Views and experience on autogenous vaccines in swine

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Suckling pigs

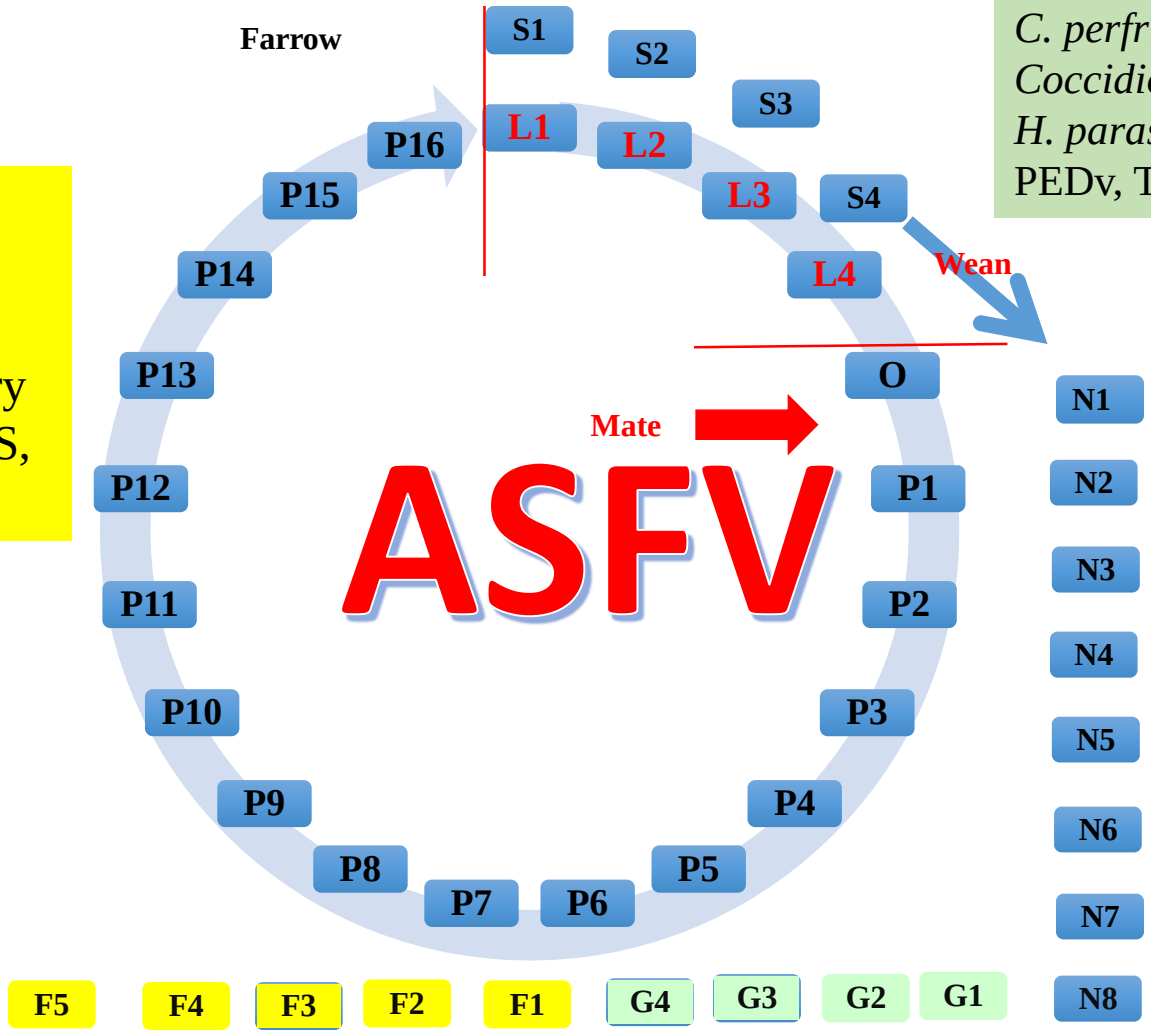
Nursery pigs

Finisher pigs

Common diseases in swine production

Sows/gilts:
PEDv
Ileitis
Swine dysentery
APP, Pm, PRRS,
PCV2, FMD

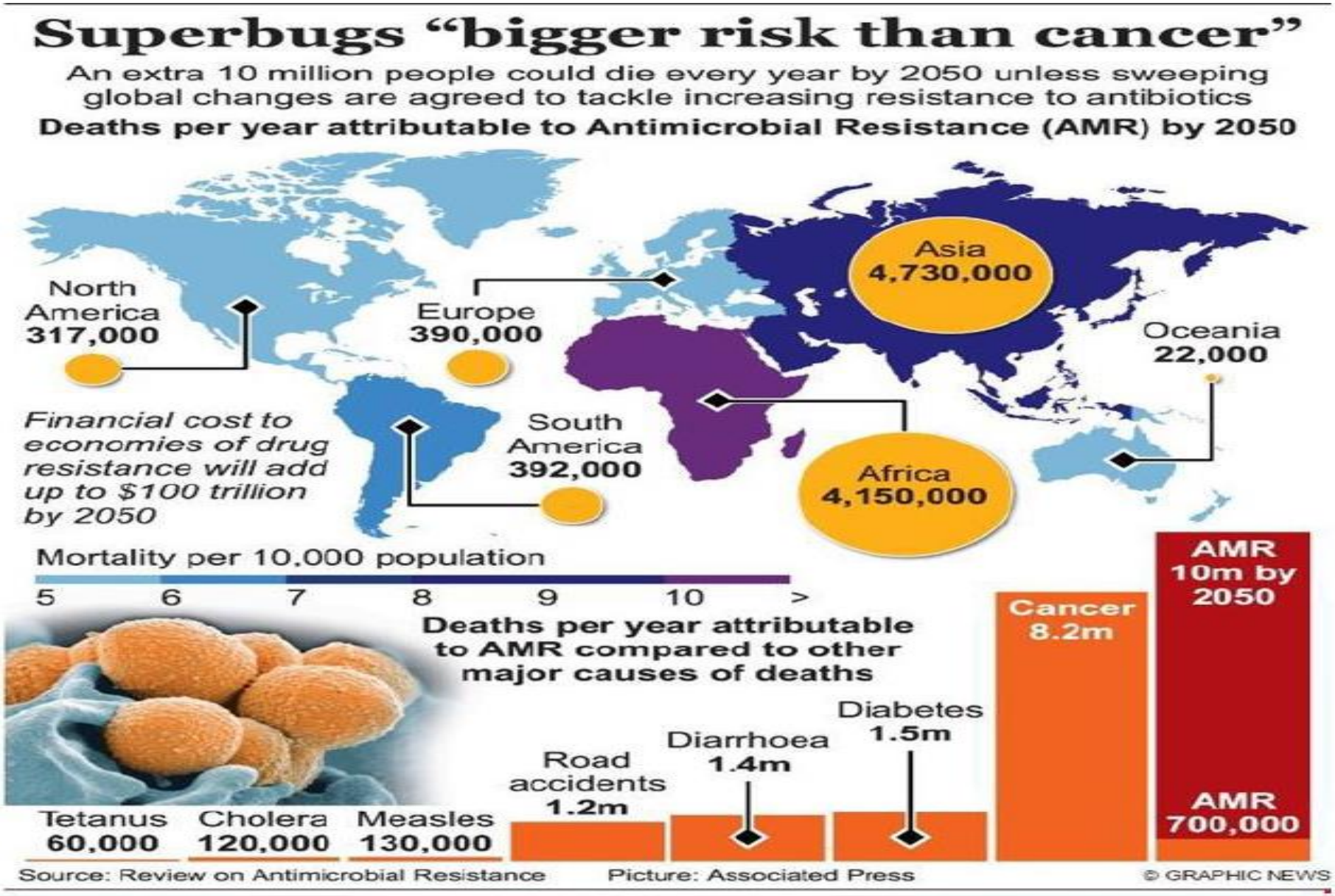
Suckling pigs
C. perfringens
Coccidiosis, E. coli,
H. parasuis, B. bronchiseptica
PEDv, TGEv, ROTAv, FMD



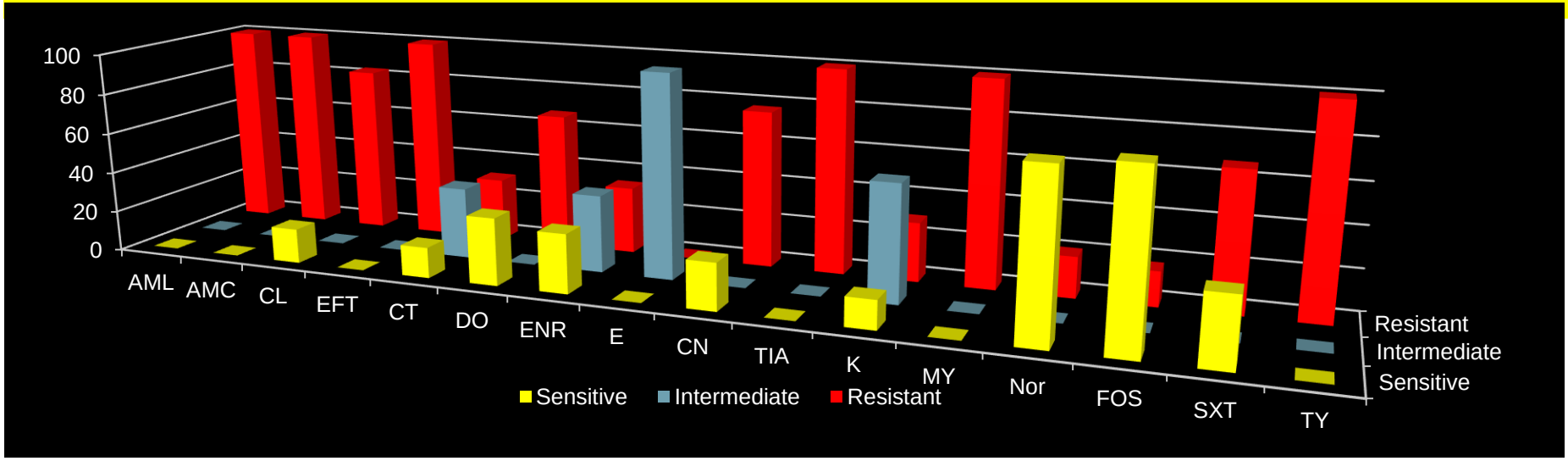
Nursery pigs
E. Coli,
L. intracellularis
B. hyodysenteriae
Salmonellosis
HPS, Pm, S.suis
PEDv, PRRSv,
CSFV, PCV2, FMD

Grower-finisher : Ileitis, Swine dysentery, Salmonellosis, *S. suis*, PCV2, APP, Pm, HPS, FMD

Antimicrobial resistance: from animals to human global crisis



In vitro antimicrobial testing against Salmonella spp. in Thailand during 2013-2015, 487 isolates



Species swine Age Type of specimen ปอด
Number 14 Collected date 15/2/60
Clinical sign Submitted date 22/2/60 time 10.00

Bacterial Identification: *Streptococcus* spp.

Antimicrobial Susceptibility Testing Method : Disk diffusion test

S	I	R	
		/	Amoxicillin (25 mcg)
		/	Amoxicillin/clavulanic (30 mcg)
			Ampicillin (10 mcg)
			Amikacin (30 mcg)
			Bacitracin (10mcg)
			Clindamycin (2 mcg)
		/	Cefotaxime (30 mcg)
		/	Cephalexin (30 mcg)
		/	Ceftiofur (30 mcg)
		/	Ceftriaxone (30 mcg)
			Ciprofloxacin(5 mcg)
			Chloramphenical (30 mcg)
			Colistin sulfate (10mcg)
			Doxycycline (30mcg)
		/	Enrofloxacin (5 mcg)
			Erythromycin (15 mcg)
			Furazolidone (15mcg)
			Fosfomycin (50 mcg)

S	I	R	
		/	Gentamicin (10 mcg)
			Halquinol
			Kanamycin (30 mcg)
			Lincomycin (2 mcg)
			Marbofloxacin
			Metronidazole (5 mcg)
			Neomycin (30 mcg)
			Norfloxacin (10 mcg)
		/	Oxytetracycline (30 mcg)
		/	Penicillin G (10 mcg)
			Polymyxin B sulfate (300 mcg)
			Spectinomycin (25 mcg)
			Streptomycin (10 mcg)
		/	Sulfamethoxazole+trimethoprim (25 mc
			Tiamulin (30 mcg)
			Tetracycline (30 mcg)
		/	Tilmicosin (15 mcg)
			Tylosin (150 mcg)

(S = Sensitive, I = Intermediate, R = Resistant)

pecies swine Age Type of specimen ปอด
umber 1, 2 Collected date
linical sign รอยโรคคล้าย APP ปอดบวมแดง มีเนื้อตาย fibrinปนหนอง Submitted date 20/2

Bacterial Identification: *Actinobacillus pleuropneumoniae* serotype 5 by a

Antimicrobial Susceptibility Testing Method : Disk diffusion test

S	I	R	
		2/2	Amoxicillin (25 mcg)
2/2			Amoxicillin/clavulanic (30 mcg)
			Apramycin (15mcg)
			Amikacin (30 mcg)
			Bacitracin (10mcg)
			Clindamycin (2 mcg)
		2/2	Cefotaxime (30 mcg)
		2/2	Cephalexin (30 mcg)
		2/2	Ceftiofur (30 mcg)
			Ceftriaxone (30 mcg)
			Ciprofloxacin(5 mcg)
			Chloramphenical (30 mcg)
			Colistin sulfate (10mcg)
2/2			Doxycycline (30mcg)
		2/2	Enrofloxacin (5 mcg)
			Erythromycin (15 mcg)
			Furazolidone (15mcg)
2/2			Fosfomycin (50 mcg)

S	I	R	
		2/2	Gentamicin (10 m
			Halquinol
			Kanamycin (30 m
			Lincomycin (2 m
			Marbofloxacin
			Metronidazole (5
			Neomycin (30 m
			Norfloxacin (10 m
		2/2	Oxytetracycline (
			Penicillin G (10 m
			Polymyxin B sulf
			Spectinomycin (
			Streptomycin (10
			Sulfamethoxazol
		2/2	Tiamulin (30 mcg
			Tetracycline (30
		2/2	Tilmicosin (15 m
			Tylosin (150 mcg

(S = Sensitive, I = Intermediate, R = Resistant)

Species swine Age Type of specimen feces
Number 1, 2, 3, 4 Collected date
Clinical sign รอยโรคคล้าย APP ปอดบวมแดง มีเนื้อตาย fibrinปนหนอง Submitted date 20/2/61 time 10

Bacterial Identification: Hemolytic *E. coli.*

Antimicrobial Susceptibility Testing Method : Disk diffusion test

S	I	R	
			Amoxicillin (25 mcg)
			Amoxicillin/clavulanic (30 mcg)
4/4			Apramycin (15mcg)
			Amikacin (30 mcg)
			Bacitracin (10mcg)
			Clindamycin (2 mcg)
			Cefotaxime (30 mcg)
			Cephalexin (30 mcg)
			Ceftiofur (30 mcg)
			Ceftriaxone (30 mcg)
			Ciprofloxacin(5 mcg)
			Chloramphenical (30 mcg)
		4/4	Colistin sulfate (10mcg)
		4/4	Doxycycline (30mcg)
		4/4	Enrofloxacin (5 mcg)
			Erythromycin (15 mcg)
			Furazolidone (15mcg)
1/4		3/4	Fosfomycin (50 mcg)

S	I	R	
		4/4	Gentamicin (10 mcg)
4/4			Halquinol
2/4	1/4	1/4	Kanamycin (30 mcg)
		4/4	Lincomycin (2 mcg)
			Marbofloxacin
			Metronidazole (5 mcg)
		4/4	Neomycin (30 mcg)
			Norfloxacin (10 mcg)
		4/4	Oxytetracycline (30 mcg)
			Penicillin G (10 mcg)
			Polymyxin B sulfate (300 mcg)
			Spectinomycin (25 mcg)
			Streptomycin (10 mcg)
			Sulfamethoxazole+trimethoprim (25
			Tiamulin (30 mcg)
			Tetracycline (30 mcg)
			Tilmicosin (15 mcg)
		4/4	Tylosin (150 mcg)

(S = Sensitive, I = Intermediate, R = Resistant)

กรมปศุสัตว์

จุฬาลงกรณ์มหาวิทยาลัย

Faculty of Veterinary Science
Chulalongkorn University

A **memorandum of understanding between Chulalongkorn University and Department of Livestock development for development of autogenous vaccine in swine (08-Apr-2016)**

- **What is autogenous vaccines**
  - a killed vaccine prepared from antigens (Virus or Bacteria) that is caused of an outbreak and return to use for control and prevention in those farms
- **Why we need autogenous vaccines**
  - Pathogenic bacteria and virus have genetic diversity and mutation
  - No cross protection in different serotype or serovar of pathogens
- **When we should use autogenous vaccines**
  - A new emerging disease outbreak occurs with no vaccine available
  - Lack efficacy of license vaccines for control and prevention of diseases
  - The license vaccines do not have the same antigen types as outbreak pathogens (strains, serotype, serovar, etc)
  - When the antimicrobials is limited or withdraw from the production systems

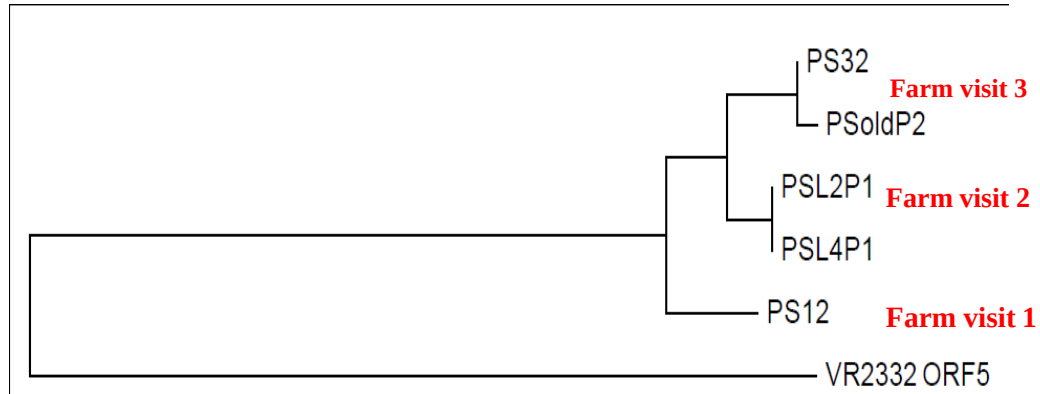
Pathogenic bacteria show high antigenic, phenotypic, and genotypic diversity

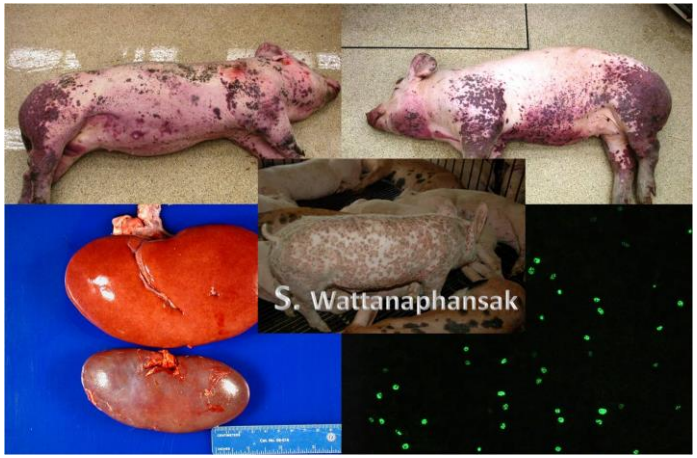
P. multocida	H. parasuis	App	S. suis	Salmonella
5 capsular serotypes A,B,C,D,E	15 serovar groups	15 serotypes	>35 serotype	>2500 serotype
A, D commonly found in pigs	1,5,10,12,13, 14 more virulence	Biotype I (1-12,15)	Type 1-9 commonly found in pig	S. typhimurium S. choleraesuis S. heidelberg S. Dublin
No cross protection among serotype	No cross protection among serotype	Biotype II (13,14)	No cross protection among serotype	No cross protection among serotype
		No cross protection among serotype		

Viral genetic diversity

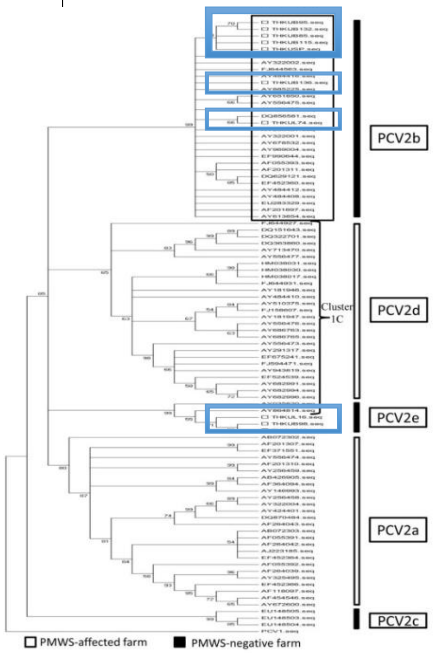
Mutation of PRRSV: How fast it can be occurred ?

PRRS infection

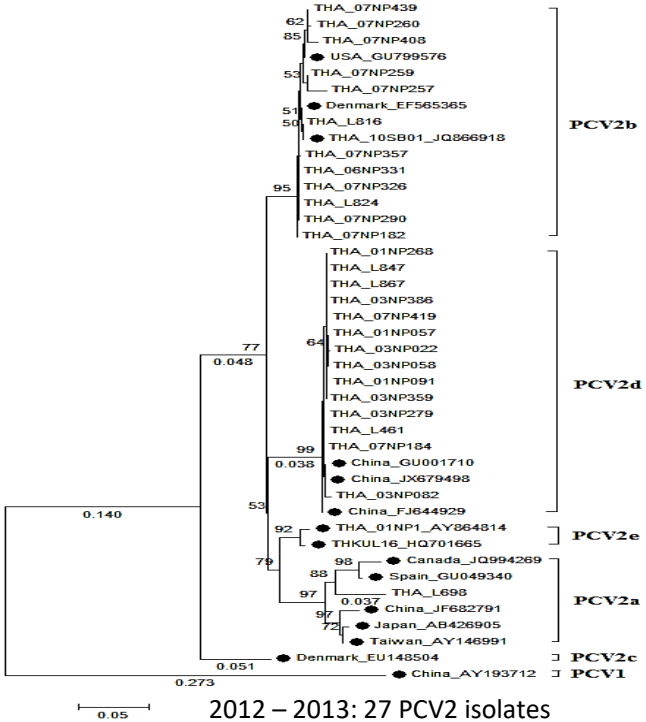




PCV2 infection



2007 – 2008: 10 PCV2 isolates
7 of 10 (70%): PCV2b cluster 1 A/B
3 of 10 (30%) : PCV2e (Jantafong et al. 2011))



2012 – 2013: 27 PCV2 isolates
14 of 27 (51.9%) PCV2d
12 of 27 (44.4%) PCV2b
1 of 27 (3.7%) PCV2a (Buapaichit et al. 2013)

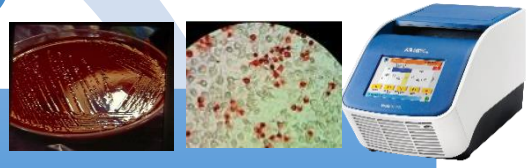
The principle and process of autogenous vaccine

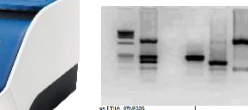
Samples collection from outbreak farms

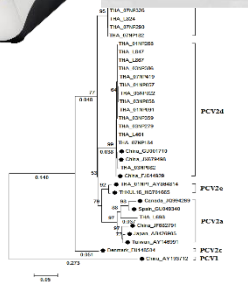
Swine Veterinarian

Swine Veterinarian

Monitoring and updated seed of antigens







Laboratory diagnosis

Swine Veterinarian

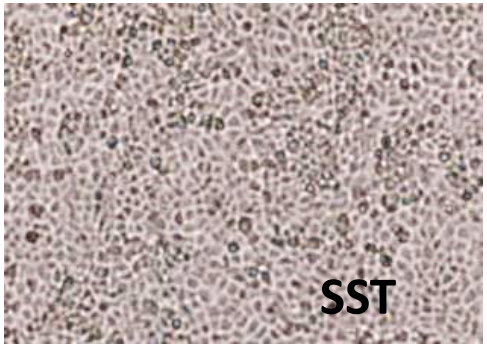
Return to used in outbreak farms

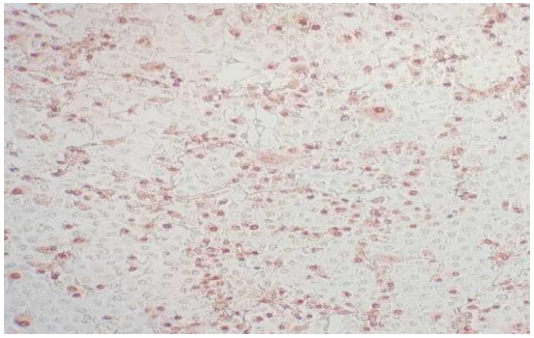
Isolation and propagation of antigens

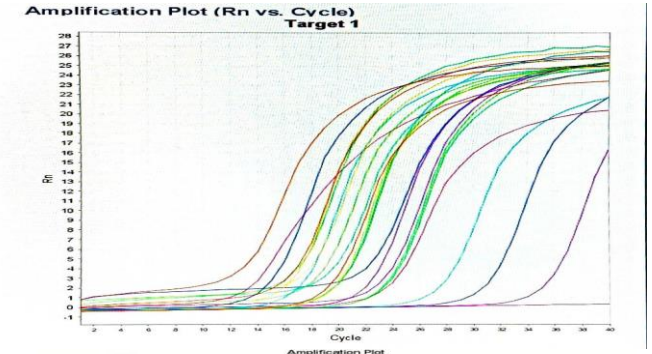
The outcome of the autogenous vaccine projects

1. Viral vaccines: PRRS, PCV2, RotaV, PED

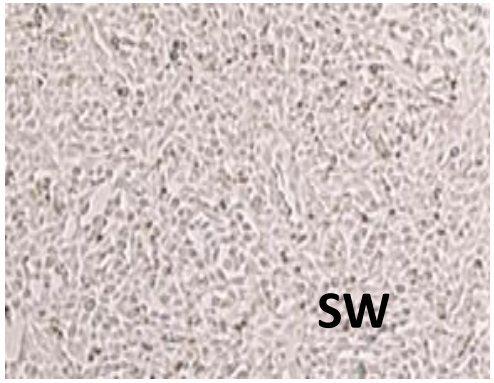
PRRS

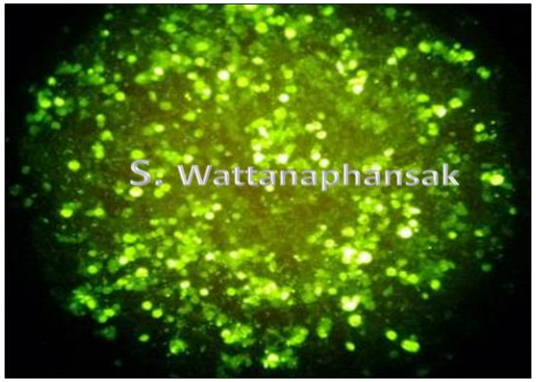


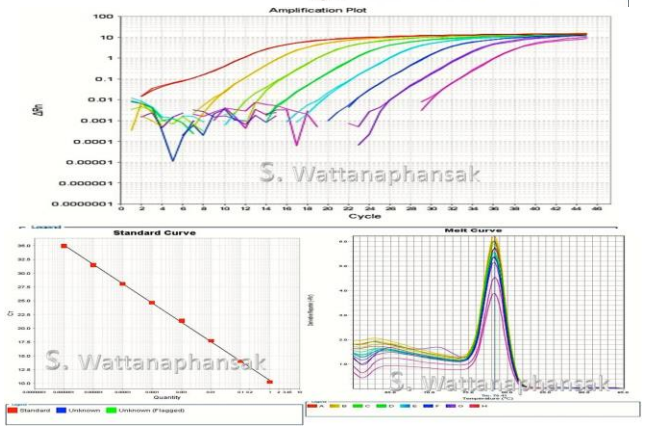




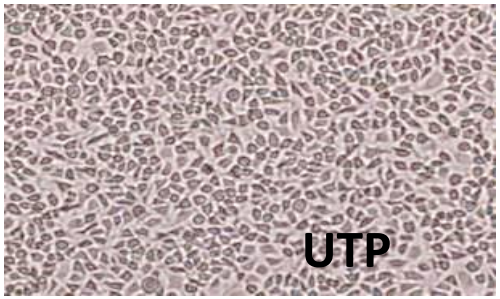
PCV2

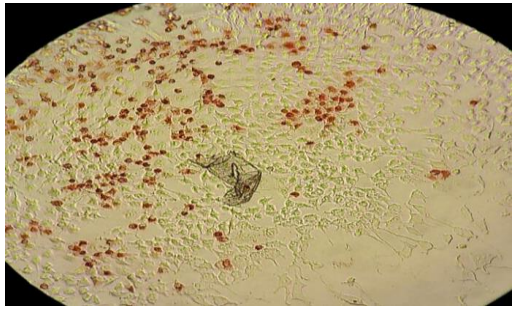


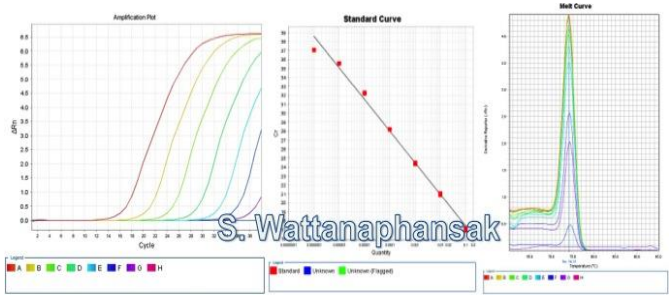




PED







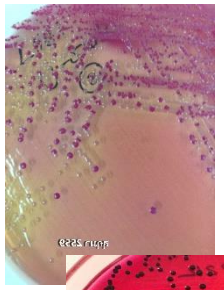
The outcome of the autogenous vaccine projects

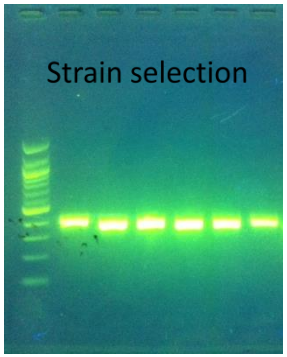
1. Combined enteric bacterial vaccines: *E. coli*+*Salmonella*+*C. perfringen*

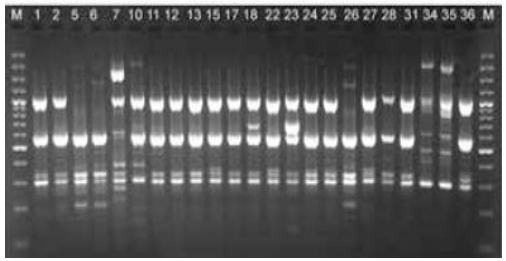
2. Combined respiratory bacterial vaccines: *H. parasuis*+*S. suis*+*P. multocida*+*M. hyorhinis*

3. *Vaccine against APP*

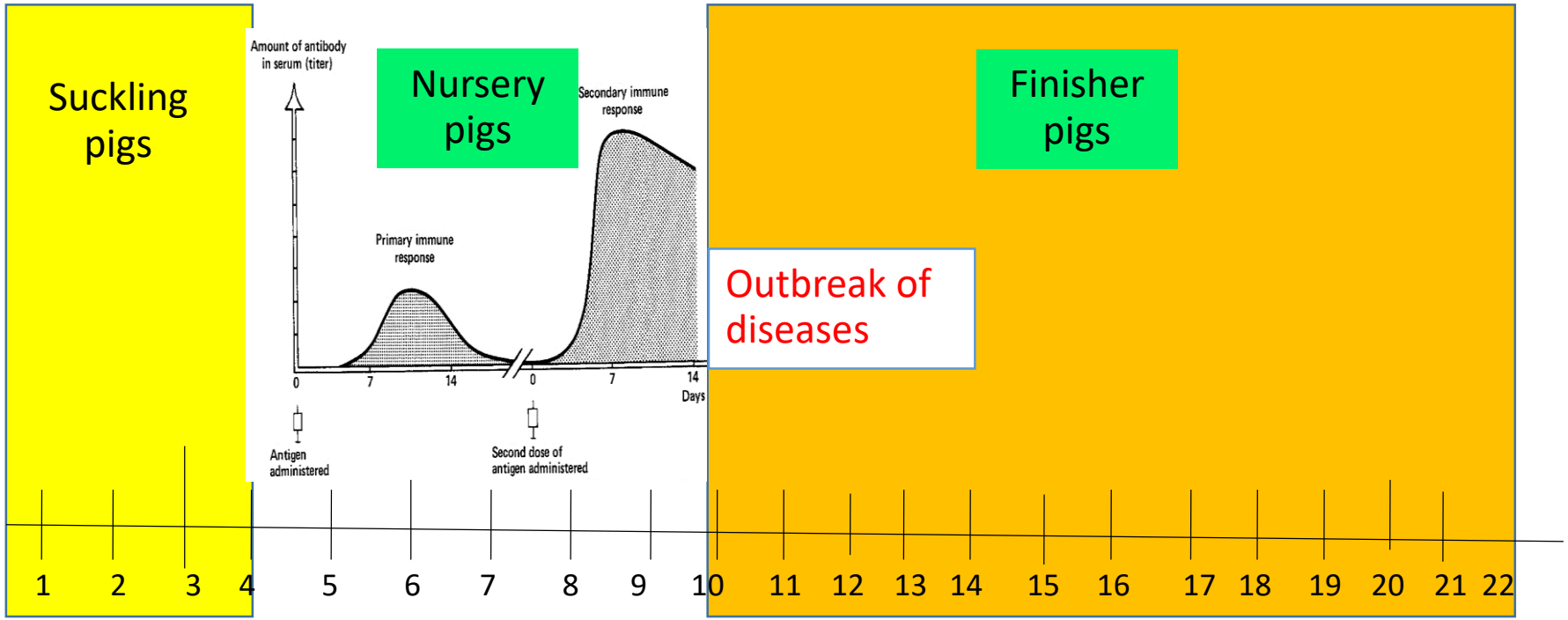
4. *Combined vaccines as requested by veterinarians*

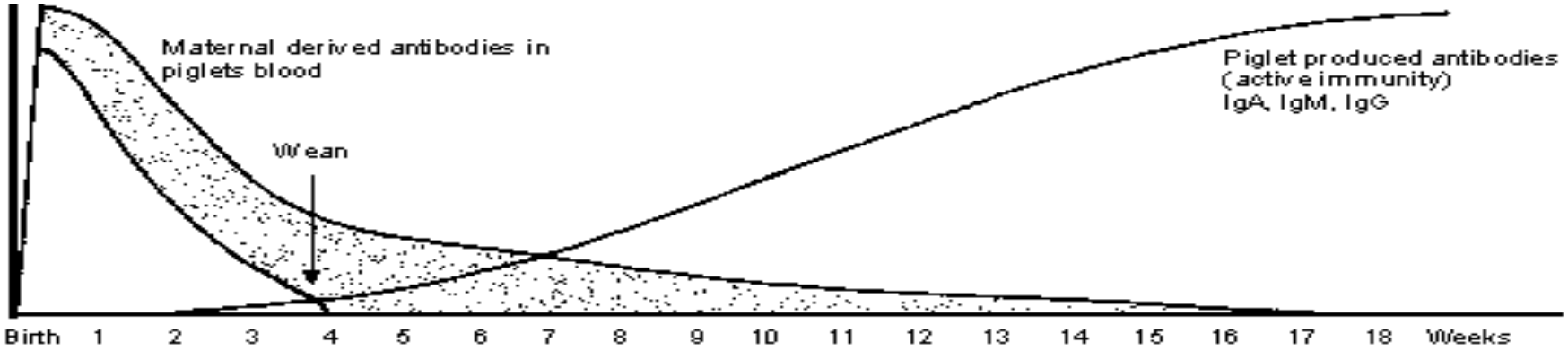




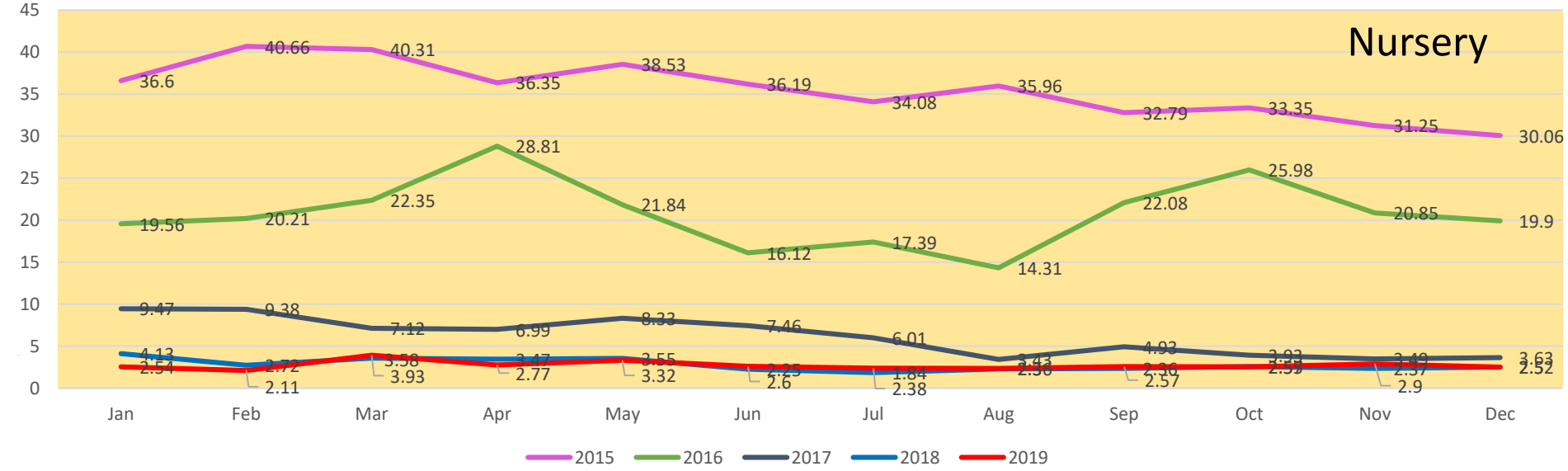


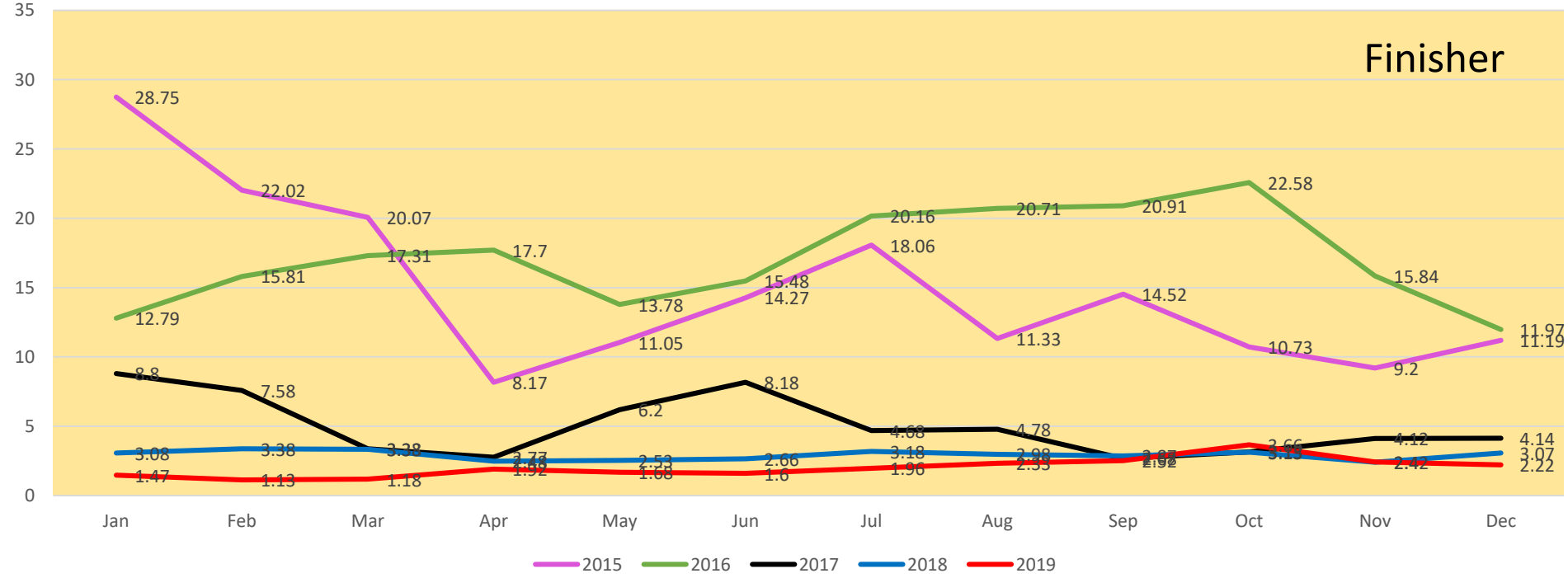
Vaccination program for autogenous vaccines in pigs



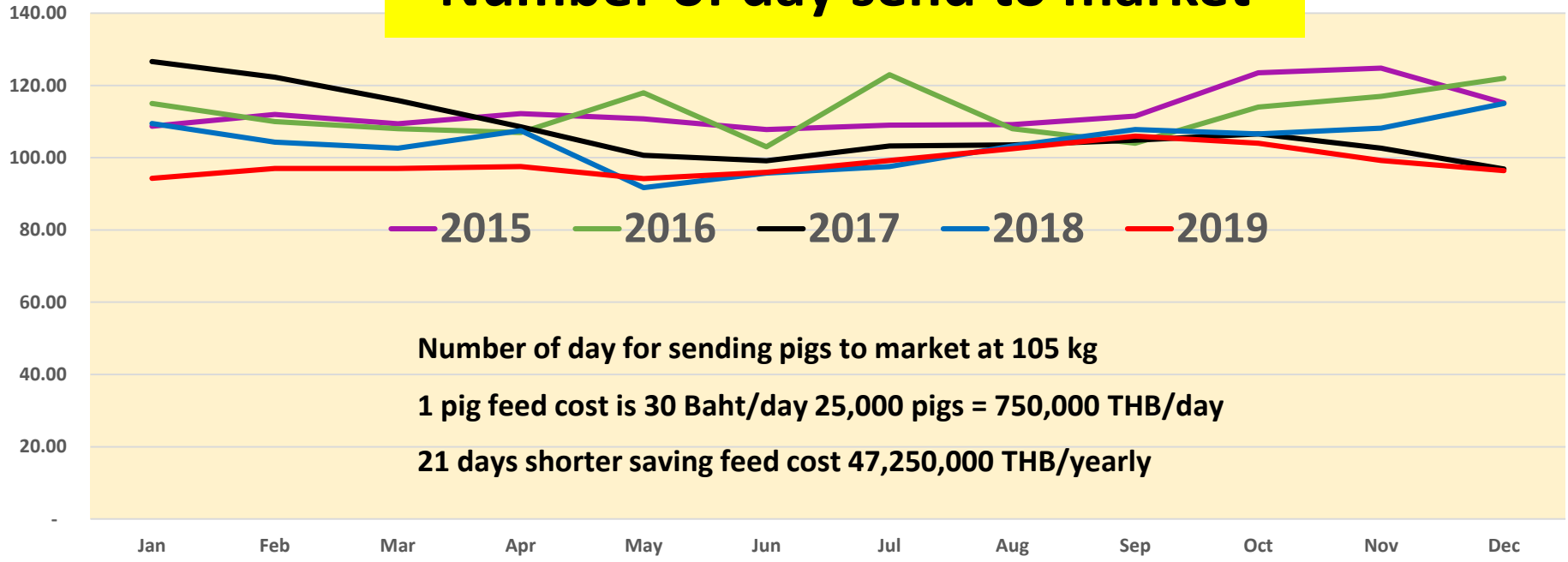


Mortality rate of nursery-finisher pigs from the years of 2015-2019 in Northern part of Thailand with 3,800 Sows

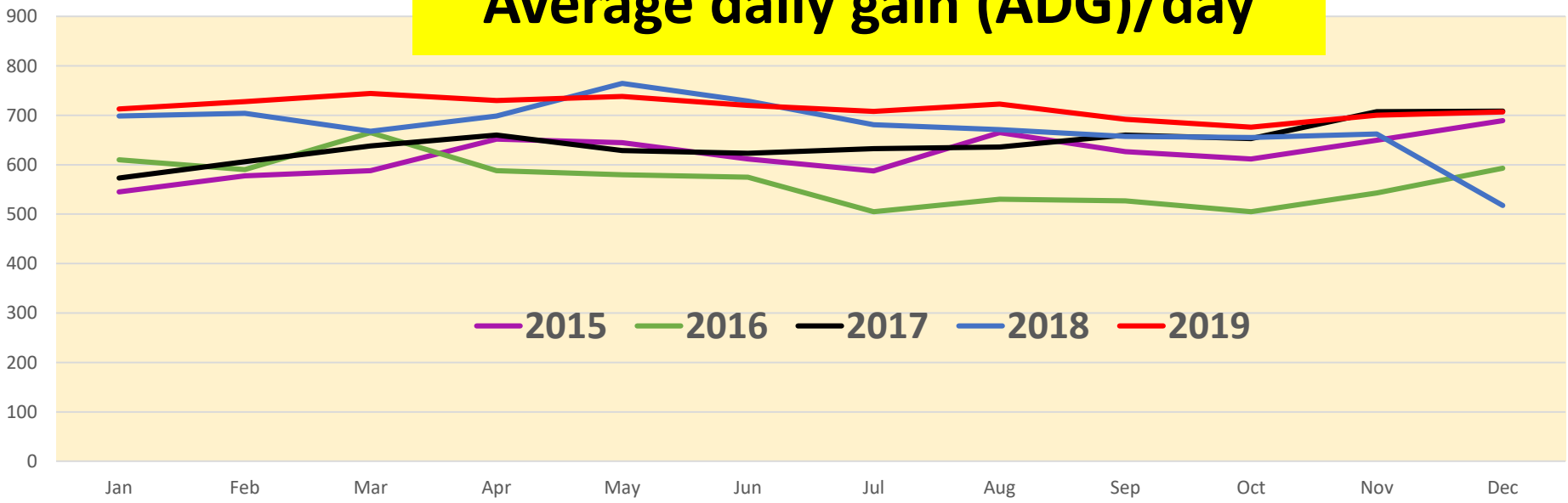




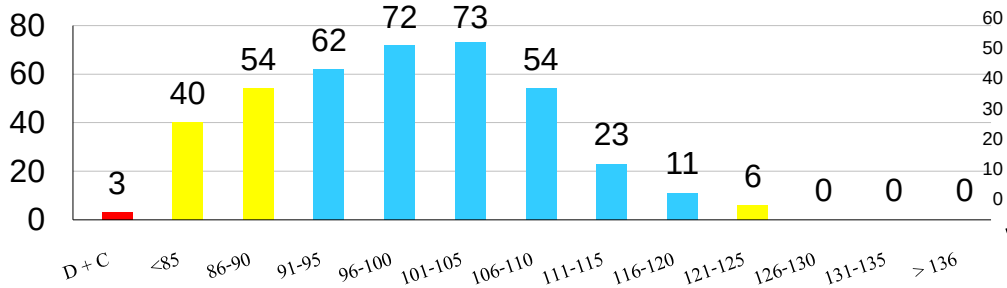
Number of day send to market



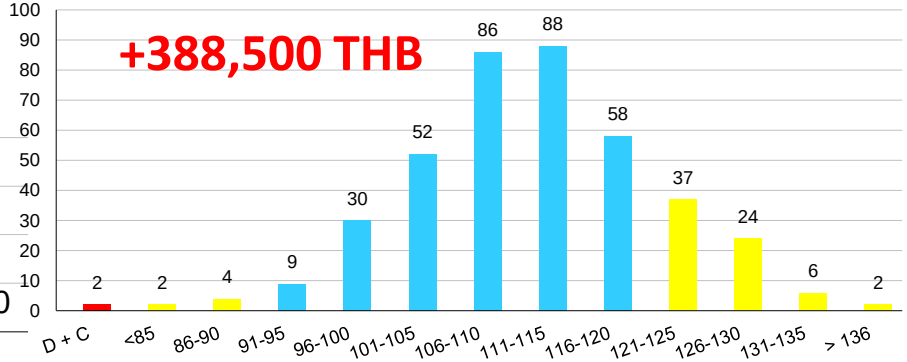
Average daily gain (ADG)/day



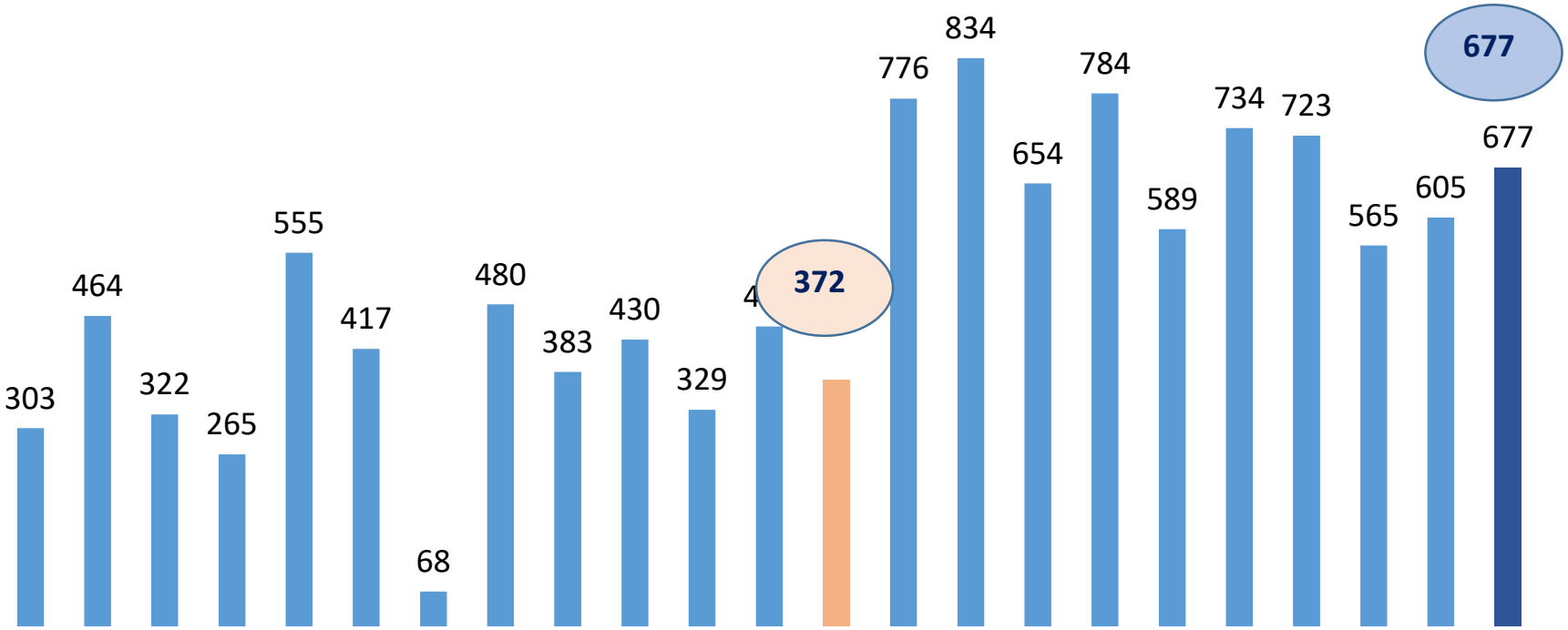
Net Profits: Thai Baht



395 Pigs 2,776,900 THB 65 THB/kg



398 pigs 3,165,400 THB 65 THB/kg



Unit with no autogenous vaccine

Unit vaccinated with autogenous vaccine

Parameters	Before vaccinated	After used for 3-6 months
Mortality rate in suckling pigs	12-20 %	2-8%
Weaned weight	4.5-6 kg	6-7.5 kg
Mortality rate in nursery (5-9 week)	15-28%	1-8%
Weight go to grower at 9-10 weeks	14-20kg	25-28kg
Time sent to the market at 105kg	26-29 week	22-24 week
Mortality rate in finisher	10-20%	3-5%
Average daily gain	550-630	730-780
Antimicrobial use	Very high level	⬇10-20% in feed ⬇30-40% injection

Field trip Prince Mahidol Award Conference 2018

https://www.youtube.com/watch?v=X7TyQU6C8cM

Advantages and limitations of the use of autogenous vaccine

- **Advantages**
  - It can be use for control outbreak of viral and bacterial diseases faster
  - Seed antigens in the vaccine can be update in short period of time
  - Can be used as an alternative when the use of antimicrobials is limited
- **Limitations**
  - Some antigens need time for cultures, several week to month
  - Diagnostic test to detect the immune response need to be developed
  - Regulation for control the use and vaccine production still unclear

Acknowledgements

Team members: Dr. Pornchalit Assavacheep,

Dr. Rachod Tantilertcharn

Members of Large animal hospital diagnostic lab and Lawsonia lab's

- Faculty of Veterinary Science, Chulalongkorn University
- University Research, Chulalongkorn University
- Department of Livestock Development
- Swine producers in Thailand