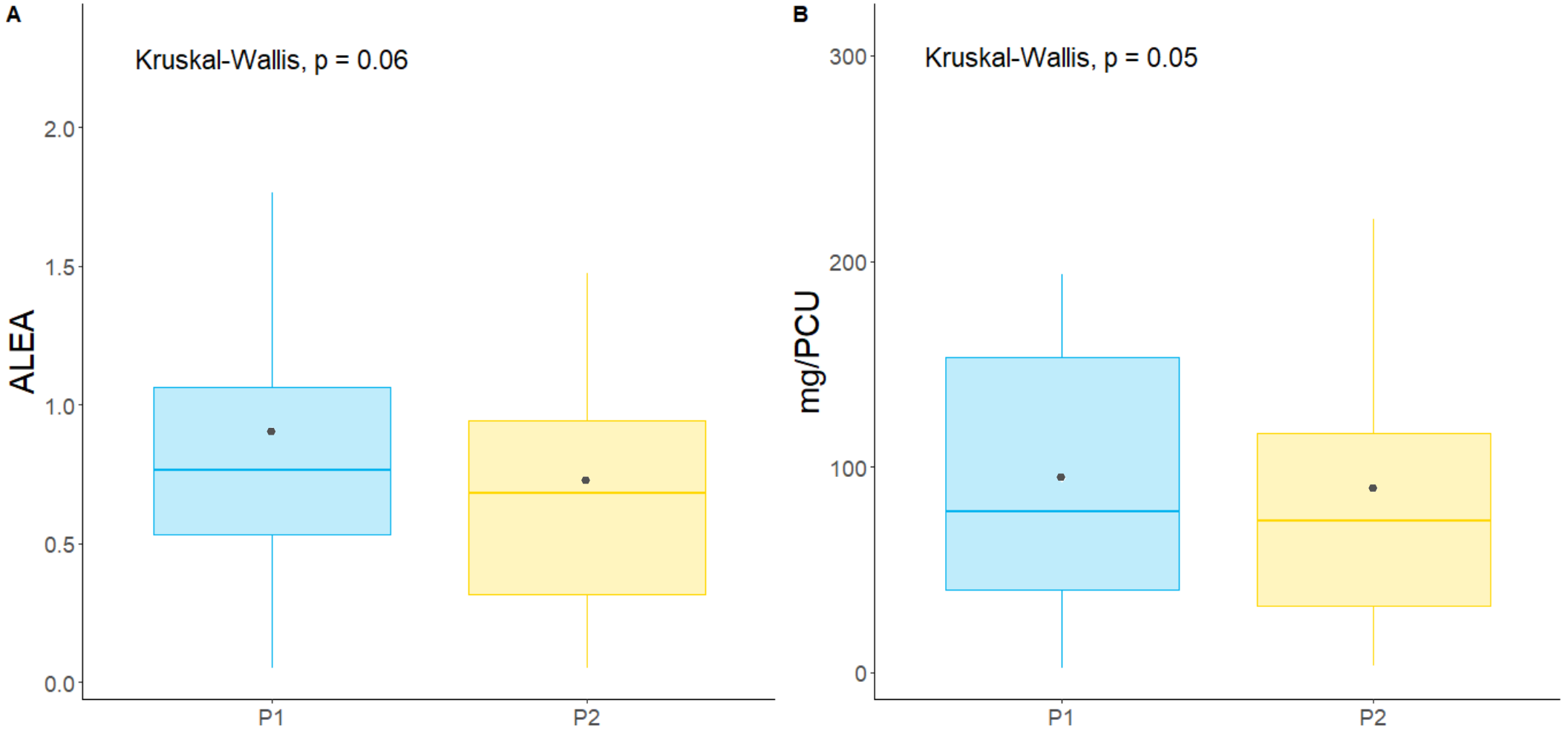
11/19
58 %

Descriptive data

Antibiotic exposures in P1 are significantly different between farms (**p<.001**). This variability is not linked to the implementation of EcoAntibio plans.



Mean comparisons



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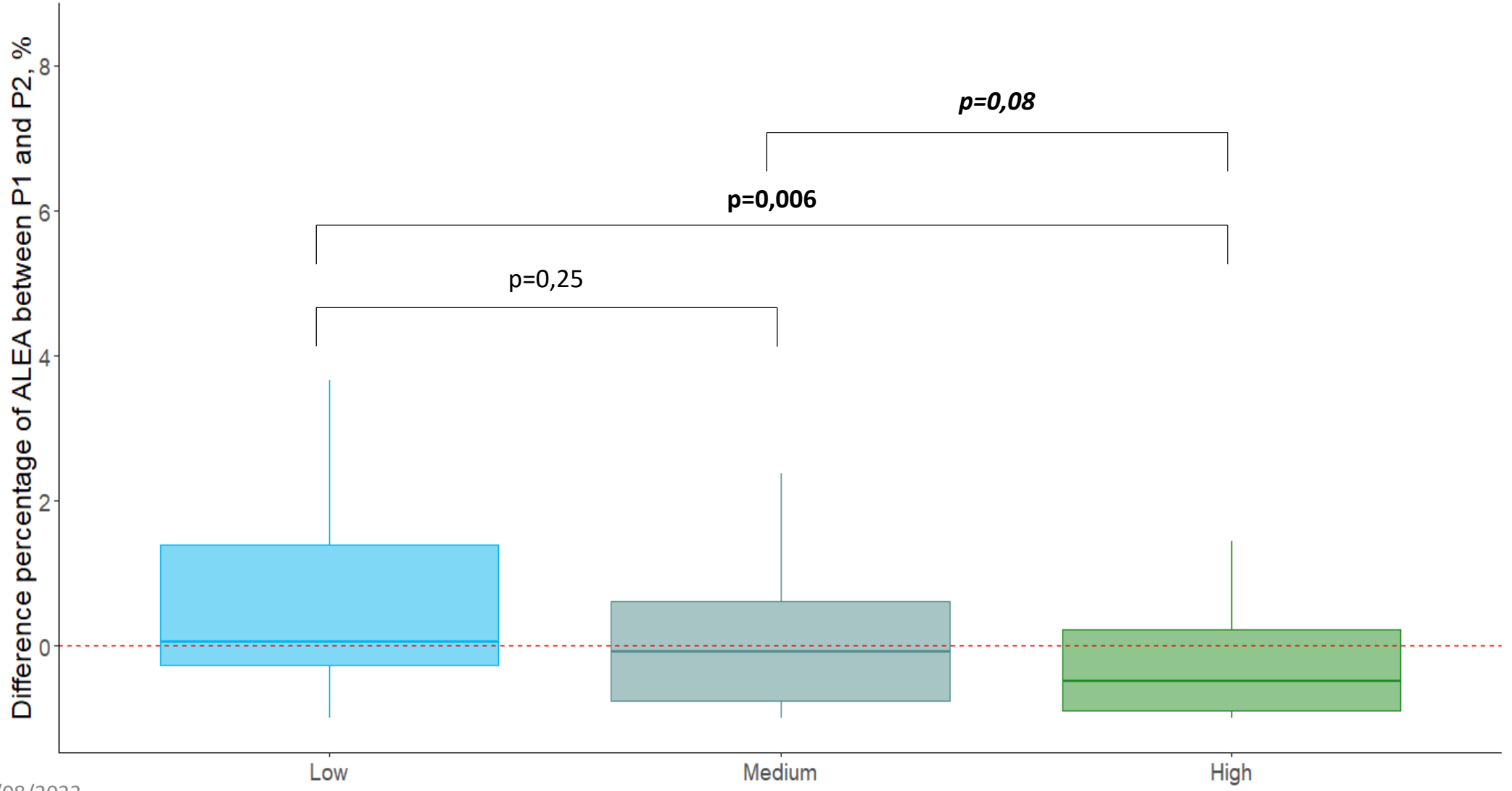
Consumption level groups

	No. farms	Limits	Reference
ALEA			
Low	4	< 0,5	David, J. C., Buchet, A., Sialelli, J. N., & Delouvée, S. (2021). Antibiotic Use in Relation with Psychological Profiles of Farmers of a French Pig Cooperative. Veterinary Sciences, 9(1), 14.
Medium	8	0,5 - 0,9	
High	7	> 0,9	
mg/PCU			
Low	10	< 100	O'Neill, L., Rodrigues da Costa, M., Leonard, F. C., Gibbons, J., Calderón Díaz, J. A., McCutcheon, G., & Manzanilla, E. G. (2020). Quantification, description and international comparison of antimicrobial use on Irish pig farms. Porcine health management, 6(1), 1-14.
High	9	≥ 100	

Difference between groups : ALEA



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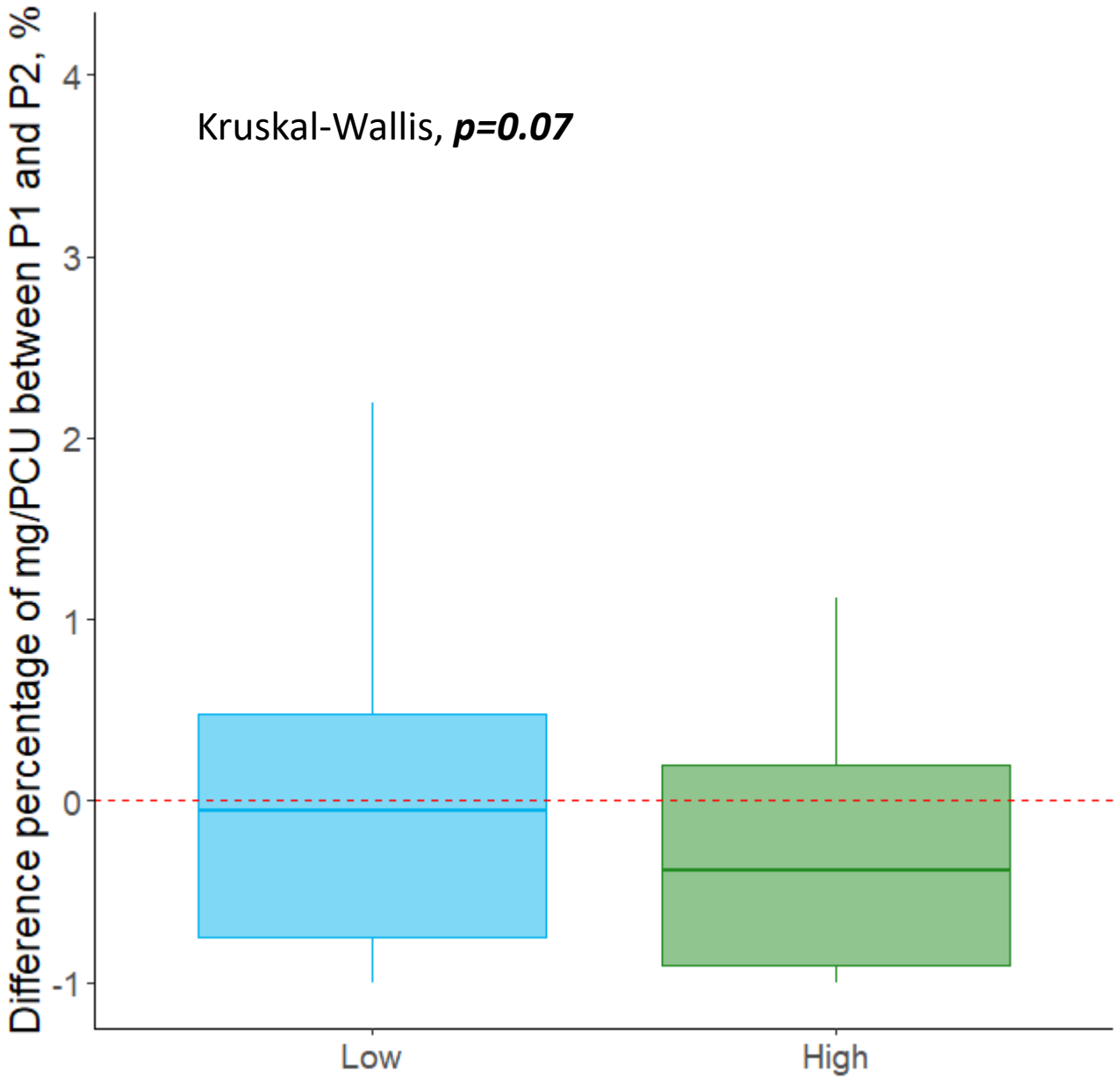
Difference between groups : mg/PCU

To simplify graph's reading, some points are not represented



To conclude

- In our knowledge, it is the **first study showing the impact of PRRSV-1 stabilization programs** on antibiotic usage.
- Even if there is a **huge variability between farms** regarding antibiotic usage reduction, we showed a **statistically impact for mg/PCU and a tendency for ALEA.**
- The important variability between farms in P1 and the evolution of antibiotics consumptions before and after a PRRSV-1 stabilization programs is not impacted by EcoAntibio plans.
- The **higher the level of consumption in P1**, the **greater the reduction in antibiotic use** (statistically significant for ALEA between low consumers and medium and high consumers and a tendency for mg/PCU).

Study limits

- The study **did not evaluate the impact** of PRRSV-1 stabilization programs **on**:
  - ➢Treatments between different physiological sectors
  - ➢Antibiotics families
  - ➢Administration routes and families

Because it was not possible retrospectively to have information about indication and type of treated animals (sow, post-weaning piglet …) for each treatment.

- In parallel, the **lack of these information did not allow us to explain the absence of reduction in some herds** (example: in one herd, we observed an outbreak of *Lawsonia intracellularis* in P2 that was never observed before and which induced many treatments with macrolides in P2).

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THANK YOU FOR YOUR ATTENTION

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