

# Serologia de Mal Rojo

## Aplicaciones de campo

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# Contexto Europeo



**Reducción  
antibióticos**

**15,2 M  
scrofe**

**Bienestar  
animal**

**Genéticas  
hiperprolíficas**

# Contexto Europeo



**Reducción  
antibióticos**

A map of Europe is shown in the background, rendered in a light gray color with black outlines for country borders. Two large, solid red circles are overlaid on the map. The first circle is positioned in the upper central part of the map, over Eastern Europe, and contains the text 'Reducción antibióticos'. The second circle is positioned in the lower left part of the map, over Western Europe, and contains the text 'Bienestar animal'. The text in both circles is white and bold.

**Bienestar  
animal**





## **SUBCLINICA** en cerdas:

- VACUNADAS pero portadoras
- Aumento de casos CLINICOS postdestete
- Aumento de casos SUBCLINICOS en matadero

**Brote agudo**

**Uso de la  
serología**



# Serología de Mal Rojo



Como evaluar la  
situación  
epidemiológica de  
mi explotación ?

# Contexto Europeo



**Reducción  
antibióticos**

**Bienestar  
animal**

**Genéticas  
hiperprolíficas**



**Lechones  
Destetados**

### Evolución Productividad Numérica (2001-2015)

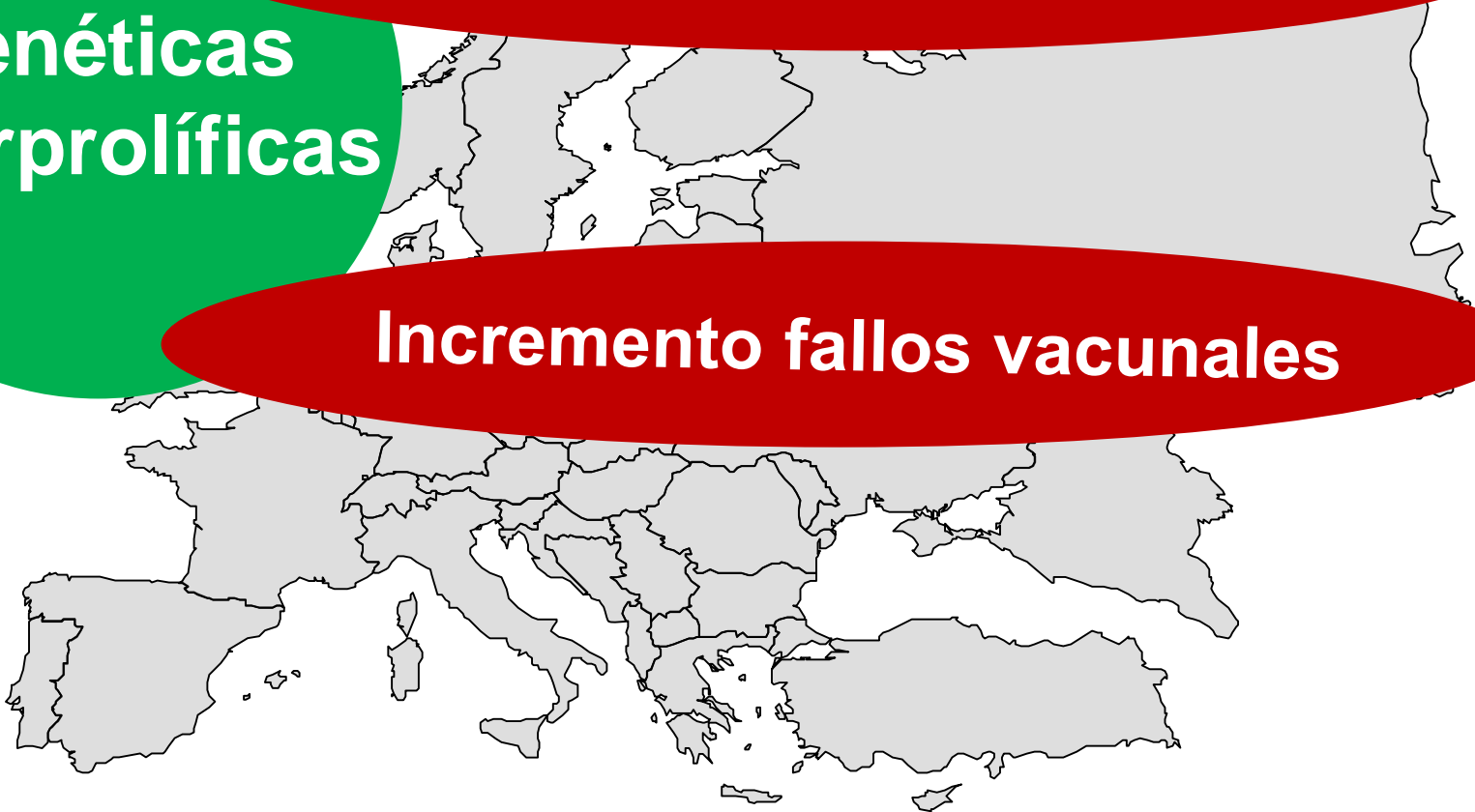


# Contexto Europeo

**Genéticas  
hiperprolíficas**

**Mejorar encalostramiento**

**Incremento fallos vacunales**



# Serologia de Mal Rojo



Como evaluar si el  
lechón esta bien  
calostrado ?

# PARTE 1

**Respuesta  
vacunal**

Como evaluar la  
situación  
epidemiológica de  
mi explotación

**Situacion de  
campo**

# Las vacunas de Mal Rojo

- EFICACIA – PROTECCION:

**Vacuna inactivada = IMMUNIDAD HUMORAL**



**Subpoblaciones SERONEGATIVAS**

# Las vacunas de Mal Rojo

## Podemos relajarnos con el Mal Rojo ?



**50% de granjas con subpoblaciones (5-25%)  
de cerdas desprotegidas**

# Erysipelas

- Interpretación títulos serologicos:
  - Cut-off: **40**
  - Vacunas: **40 -100**
    - Aluminium hydroxide adjuvant: **40-60**
    - ERYSENG PARVO / MSD: **80-100**
    - Oil adjuvant: **90-110**
    - Vivas: **100 - 110**
  - Contacto campo: **> 100 (110 – 140)**

# Case 35494

|                             |  |
|-----------------------------|--|
| <b>Country</b>              | <b>Romania</b>   |
| <b>Breeding sows</b>        | <b>3200</b>  |
| <b>Production sistem</b>    | <b>Farrow to finish</b>  |
| <b>Gilt origin</b>          | <b>Own replacement</b>   |
| <b>Vaccine</b>              | <b>Eryromvac (live vaccine)</b>  |
| <b>Vaccination protocol</b> | <b><u>Gilts:</u> 2 shots before mating.<br/><u>Sows:</u> 2 mass vaccination/year<br/><u>Pigs:</u> 1 shot at 90 days of age</b> |



# Case 35494

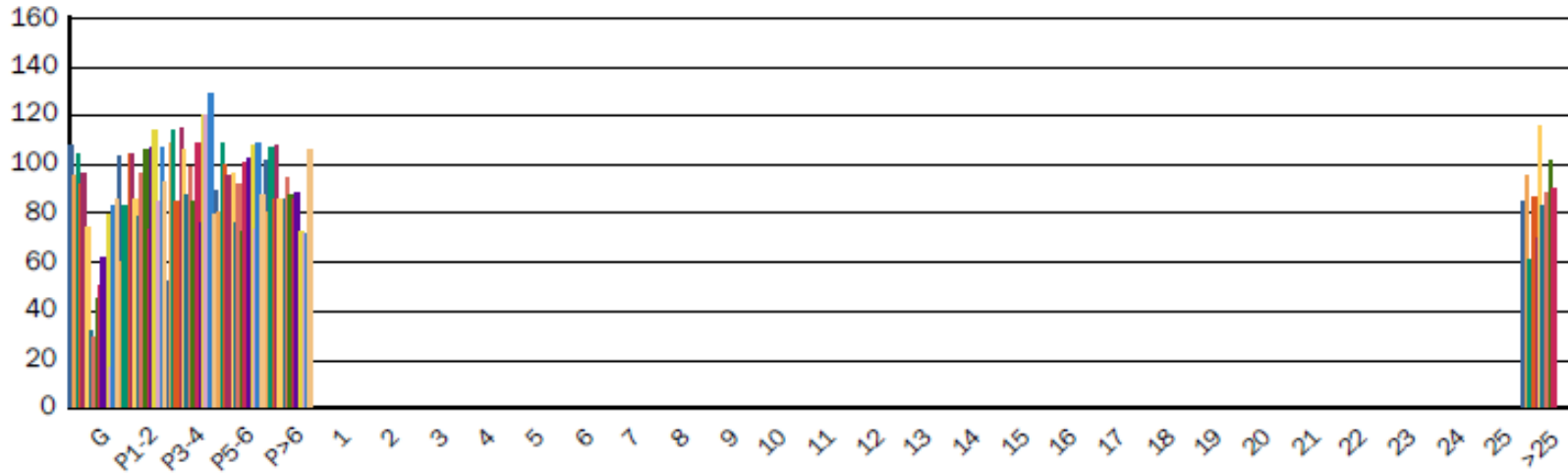
## Porcine Erysipela

Elisa (CIVTEST SUISE/MR)

Reference values: NEG < 40 ; POS > 40

### Individual Antibody Titres

A00035494



### % Positivity

A00035494



# Case 35494

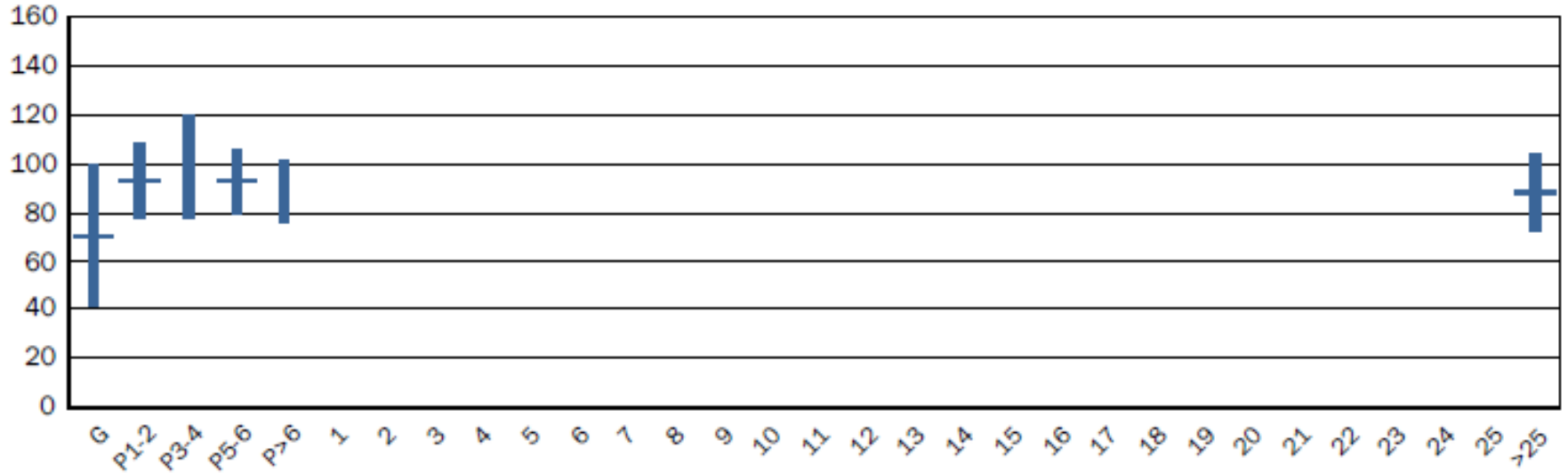
## Porcine Erysipela

Elisa (CIVTEST SUISE/SE/MR)

Reference values: NEG < 40 ; POS > 40

### Mean Antibody Titres

A00035494



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# Case 33737

|                             |   |
|-----------------------------|---|
| <b>Country</b>              | <b>Hungary</b>  |
| <b>Breeding sows</b>        | <b>600</b>  |
| <b>Production sistem</b>    | <b>Farrow to finish</b>   |
| <b>Gilt origin</b>          | <b>Own replacement</b>  |
| <b>Vaccine</b>              | <b>PARVOSUIN MR – oil adjuvant</b>  |
| <b>Vaccination protocol</b> | <b><u>Gilts</u>: 2 shots before mating<br/><u>Sows</u>: 1 shot in lactation</b> |

# Case 33737

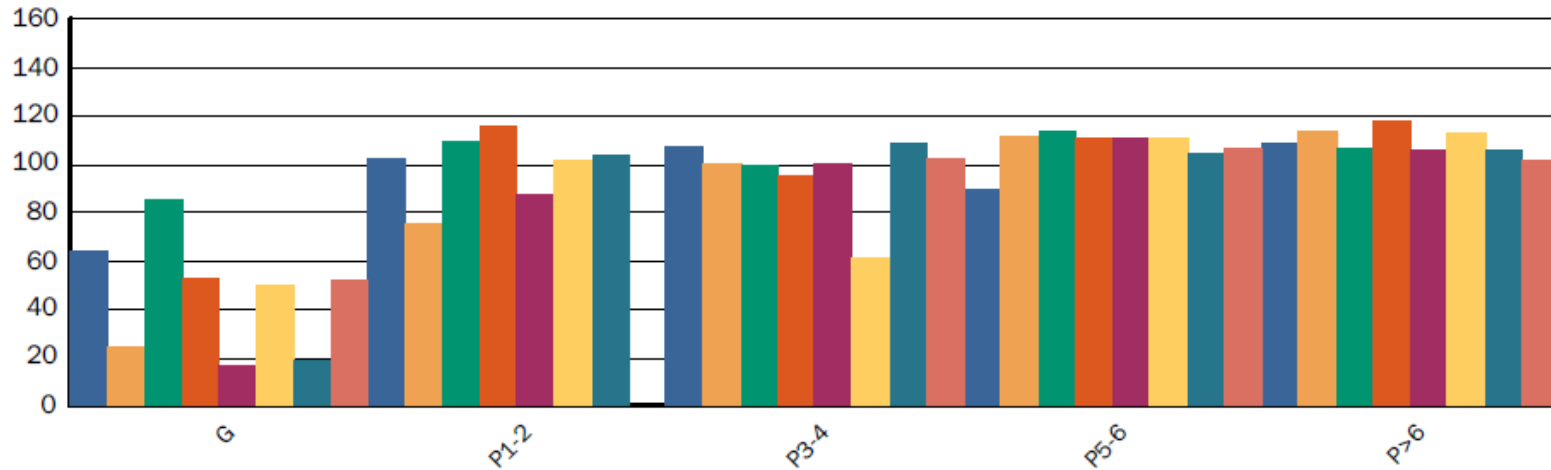
## Porcine Erysipela

Elisa (CIVTEST SUI5 SE/MR)

Reference values: NEG < 40 ; POS > 40

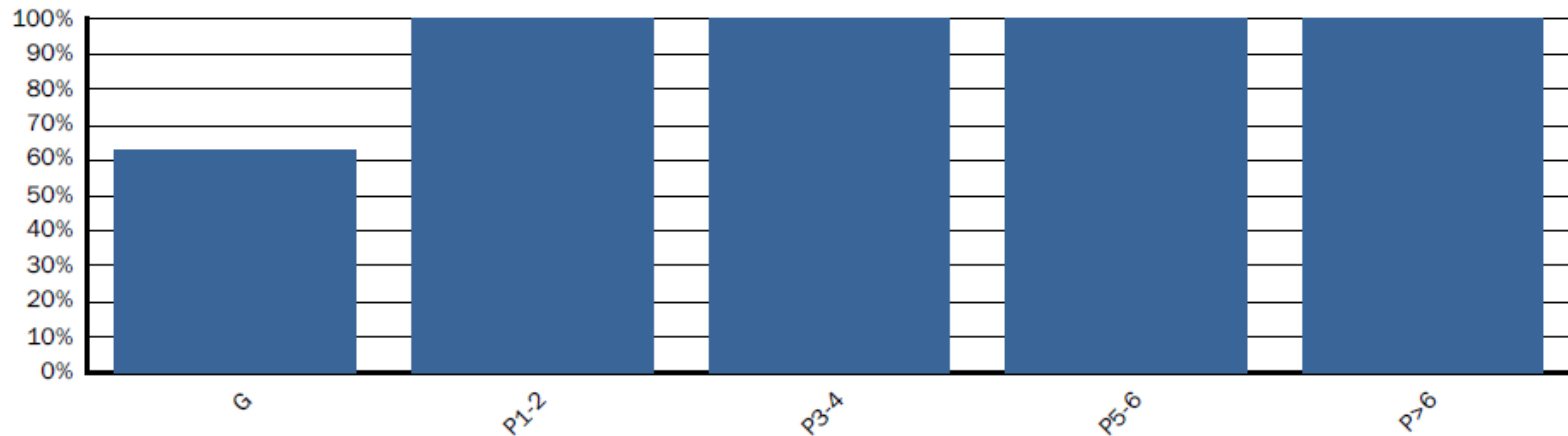
### Individual Antibody Titres

A00033737



### % Positivity

A00033737



# Case 33737

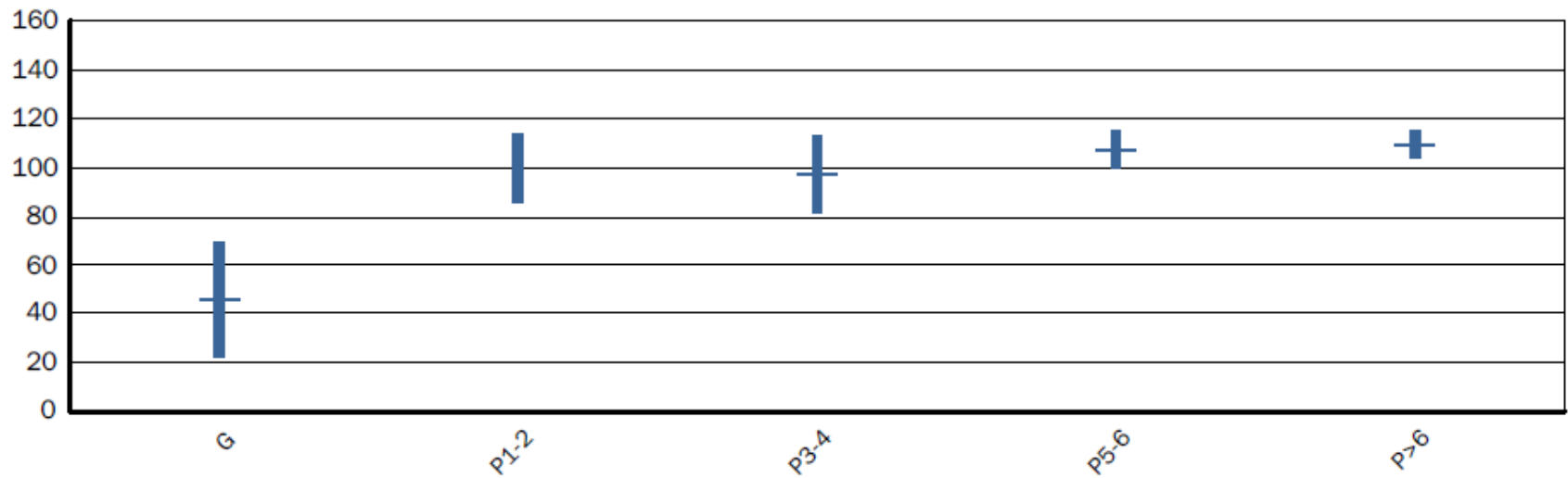
## Porcine Erysipela

Elisa (CIVTEST SUI5 SE/MR)

Reference values: NEG < 40 ; POS > 40

### Mean Antibody Titres

A00033737



# Case 36282

|                          |                                      |
|--------------------------|--------------------------------------|
| <b>Country</b>           | <b>Chzec Republic</b>                |
| <b>Breeding sows</b>     | <b>170</b>                           |
| <b>Production sistem</b> | <b>Farrow to finish</b>              |
| <b>Gilt origin</b>       | <b>Own replacement</b>               |
| <b>Vaccine</b>           | <b>Erysin Bioveta – Oil adjuvant</b> |
| <b>Comments</b>          | <b>Kill vaccine (oil)</b>            |

# Case 36282

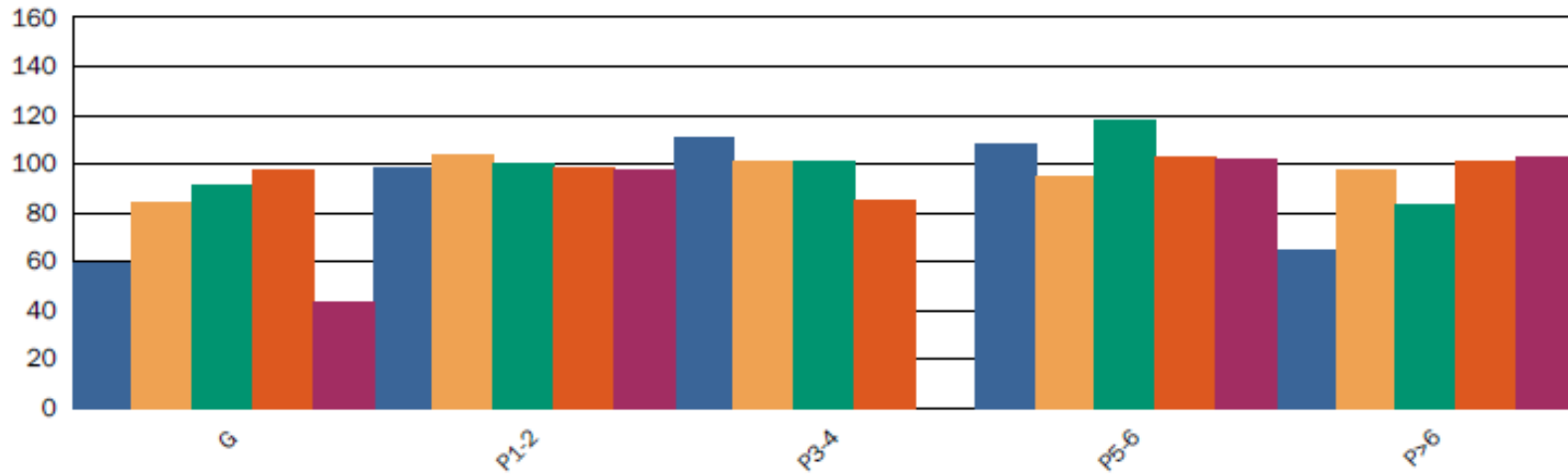
## Porcine Erysipela

Elisa (CIVTEST SUIS SE/MR)

Reference values: NEG < 40 ; POS > 40

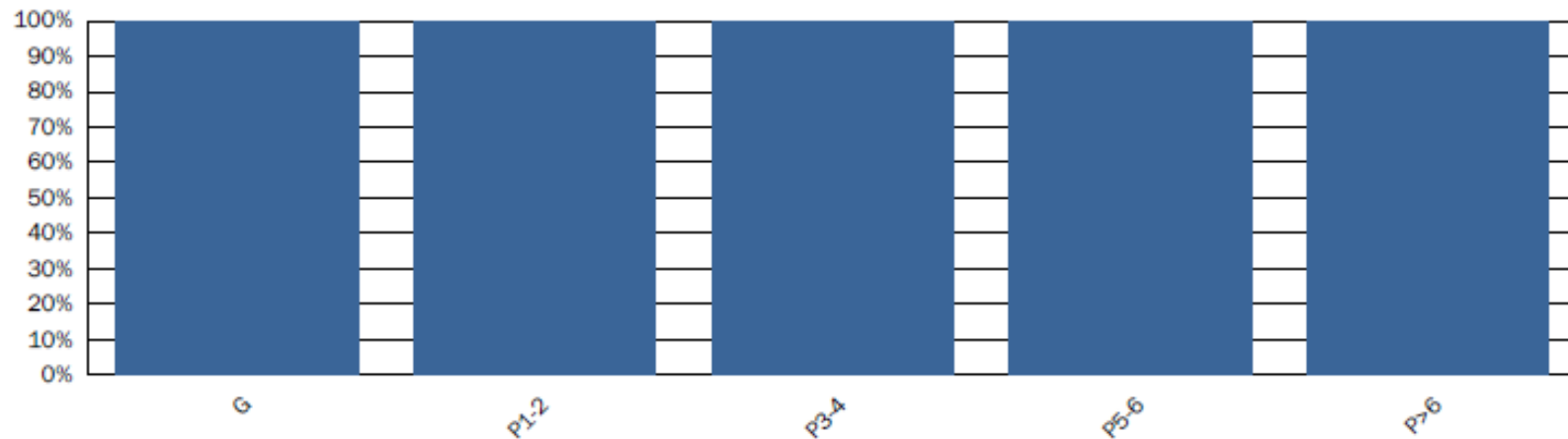
### Individual Antibody Titres

A00036282



### % Positivity

A00036282



# Case 36282

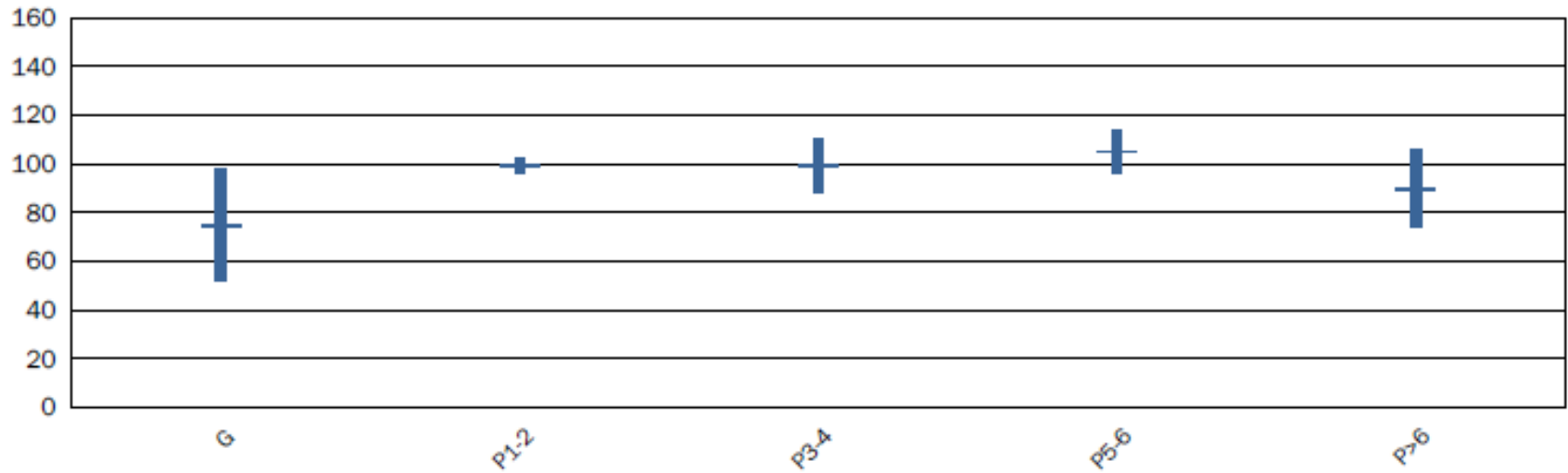
## Porcine Erysipela

Elisa (CIVTEST SUISE/ MR)

Reference values: NEG < 40 ; POS > 40

### Mean Antibody Titres

A00036282



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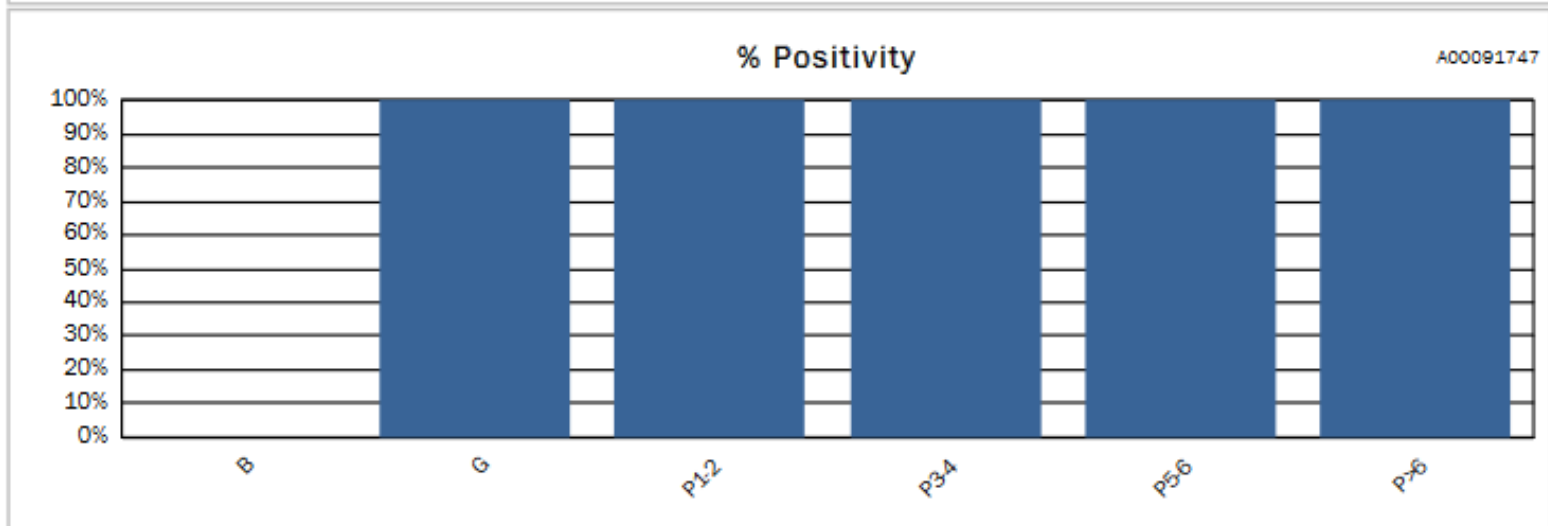
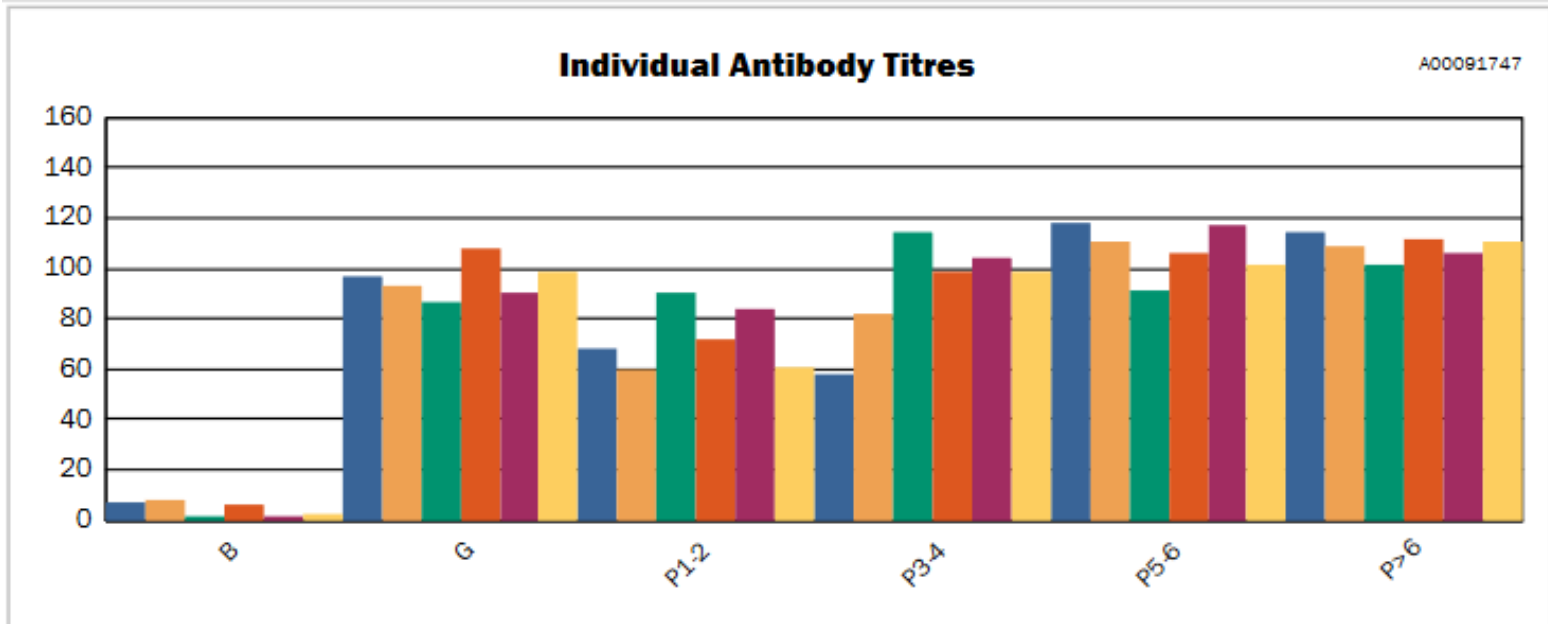
|                   |   |
|-------------------|---|
| Country           | Holanda   |
| Sows              | 700   |
| Productive system | Sitio 1 con Cerdas + Postdestete                                    |
| Gilt source       | Auto remplazo   |
| Vaccine           | <b>ERYSENG PARVO</b>  |
| Vaccine program   | <u>Gilts</u> : 2 dosis antes IA<br><u>Sows</u> : 1 dosis post-parto |

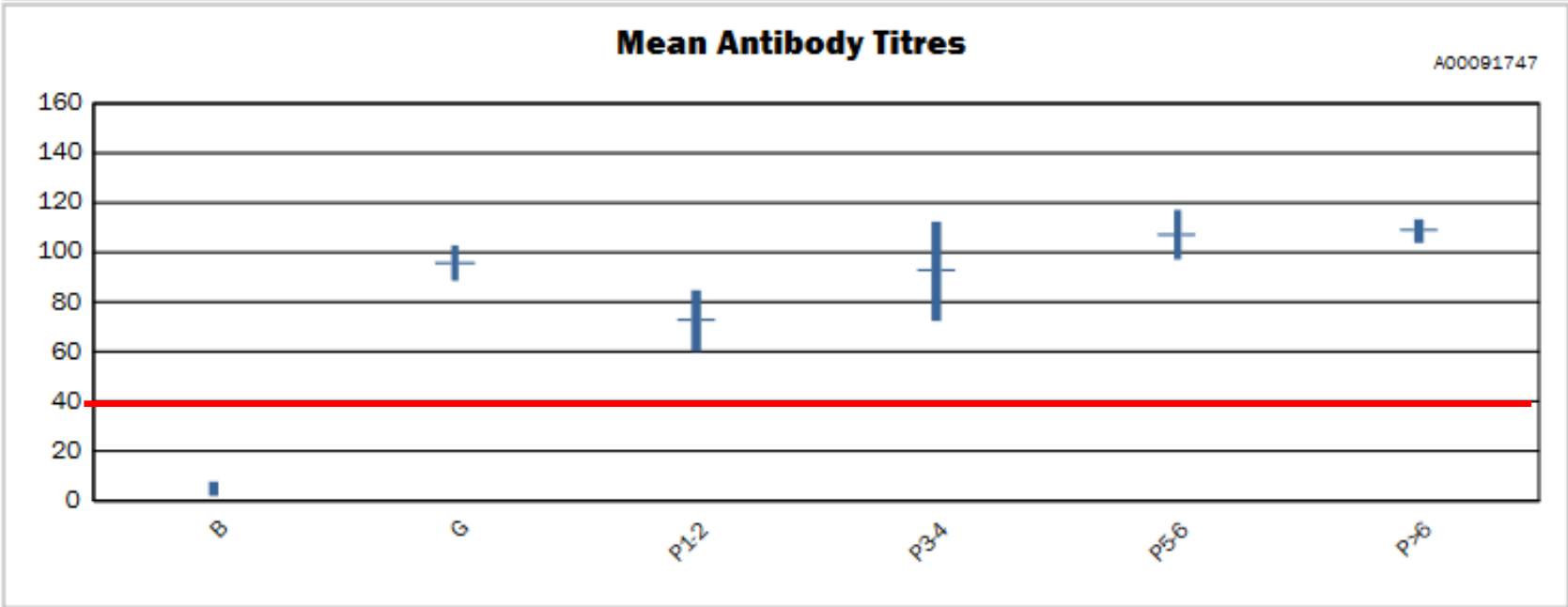
|                  |       |                                  |               |
|------------------|-------|----------------------------------|---------------|
| PPV              | Gilts | 180+ <del>208</del> 208 days age | eryseng parvo |
|                  | Sows  | farrowing                        | "             |
| SWINE ERYSIPELAS | Gilts | 180+ 208 dg age                  | eryseng parvo |
|                  | Sows  | eryseng parvo : farrowing        |               |
|                  | Pigs  |                                  |               |

## Porcine Erysipela

Reference values: NEG < 40 ; POS > 40

Elisa (CIVTEST SUISE/MR)





|                          |   |
|--------------------------|---|
|                          | <b>Chzec Republic</b>   |
| <b>Sows</b>              | <b>1865</b>   |
| <b>Productive system</b> | <b>Ciclo cerrado</b>  |
| <b>Gilt source</b>       | <b>Auto remplazo</b>  |
| <b>VaccineCountry</b>    | <b>Hidróxido aluminio</b>   |
| <b>Vaccine Program</b>   | <b><u>Gilts:</u> 2 dosis antes IA</b><br><b><u>Sows:</u> 1 dosis post-parto</b> |

|                     |       |  |                   |
|---------------------|-------|--|-------------------|
| PPV                 | Pigs  | NO   |                   |
|                     | Gilts | two shots before first AI, at age of 22 and 25 weeks | PARVORUVAX Merial |
| SWINE<br>ERYSIPELAS | Sows  | 21 <sup>st</sup> day after every farrowing           | PARVORUVAX Merial |
|                     | Pigs  | NO   |                   |
|                     | Gilts | two shots before first AI, at age of 22 and 25 weeks | PARVORUVAX Merial |
|                     | Sows  | 21 <sup>st</sup> day after every farrowing           | PARVORUVAX Merial |
|                     | Pigs  | NO   |                   |



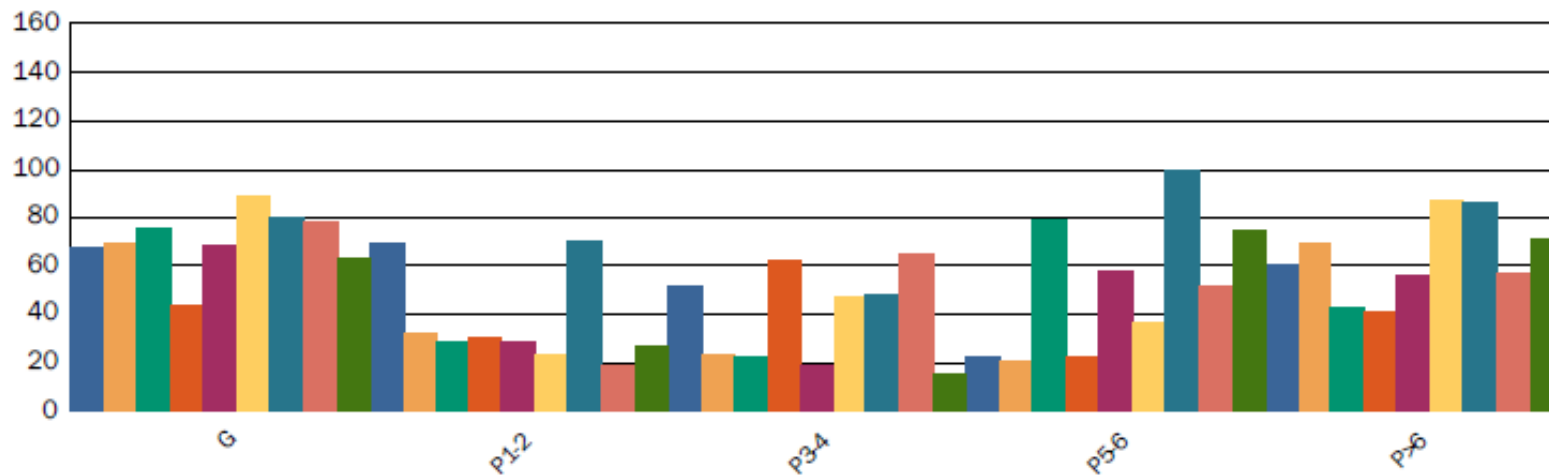
## Porcine Erysipela

Reference values: NEG < 40 ; POS > 40

Elisa (CIVTEST SUI5 SE/MR)

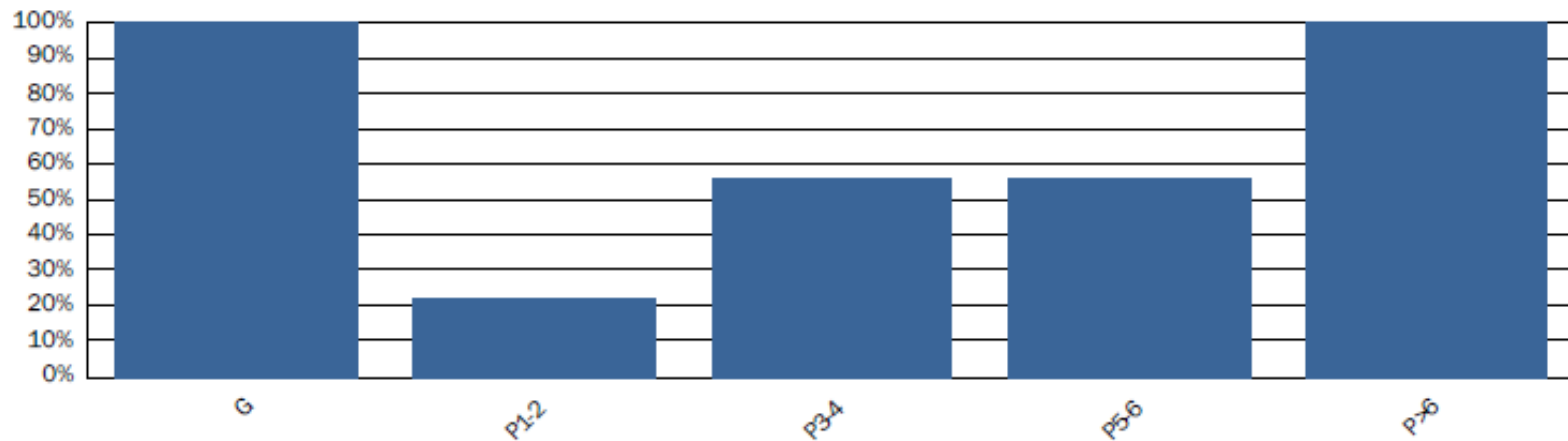
### Individual Antibody Titres

A00041871



### % Positivity

A00041871



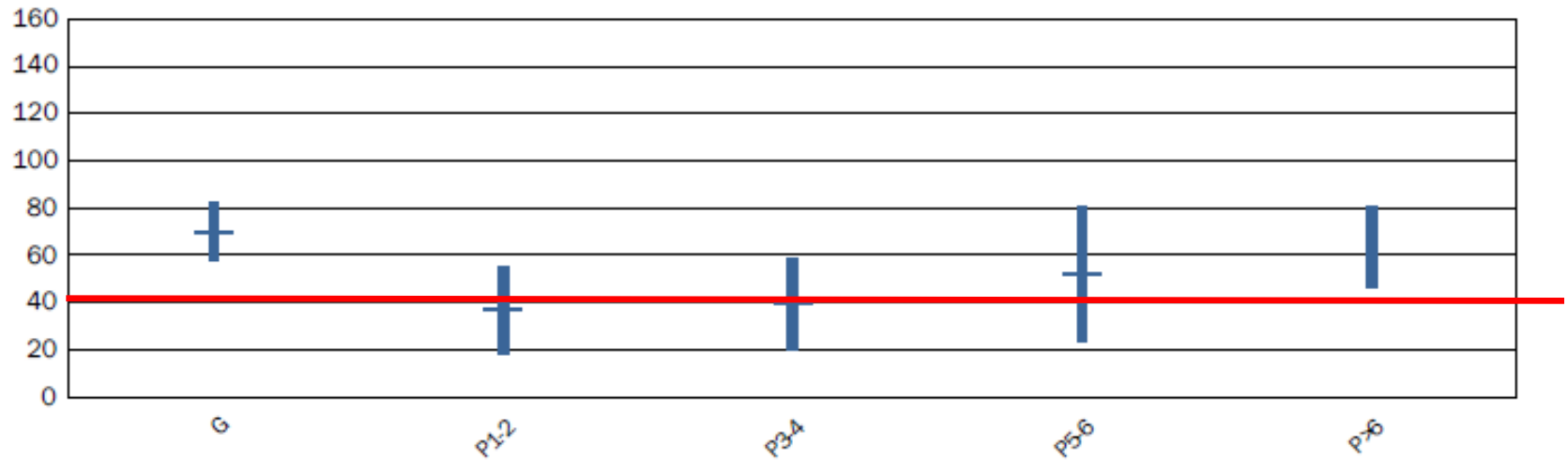
## Porcine Erysipela

Elisa (CIVTEST SUISE/MR)

Reference values: NEG < 40 ; POS > 40

### Mean Antibody Titres

A00041871

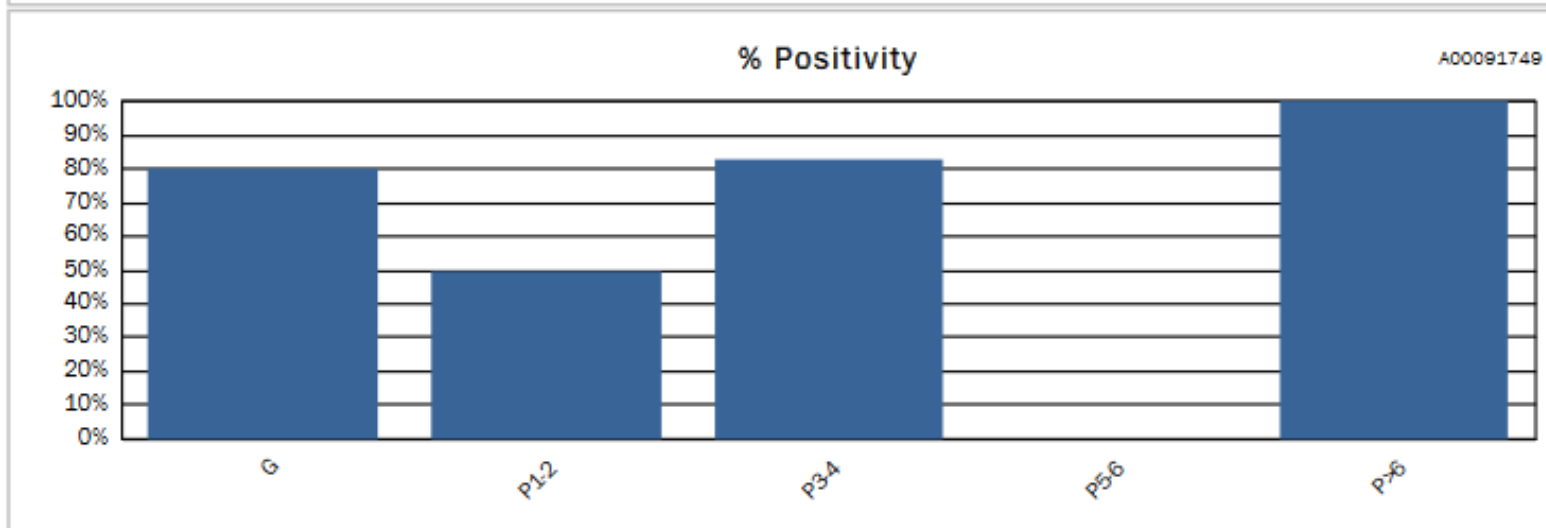
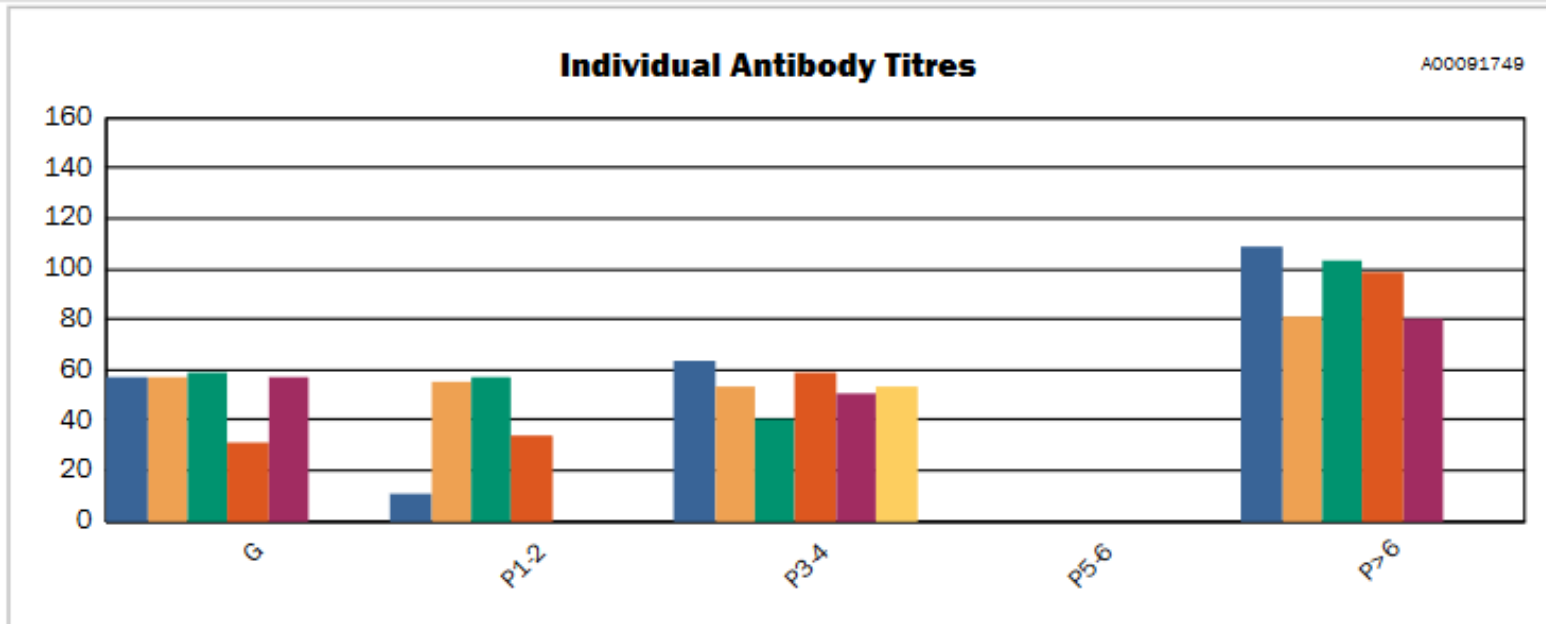


|                          |   |
|--------------------------|---|
| <b>Country</b>           | <b>Belgica</b>  |
| <b>Sows</b>              | <b>350</b>  |
| <b>Productive system</b> | <b>Sitio 1: cerdas + post-destete<br/>Sitio 2: cebos multisite</b>        |
| <b>Gilt source</b>       | <b>Auto reemplazo</b>   |
| <b>Vaccine</b>           | <b>Hidróxido aluminio</b>   |
| <b>Vaccine program</b>   | <b><u>Gilts</u>: 2 dosis antes IA<br/><u>Sows</u>: 1 dosis post-parto</b> |

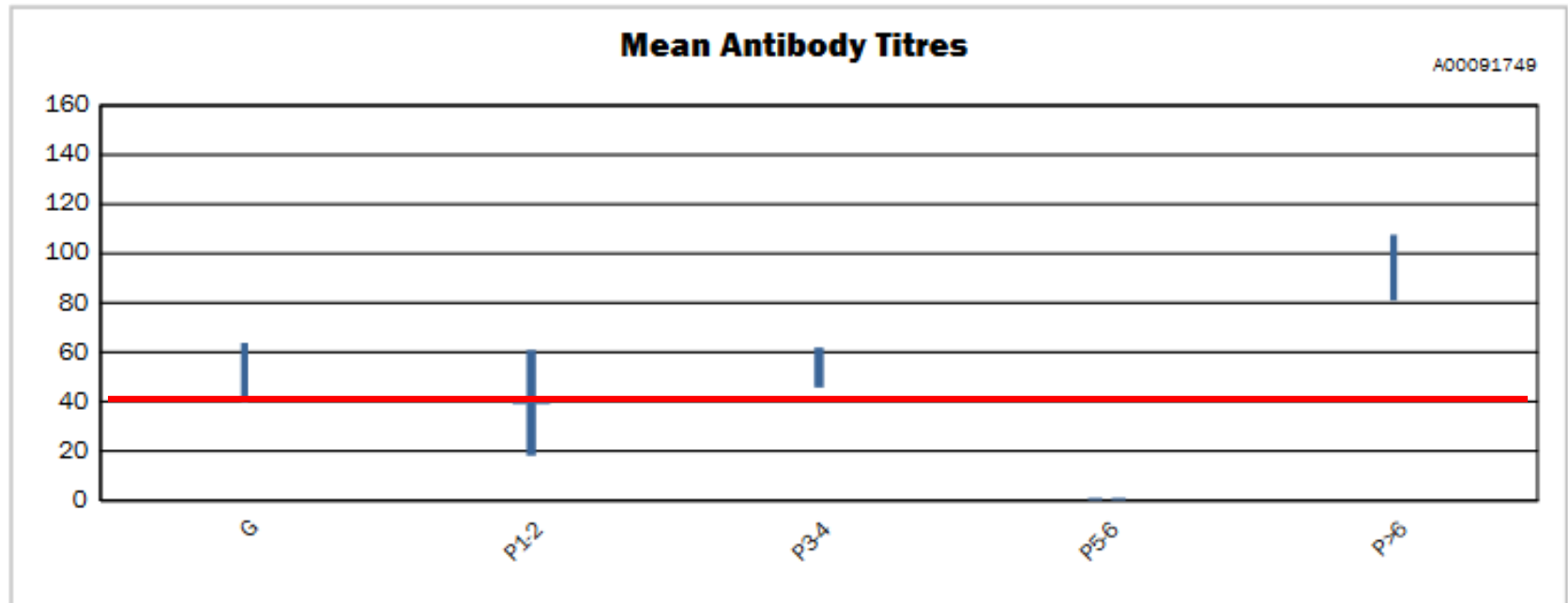
## Porcine Erysipela

Reference values: NEG < 40 ; POS > 40

Elisa (CIVTEST SUISE/MR)







# Case 37503

|                          |                           |
|--------------------------|---------------------------|
| <b>Country</b>           | <b>Poland</b>             |
| <b>Breeding sows</b>     | <b>2100</b>               |
| <b>Production sistem</b> | <b>Farrow to finish</b>   |
| <b>Gilt origin</b>       | <b>Own replacement</b>    |
| <b>Vaccine</b>           | <b>Hidr3xido aluminio</b> |

|                     |       |                     |          |
|---------------------|-------|---------------------|----------|
| PPV                 | Pigs  |                     |          |
|                     | Gilts | twice before mating | Parvovax |
|                     | Sows  | in every lactation  | Parvovax |
| SWINE<br>ERYSIPELAS | Pigs  |                     |          |
|                     | Gilts | twice before mating | Parvovax |
|                     | Sows  | every lactation     | Parvovax |

# Case 37503

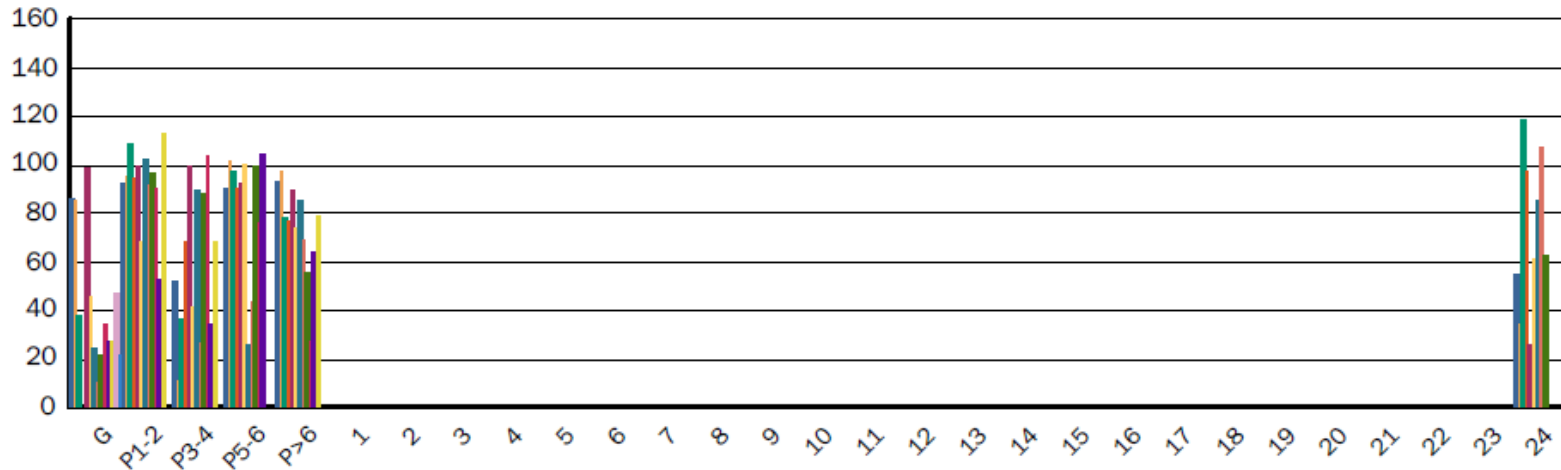
## Porcine Erysipela

Reference values: NEG < 40 ; POS > 40

Elisa (CIVTEST SUI5 SE/MR)

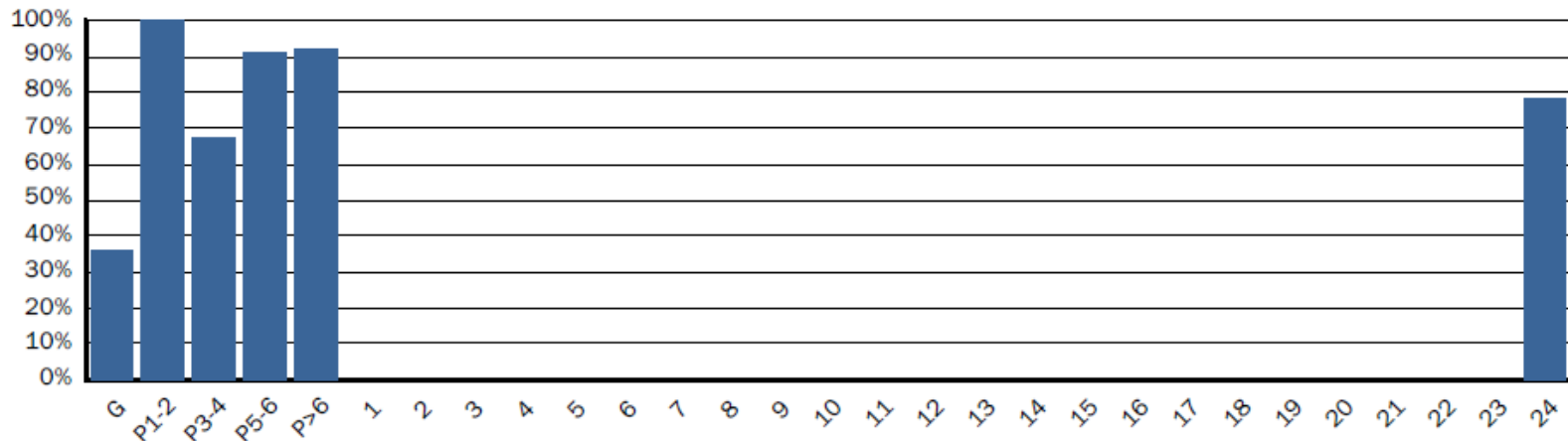
### Individual Antibody Titres

A00037503



### % Pozytywnych

A00037503



# Case 37503

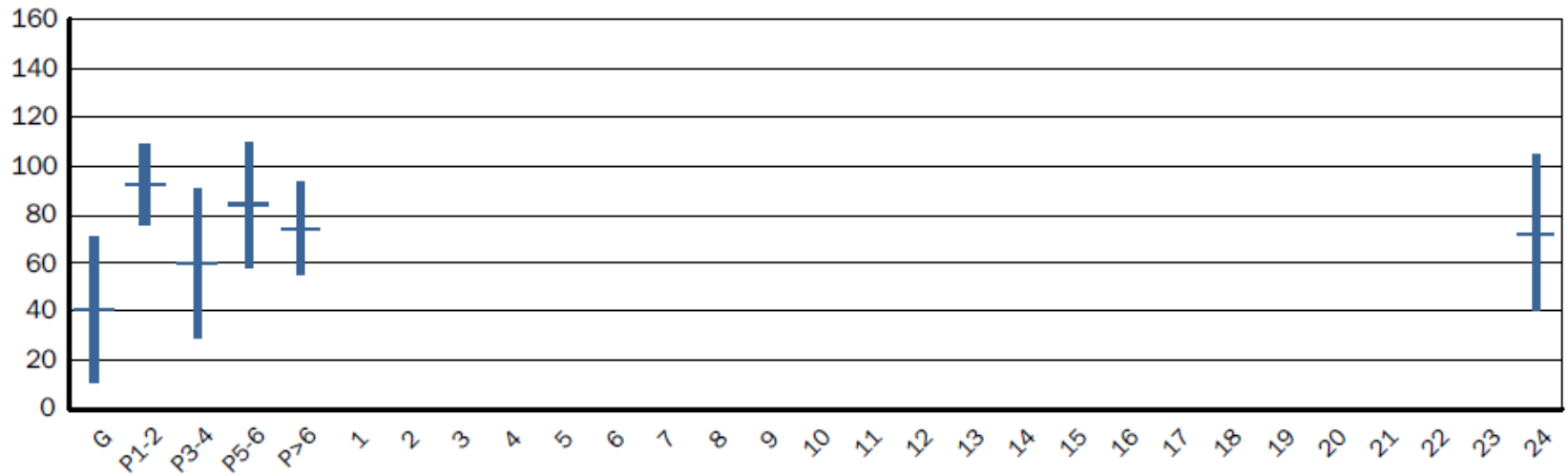
## Porcine Erysipela

Elisa (CIVTEST SUISE/ MR)

Reference values: NEG < 40 ; POS > 40

### Mean Antibody Titres

A00037503



# Case 35998

|                          |                            |
|--------------------------|----------------------------|
| <b>Country</b>           | <b>Polonia</b>             |
| <b>Breeding sows</b>     | <b>1000</b>                |
| <b>Production sistem</b> | <b>Ciclo cerrado</b>       |
| <b>Gilt origin</b>       | <b>Propio i externo</b>    |
| <b>Vaccine</b>           | <b>Tocoferol adjuvante</b> |

|                     |       |                     |                   |
|---------------------|-------|---------------------|-------------------|
| PPV                 | Pigs  |                     |                   |
|                     | Gilts | twice before mating | Porcilis EryParvo |
|                     | Sows  | in lactation        | Porcilis EryParvo |
| SWINE<br>ERYSIPELAS | Pigs  |                     |                   |
|                     | Gilts | twice before mating | Porcilis EryParvo |
|                     | Sows  | in lactation        | Porcilis EryParvo |

# Case 35998

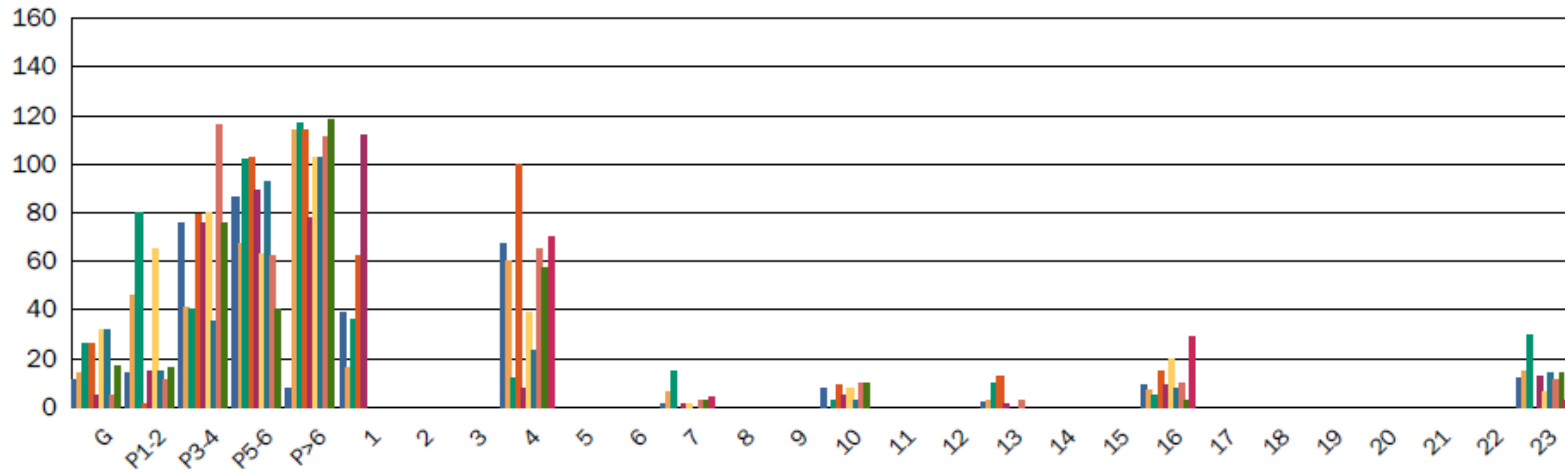
## Porcine Erysipela

Reference values: NEG < 40 ; POS > 40

Elisa (CIVTEST SUIS SE/MR)

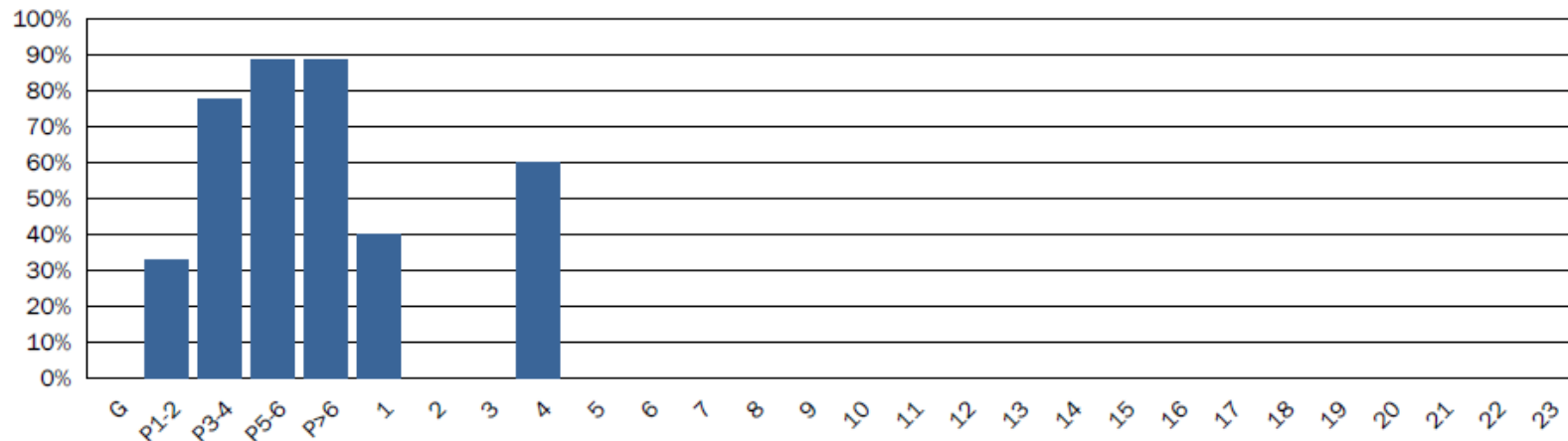
### Individual Antibody Titres

A00035998



### % Pozytywnych

A00035998



# Case 35998

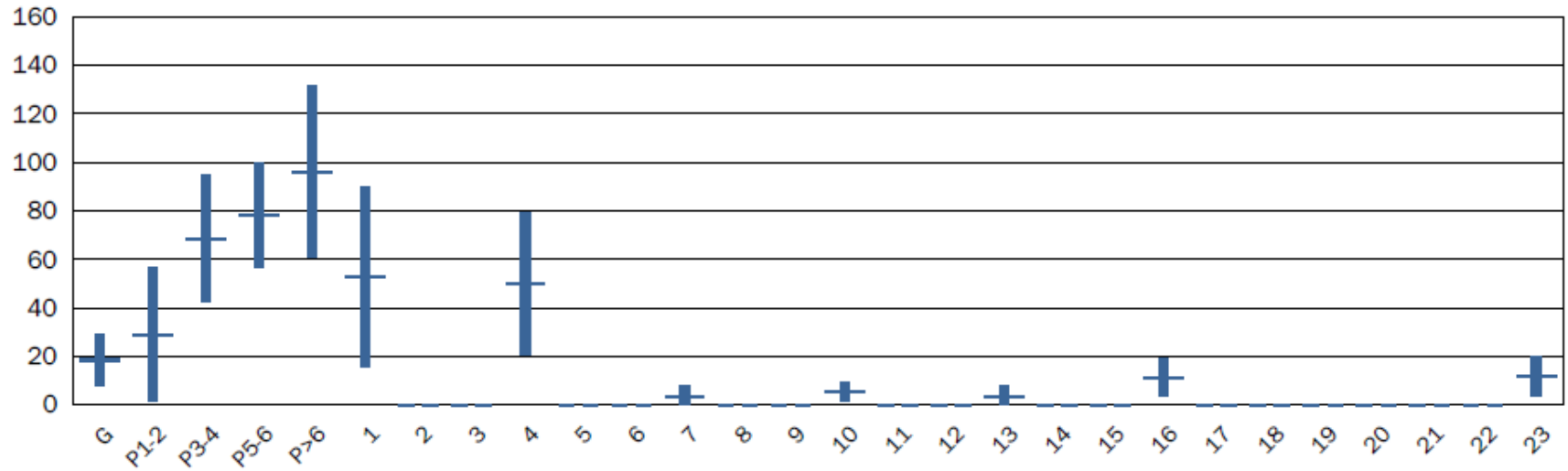
## Porcine Erysipela

Elisa (CIVTEST SUI5 SE/MR)

Reference values: NEG < 40 ; POS > 40

### Mean Antibody Titres

A00035998



|                   |   |
|-------------------|---|
| Country           | UK  |
| Sows              | 1000  |
| Productive system | Ciclo cerrado                                       |
| Gilt source       | Auto reemplazo                                      |
| Vaccine           | <b>Tocoferol adjuvante</b>                          |
| Vaccine program   | <u>Gilts</u> : 2 dosis antes IA<br><u>Sows</u> : NO |

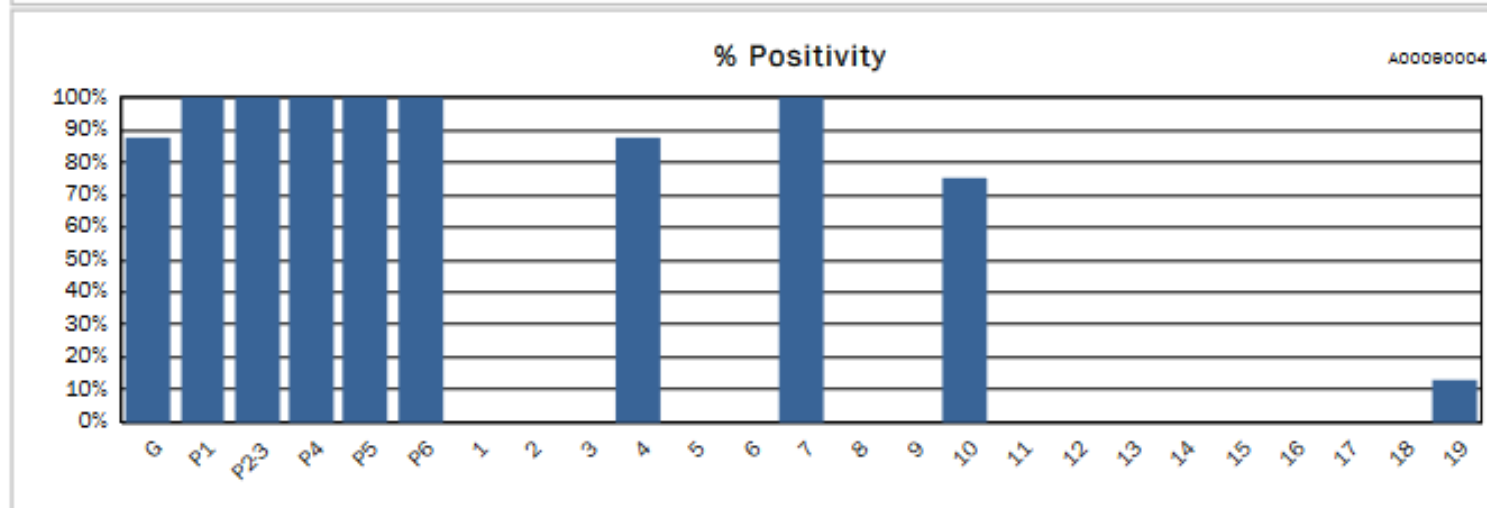
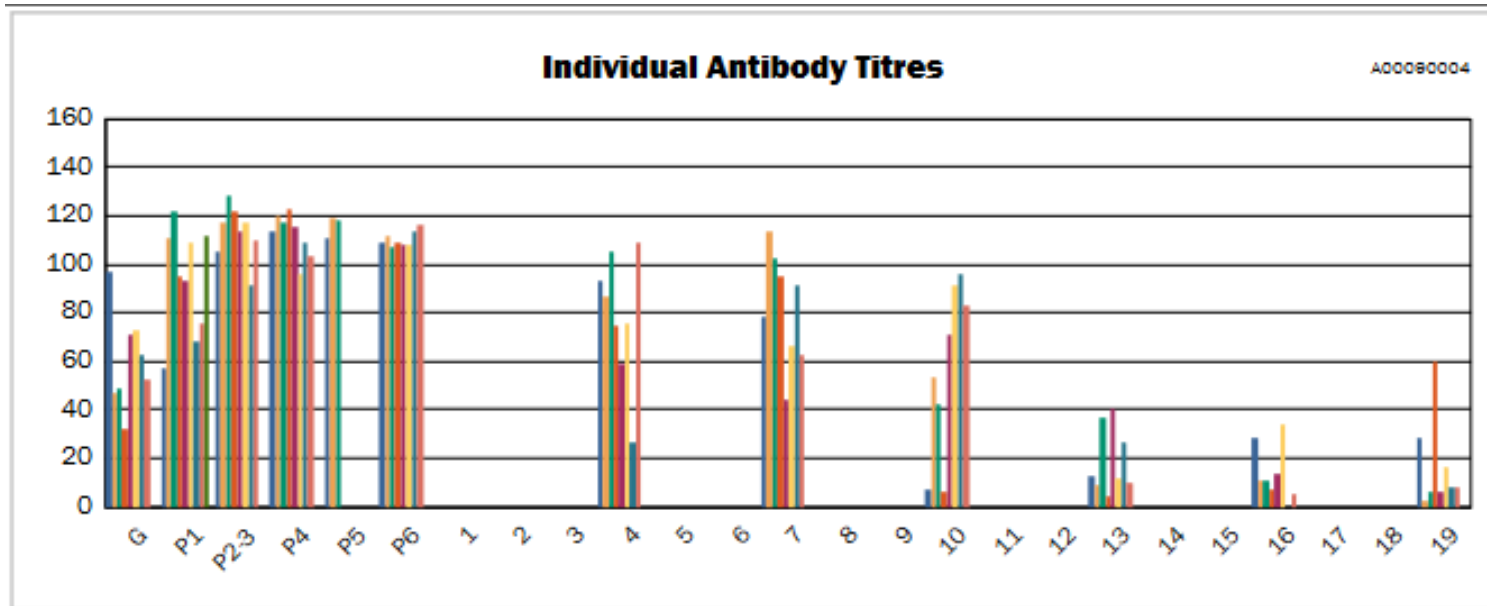
|                     | Pigs  |                       |                    |
|---------------------|-------|-----------------------|--------------------|
| PPV                 | Gilts | 6+3 weeks pre-service | Porcitis Ery/Parvo |
|                     | Sows  | NO                    |                    |
| SWINE<br>ERYSIPELAS | Gilts | 6+3 weeks pre-service | Porcitis Ery/Parvo |
|                     | Sows  | NO                    |                    |
|                     | Pigs  | NO                    |                    |

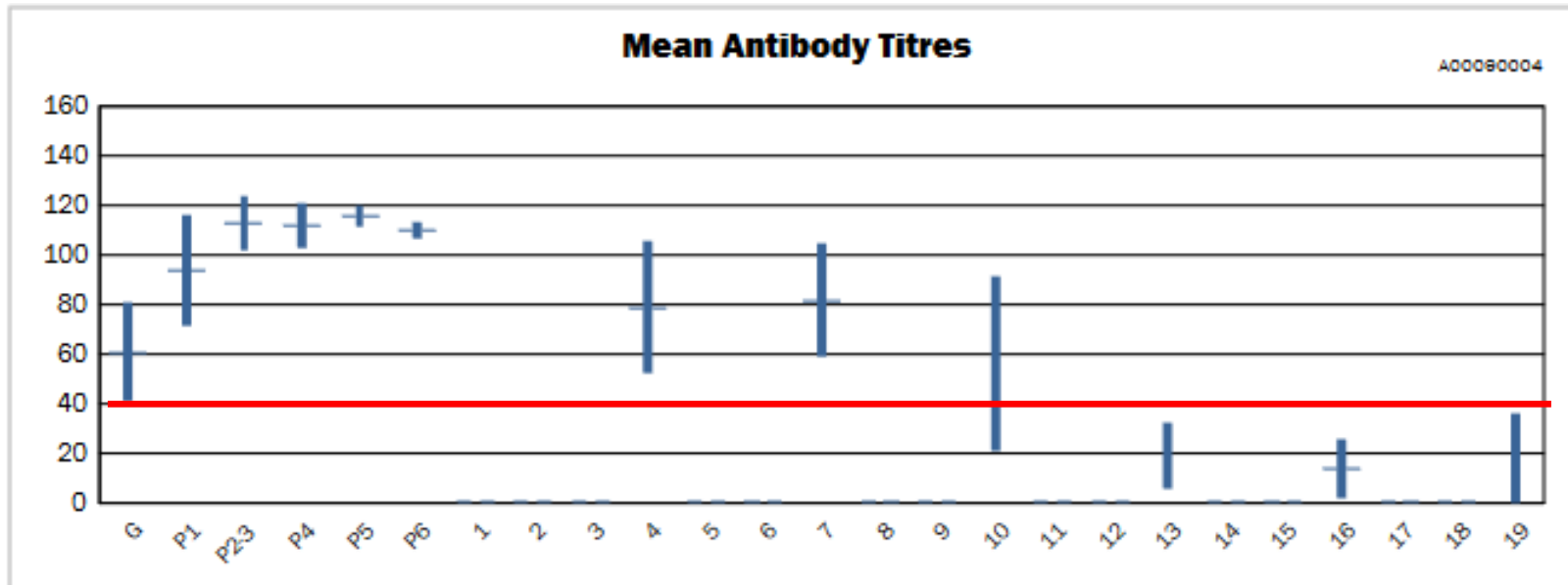


## Porcine Erysipela

Reference values: NEG < 40 ; POS > 40

Elisa (CIVTEST SUIS SE/MR)





## Porcine Erysipela

Reference values: NEG < 40 ; POS > 40

Elisa (CIVTEST SUIS SE/MR)

### Blood - Sow Nulliparous - 0 Parity (NOT VACCINATED)

|                  |                   |                  |                  |
|------------------|-------------------|------------------|------------------|
| NVG1 - <b>51</b> | NVG2 - <b>22</b>  | NVG3 - <b>7</b>  | NVG4 - <b>10</b> |
| NVG5 - <b>37</b> | NVG6 - <b>61</b>  | NVG7 - <b>15</b> | NVG8 - <b>21</b> |
| NVG9 - <b>14</b> | NVG10 - <b>22</b> |                  |                  |

### Blood - Sow Nulliparous - 0 Parity (VACCINATED)

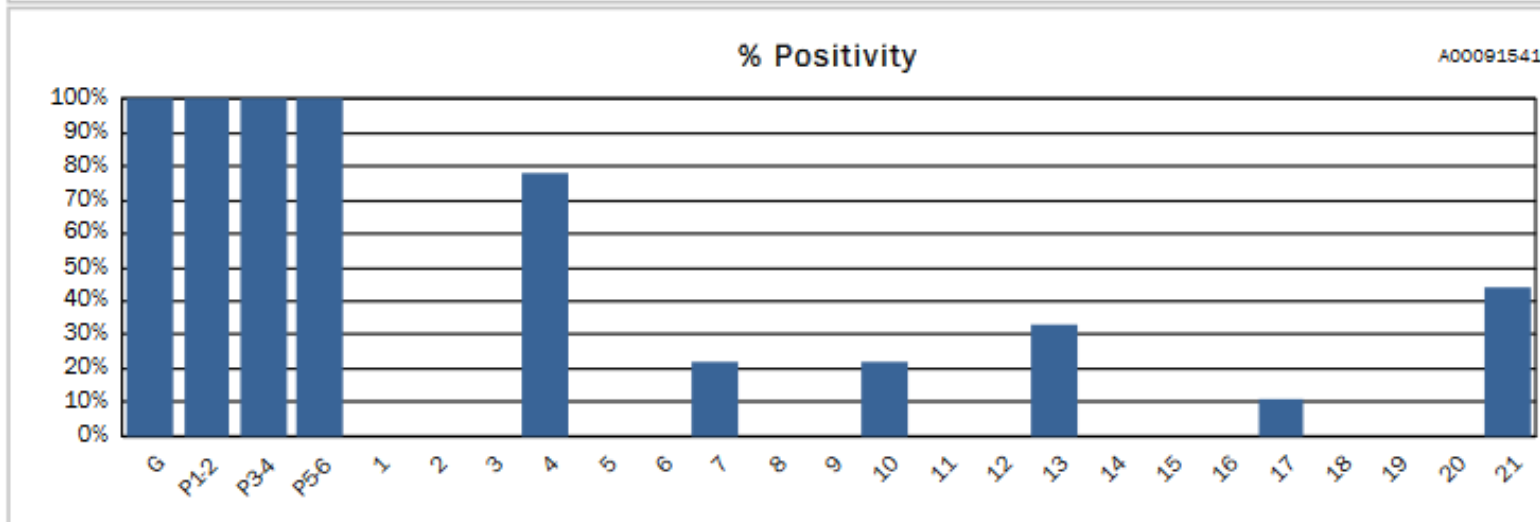
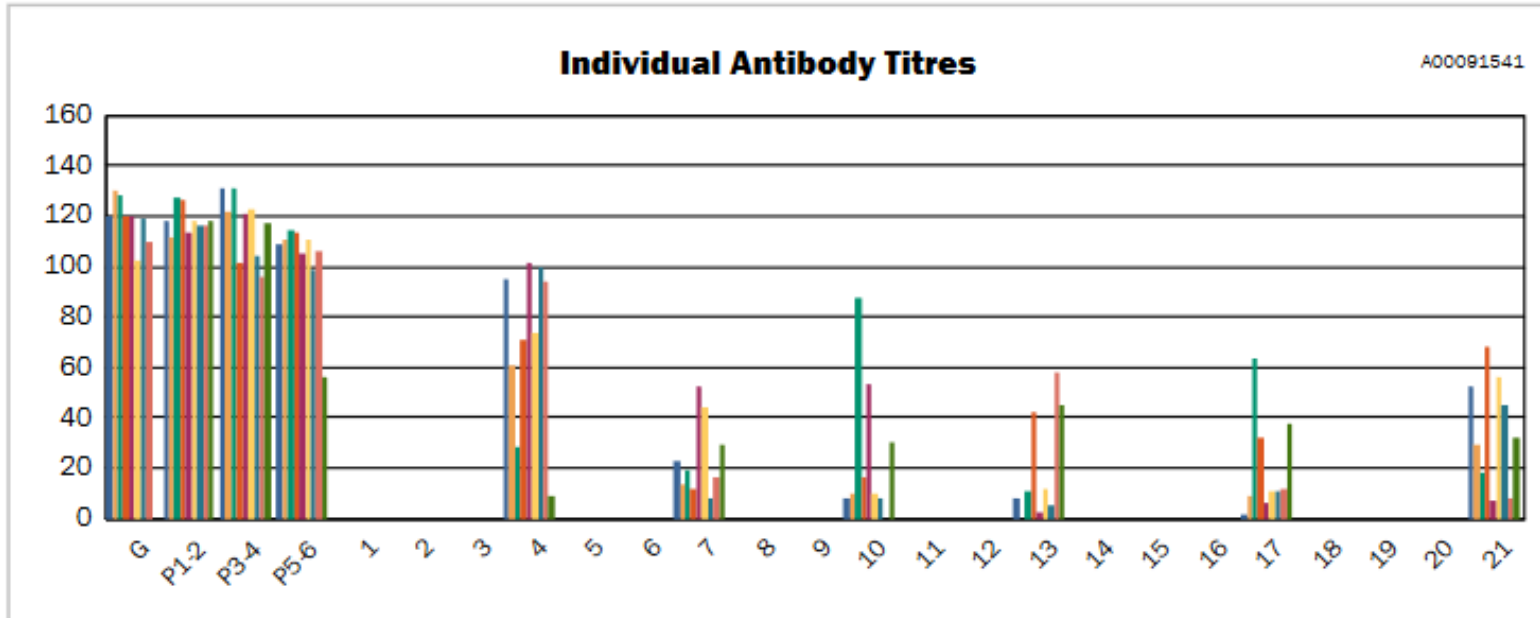
|                 |                  |                 |                  |
|-----------------|------------------|-----------------|------------------|
| VG1 - <b>61</b> | VG2 - <b>105</b> | VG3 - <b>95</b> | VG4 - <b>100</b> |
| VG5 - <b>98</b> | VG6 - <b>68</b>  | VG7 - <b>29</b> | VG8 - <b>21</b>  |
| VG9 - <b>16</b> | VG10 - <b>68</b> |                 |                  |

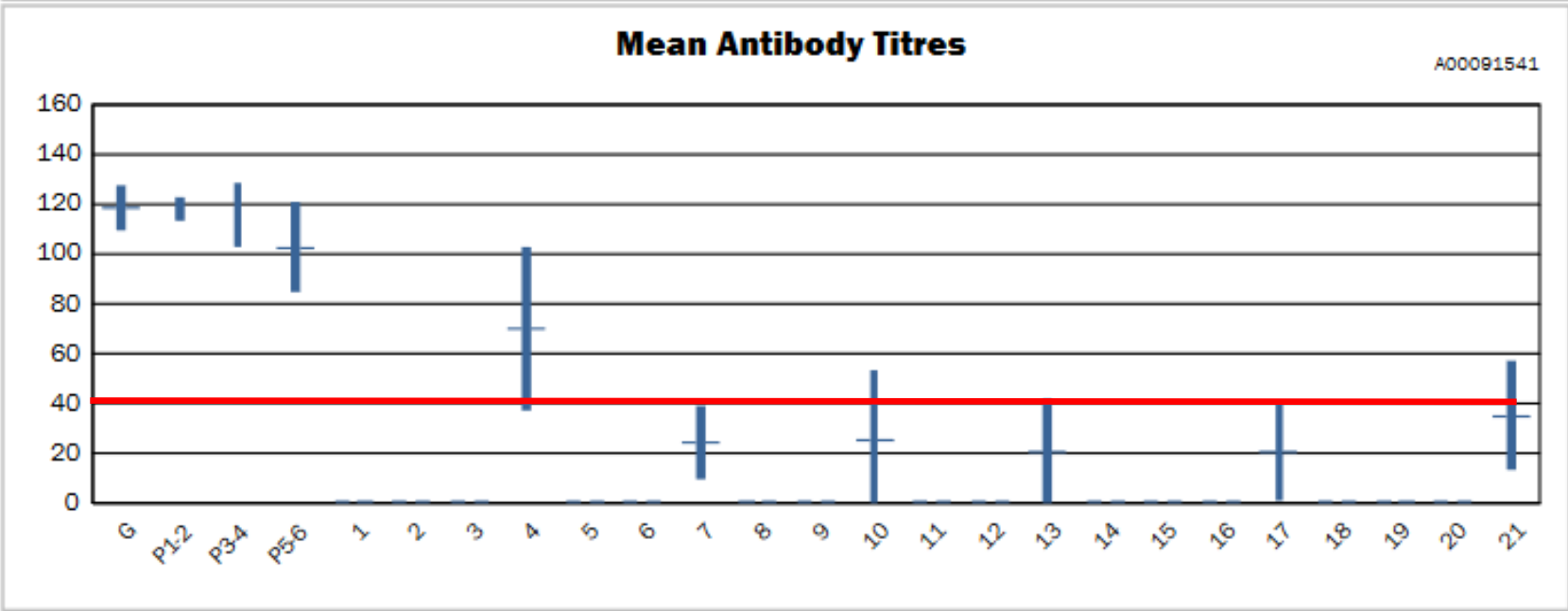


## Porcine Erysipela

Reference values: NEG < 40 ; POS > 40

Elisa (CIVTEST SUIS SE/MR)





# Case 52804

|                             |  |
|-----------------------------|--|
| <b>Country</b>              | <b>Romania</b>   |
| <b>Breeding sows</b>        | <b>3200</b>  |
| <b>Production sistem</b>    | <b>Ciclo cerrado</b>   |
| <b>Gilt origin</b>          | <b>Auto reemplazo</b>  |
| <b>Vaccine</b>              | <b>Oil adjuvant – PARVOSUIN MR</b>   |
| <b>Vaccination protocol</b> | <b><u>Gilts</u>: 2 shots before mating.<br/><u>Sows</u>: 2 mass vaccination/year<br/><u>Pigs</u>: 1 shot at 90 days of age</b> |

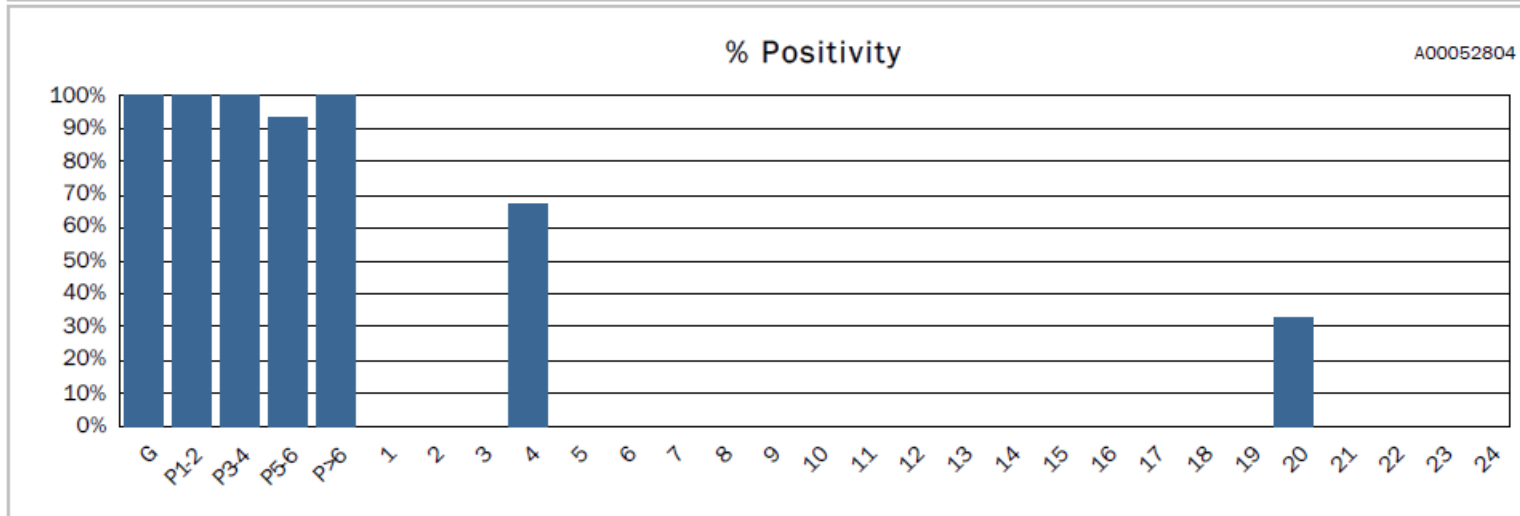
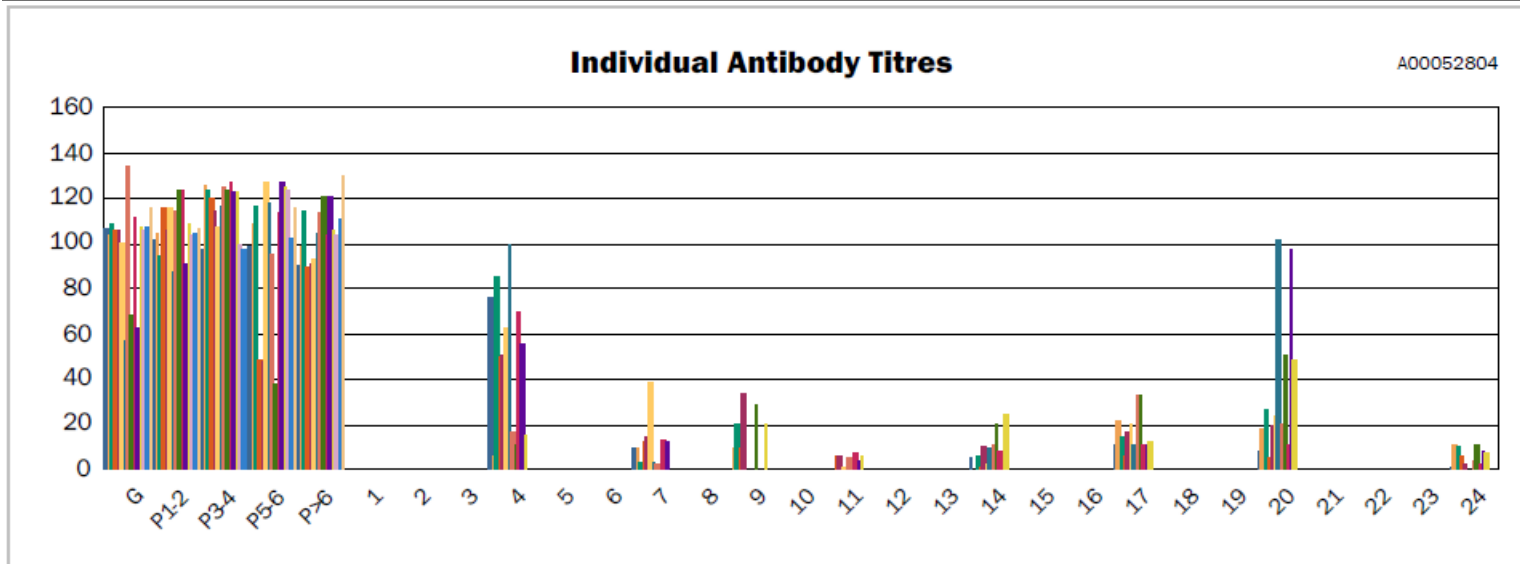
|                  |       |                                |               |
|------------------|-------|--------------------------------|---------------|
| PPV              | Gilts | - DZ1: 190 DAYS, DZ2: 205 DAYS | PARVOSUIN MR  |
|                  | Sows  | - 20 DAYS AFTER FARROWING      |               |
|                  | Pigs  |                                |               |
| SWINE ERYSIPELAS | Gilts | - 190 AND 205 DAYS OF LIFE     | PARVOSUIN MR  |
|                  | Sows  | - 20 DAYS AFTER FARROWING      | PARVOSUIN MR  |
|                  | Pigs  | - 90 DAYS OF LIFE              | RUVAC PASTEUR |

# Case 52804

## Porcine Erysipela

Reference values: NEG < 40 ; POS > 40

Elisa (CIVTEST SUIS SE/MR)

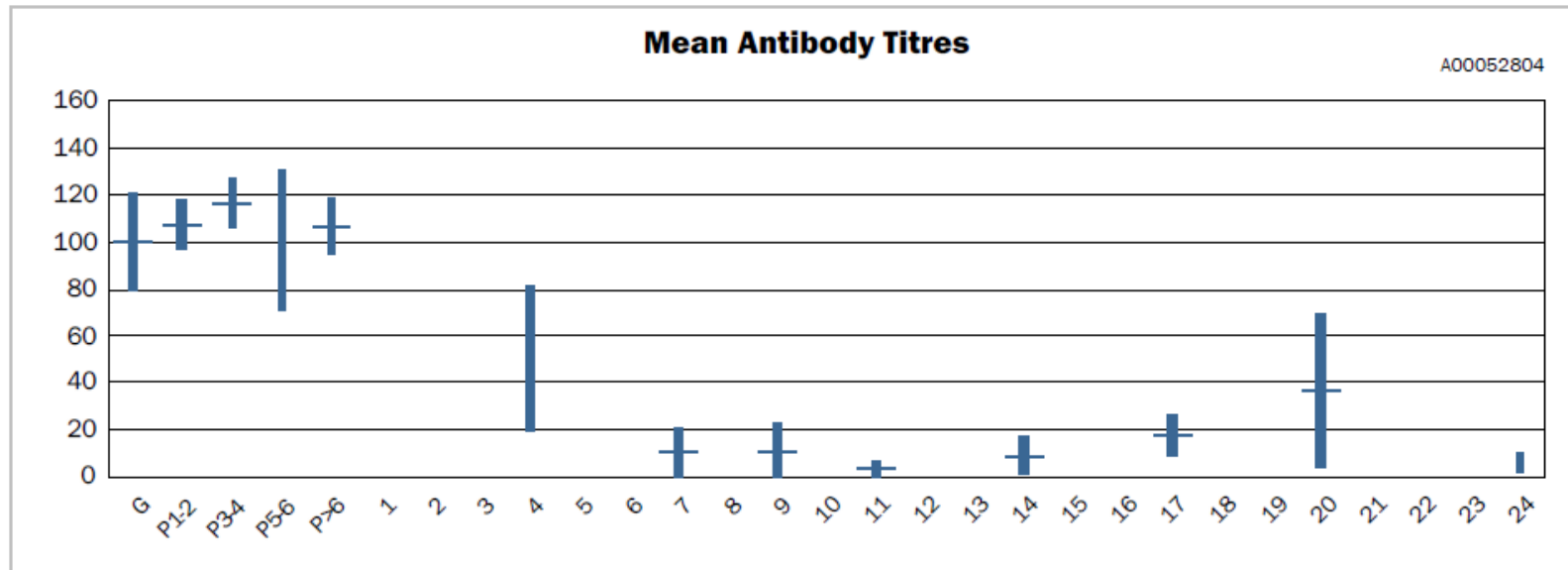


# Case 52804

## Porcine Erysipela

Elisa (CIVTEST SUISE/ MR)

Reference values: NEG < 40 ; POS > 40





|                          |   |
|--------------------------|---|
| <b>Country</b>           | <b>Txec Republic</b>  |
| <b>Sows</b>              | <b>350</b>  |
| <b>Productive system</b> | <b>Ciclo cerrado</b>  |
| <b>Gilt source</b>       | <b>Auto reemplazo</b>   |
| <b>Vaccine</b>           | <b>Oil adjuvant - PARVOSUIN MR</b>  |
| <b>Vaccine program</b>   | <p><b><u>Gilts</u>: 2 shots before AI</b></p> <p><b><u>Sows</u>: 1 shot each lactation period</b></p> <p><b><u>Pigs</u>: 1 dosis 8 semanas vida</b></p> |

|                     |       |  |                    |
|---------------------|-------|--|--------------------|
| PPV                 | Gilts | at age of 5,5 months + revaccination 3 weeks later | PARVOSUIN MR       |
|                     | Sows  | on 10-14 days after every farrowing                | PARVOSUIN MR       |
|                     | Pigs  | NOT  |                    |
| SWINE<br>ERYSIPELAS | Gilts | at age of 5,5 months + revaccination 3 weeks later | PARVOSUIN MR       |
|                     | Sows  | on 10-14 days after every farrowing                | PARVOSUIN MR       |
|                     | Pigs  | at age of 7-8 weeks                                | ERYSIN, Bloweta CZ |

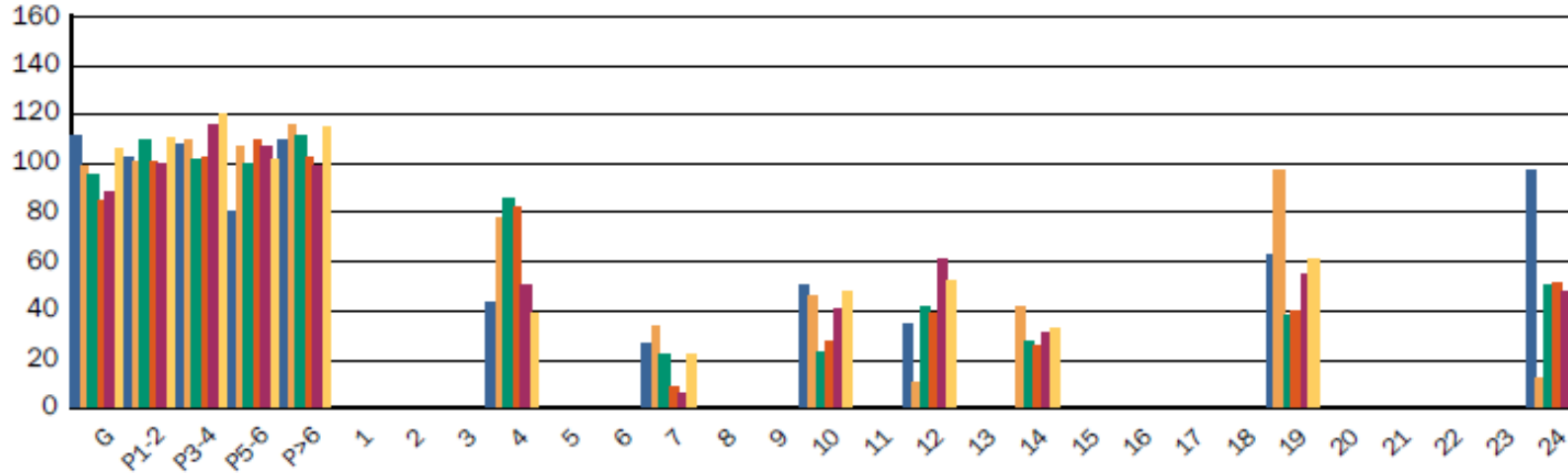
## Porcine Erysipela

Elisa (CIVTEST SUIS SE/MR)

Reference values: NEG < 40 ; POS > 40

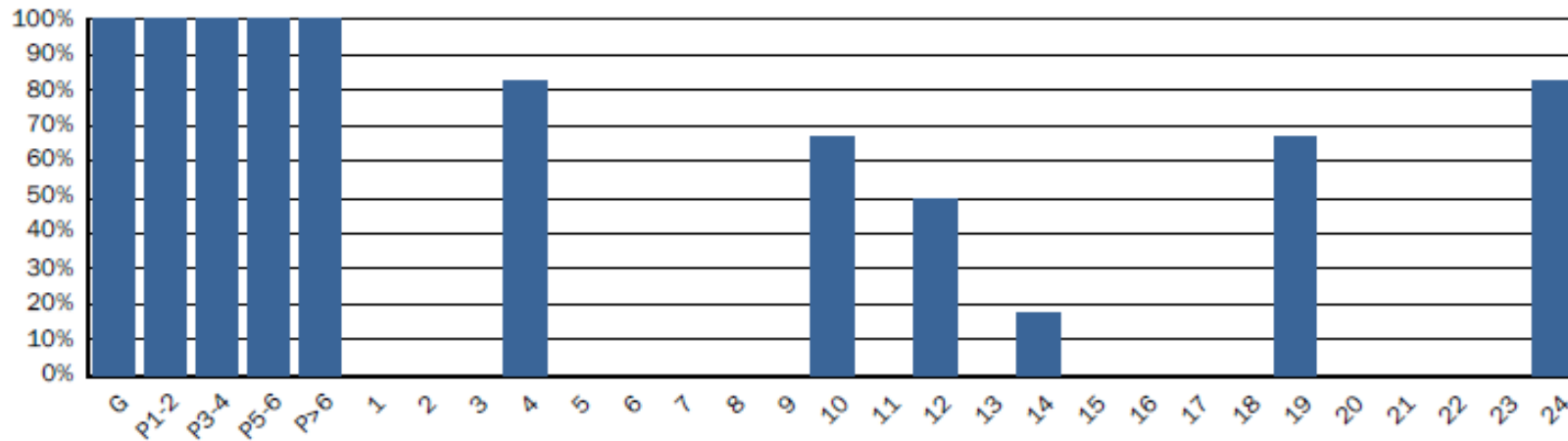
### Individual Antibody Titres

A00040045



### % Positivity

A00040045



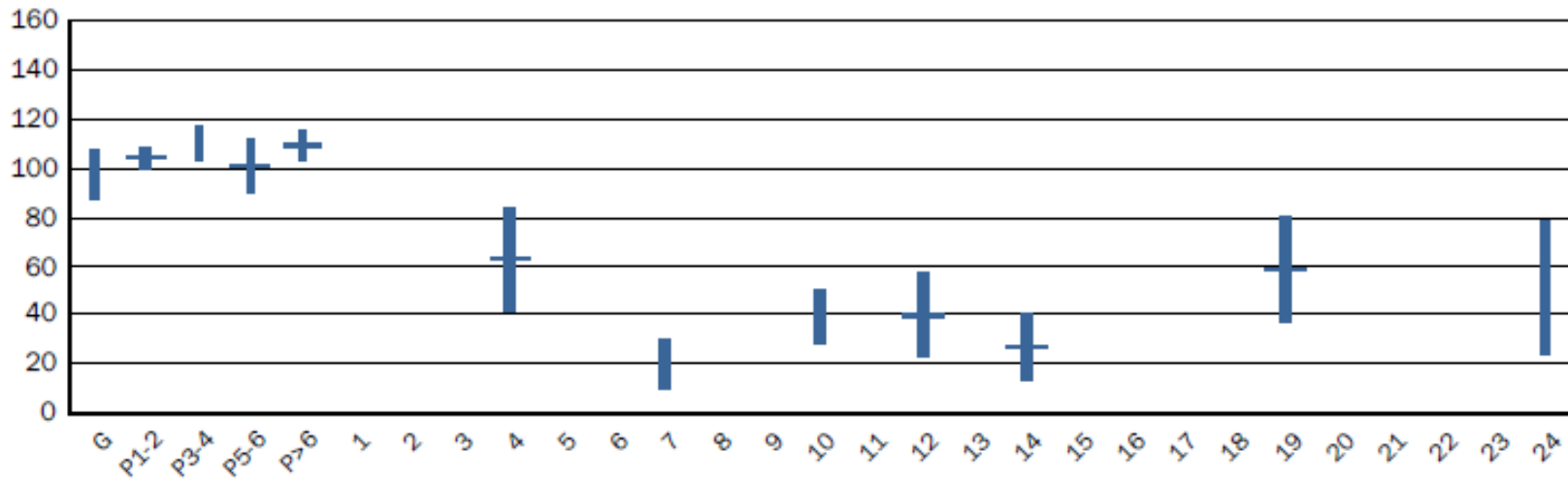
## Porcine Erysipela

Elisa (CIVTEST SUISE/MR)

Reference values: NEG < 40 ; POS > 40

### Mean Antibody Titres

A00040045

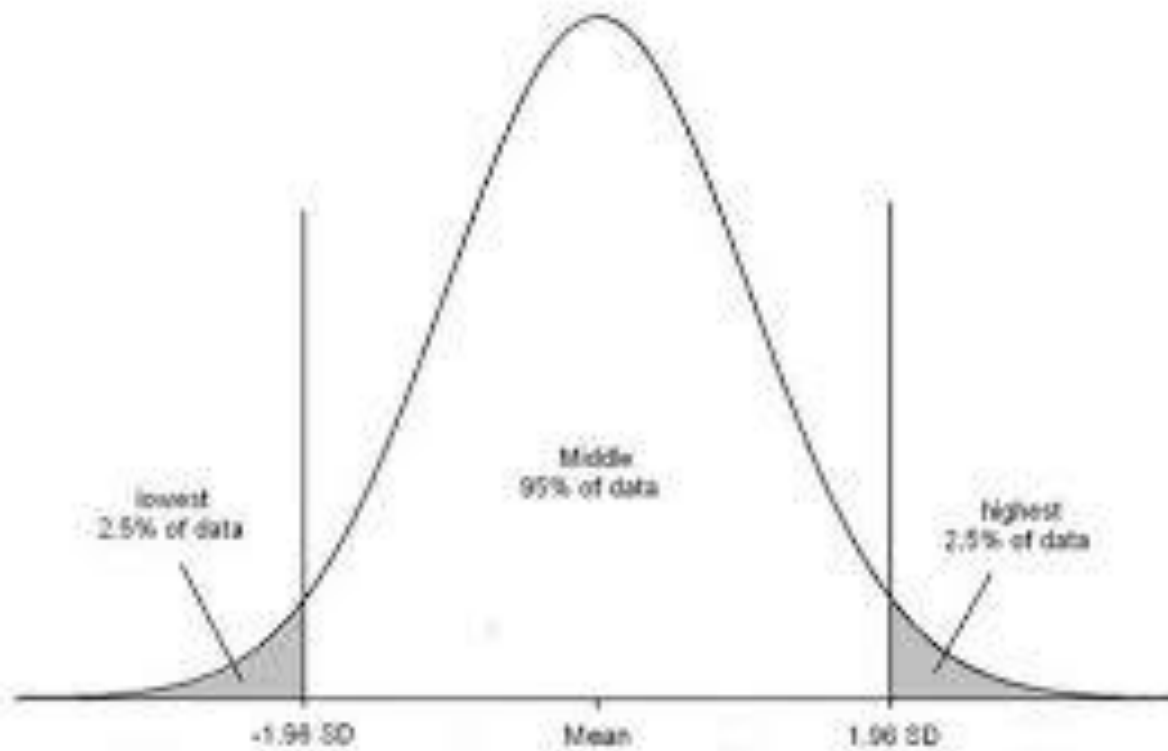


# PARTE 2

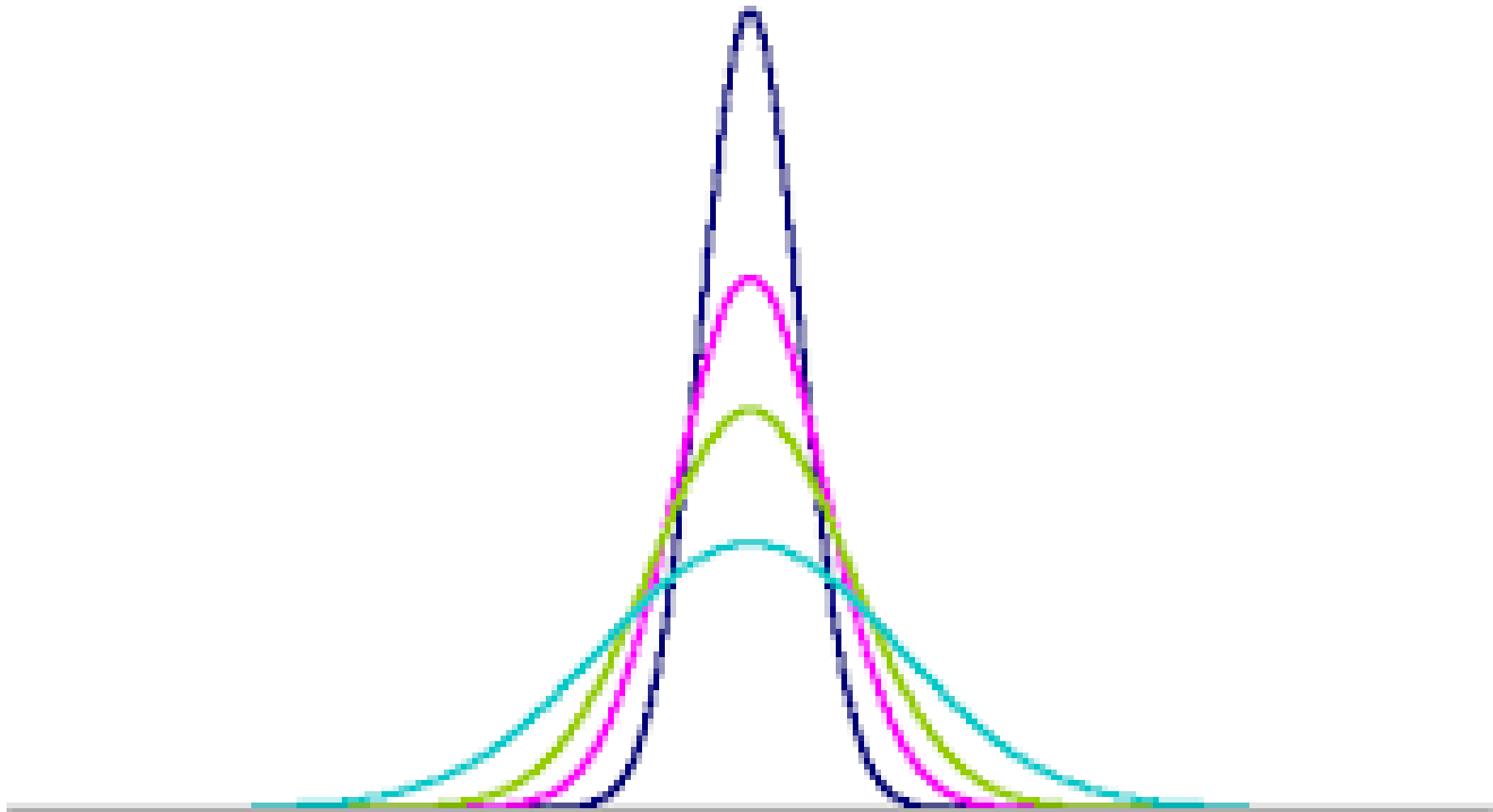
Como evaluar si el  
lechón esta bien  
calostrado ?



- IMPOSIBLE evitar Subpoblaciones



- Podemos HOMOGENIZAR Subpoblaciones



- SUBPOBLACIONES calostrales:
  - **Edad** de la cerda
  - **Peso lechon** al nacimiento
  - **Problemas** con la cerda o con el lechon



## 2.- **Peso lechon** al nacimiento

Influence of birth weight of piglets on colostrum intake, IgG immunity and mortality during lactation.

|                                   |                            | Consumo de calostro al T24h (g) |                             |                             |                             |                             |                             |
|-----------------------------------|----------------------------|---------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
|                                   |                            | 0-100                           | 100-200                     | 200-300                     | 300-400                     | 400-500                     | >500                        |
| Peso al nacimiento (kg)           |                            | 1.10<br>± 0.05 <sup>a</sup>     | 1.14<br>± 0.03 <sup>a</sup> | 1.29<br>± 0.02 <sup>b</sup> | 1.41<br>± 0.02 <sup>c</sup> | 1.62<br>± 0.02 <sup>d</sup> | 1.71<br>± 0.04 <sup>e</sup> |
| Vitalidad                         | Splay-leg                  | 26.9 % <sup>a</sup>             | 20.7 % <sup>a</sup>         | 8.2 % <sup>b</sup>          | 7.2 % <sup>b</sup>          | 5.1 % <sup>b</sup>          | 2.4 % <sup>b</sup>          |
|                                   | Rotura de cordón           | 18.5 % <sup>ab</sup>            | 26.9 % <sup>ab</sup>        | 24.6 % <sup>a</sup>         | 8 % <sup>c</sup>            | 8.9 % <sup>bc</sup>         | 7.3 % <sup>bc</sup>         |
|                                   | Dificultades respiratorias | 13.0 % <sup>a</sup>             | 3.6 % <sup>b</sup>          | 1.6 % <sup>b</sup>          | 1.4 % <sup>b</sup>          | 1.3 % <sup>b</sup>          | 0 % <sup>b</sup>            |
| Tasa de mortalidad al destete (%) |                            | 63 % <sup>a</sup>               | 34 % <sup>b</sup>           | 11 % <sup>c</sup>           | 8.0 % <sup>cd</sup>         | 2.5 % <sup>d</sup>          | 4.8 % <sup>cd</sup>         |
| IgG a las 24h (mg/ml)             |                            | 11.2<br>± 1.6 <sup>a</sup>      | 17.8<br>± 1.7 <sup>b</sup>  | 23.0<br>± 0.8 <sup>c</sup>  | 24.7<br>± 0.7 <sup>cd</sup> | 27.0<br>± 1.0 <sup>d</sup>  | 25.6<br>± 1.1 <sup>cd</sup> |

Adap. de “Le colostrum, transmetteur de l'immunité de la truie au porcelet”, [Catherine Belloc](#), 2011, [www.3tres3.com](http://www.3tres3.com)

## 3.- Problemas:

### – Problemas con la cerda?

- Numero pezones y su conformación
- Edema mamario / mastitis subclinica / cetosis

### – Fallos de manejo del encalostramiento?

- Manejo incorrecto de adopciones durante las primeras 24 horas

### – Problemas con el lechon?

- Infectado de PRRS?
- Mycotoxinas??

- **PROTOCOLO EVALUACION ENCALOSTRAMIENTO**

# Protocolo encalostroamiento

- Los niveles de anticuerpos MATERNALES son **directamente proporcionales** a los anticuerpos transferidos (via calostro) al lechon
- 99% cerdas del mundo vacunan contra Erysipelas
- La vacunación de Erysipelas induce un titulo de anticuerpo medible (CUANTITATIVO) vía ELISA.
- El ELISA es ROBUSTO:
  - Repetibilidad de título de la muestra.
  - Permite cuantificar

- **7 días** post-parto:
  - **10** cerdas (20% approx)
  - **3** lechones de **PESO MEDIO** por camada (total 30 lechones)



- INTERPRETACION:

Cut off = **40**

**Cerda**

**110**

**65**

**40**

**25**

**Lechon**

**≈ 100 -115**

**≈ 60- 70**

**≈ 35-45**

**≈ 20-30**

## SÉROLOGIE

S/R: Sans référence FS: Non analysé pou

### MAL ROJO

Valeurs de référence: NEG < 30 ; DUD 30-

#### ELISA (CIVTEST MR)

##### Sang - Trules

188-1 - **23**

186-1 - **19**

32-4 - **43**

189-1 - **44**

137-2 - **24**

85-3 - **31**

139-2 - **65**

135-2 - **29**

34-4 - **67**

88-3 - **65**

##### Sang - Porcs - 4 Semaines

188-A - **23**

189-B - **55**

139-C - **17**

186-A - **17**

137-B - **46**

135-C - **81**

32-A - **62**

85-B - **49**

188-B - **30**

189-C - **55**

34-A - **93**

186-B - **24**

137-C - **49**

88-A - **83**

32-B - **55**

85-C - **37**

188-C - **22**

139-A - **67**

34-B - **83**

186-C - **12**

135-A - **51**

88-B - **87**

32-C - **32**

189-A - **43**

139-B - **79**

34-C - **88**

137-A - **58**

135-B - **51**

88-C - **92**

85-A - **48**

- **Spanish case:**

Danbred sows: 2500

Neonatal diarrhea and Atrophic Rhinitis

- [..\..\..\Desktop\grau encalostament agost 2016.xlsx](#)



# Monitoring of colostrum uptake

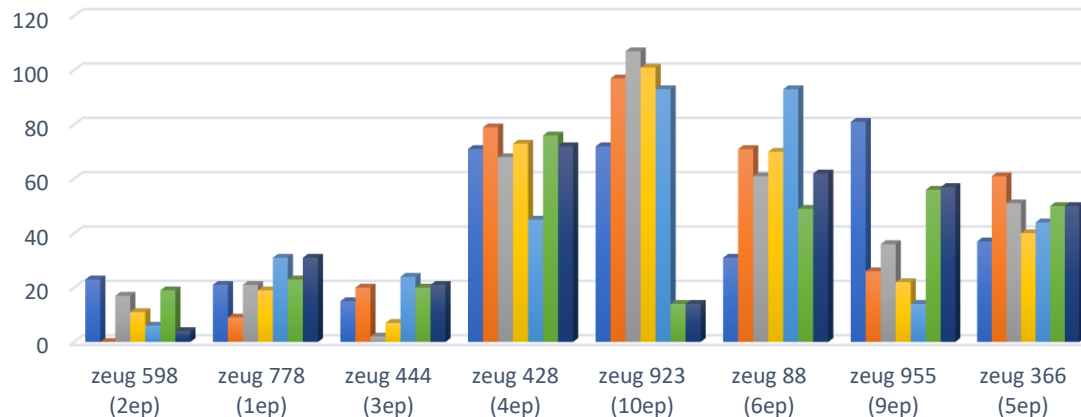
| zeug            | big 1 L | big 2 L | big 3 M | big 4 M | big 5 Z | big 6 Z |     |
|-----------------|---------|---------|---------|---------|---------|---------|-----|
| zeug 598 (2ep)  | 23      | 0*      | 17      | 11      | 6*      | 19      | 4*  |
| zeug 778 (1ep)  | 21      | 9*      | 21      | 19      | 31      | 23      | 31  |
| zeug 444 (3ep)  | 15      | 20      | 2*      | 7*      | 24      | 20      | 21  |
| zeug 428 (4ep)  | 71      | 79      | 68      | 73      | 45      | 76      | 72  |
| zeug 923 (10ep) | 72      | 97      | 107     | 101     | 93      | 14*     | 14* |
| zeug 88 (6ep)   | 31      | 71      | 61      | 70      | 93      | 49      | 62  |
| zeug 955 (9ep)  | 81      | 26*     | 36*     | 22*     | 14*     | 56      | 57  |
| zeug 366 (5ep)  | 37      | 61      | 51      | 40      | 44      | 50      | 50  |

48 pigs

25 %

8 %

## S/P ratio's vlekziekte



In geval van een correcte biestopname, heeft de big titers die even hoog of hoger zijn dan deze van de zeug.

\*Bij 25% van de bemonsterde biggen is de



The Reference  
in Prevention  
for Animal Health



**QUESTIONS ?**