

# 亞洲流行豬病趨勢

## 種豬群常見疾病

20170426 Douglas Hung (Taiwan)

Boehringer Ingelheim PREVENTION WORKS  
Shaping the future of swine health

1

美國愛荷華州立大學獸醫診斷實驗室  
針對2003-2010年間的409例傳染性流產病例進行分析

| Agents   | Number of Diagnoses (N = 409) | Percent of Infectious Abortions |
|--|-------------------------------|---------------------------------|
| PRRSV  | 232                           | 57                              |
| PCV2   | 52                            | 13                              |
| PPV (mummified fetuses)                                    | 34                            | 8.3                             |
| Leptospira*  | 24                            | 5.9                             |
| Streptococcus sp. ( <i>Streptococcus suis</i> most common) | 12                            | 2.9                             |
| <i>E. coli</i>   | 11                            | 2.7                             |
| <i>A. pyogenes</i>   | 6                             | 1.5                             |
| Staphylococcus sp. ( <i>S. hyicus</i> most common)         | 5                             | 1.2                             |
| <i>Salmonella</i> sp.                                      | 2                             | 0.5                             |

\*The number of *Leptospira* abortions is artificially elevated as 71% of the cases (17/24) were from a single large outbreak.

Boehringer Ingelheim PREVENTION WORKS  
Shaping the future of swine health

2

Time for some scientific work – this congress' Tom Alexander lecture was given by Prof Dr John Harding, University of Saskatchewan, Canada. He touched on a survey he did with many veterinarians around the world, asking them what practices should be stopped, what practices should be started, and...

...what are the most dangerous diseases at the moment. **PRRSv made it to the top**, just beating PEDv.

Boehringer Ingelheim PREVENTION WORKS  
Shaping the future of swine health

3

PRRS CSF PR PCV2

PRRS FMD PED E.coli

PRRS APP M.hyo

PRRS E.Coli PCV2 Sal. PED

PRRS PED FMD CSF APP

PRRS PED M.hyo PR

APP: 放線桿菌胸膜肺炎 Actinobacillus pleuropneumonia  
CSF: 豬藍 classical swine fever  
FMD: 口蹄疫 foot-and-mouth disease  
M.hyo: 豬肺炎黴漿菌 Mycoplasma hyopneumoniae  
PCV2: 豬第二型環狀病毒 porcine circovirus type 2  
PED: 豬流行性下痢 porcine epidemic diarrhea  
PR: 假性狂犬病 pseudorabies  
PRRS: 藍耳病 porcine reproductive and respiratory syndrome  
Sal.: 沙門氏桿菌 Salmonella spp.

Boehringer Ingelheim PREVENTION WORKS  
Shaping the future of swine health

4

# Reproductive disorders 繁殖障礙

|             | abortion<br>流產 | weak births<br>弱小仔豬 | stillbirths<br>死產 | mummification<br>木乃伊胎 | others<br>其他 |
|-------------|----------------|---------------------|-------------------|-----------------------|--------------|
| CSF<br>豬瘋   | ✓              |                     |                   |                       |              |
| PRRS<br>藍耳  | ✓              | ✓                   | ✓                 | ✓                     | ✓            |
| PCV2<br>藍耳  |                | ✓                   |                   |                       |              |
| PR<br>假性狂犬病 | ✓              |                     |                   |                       |              |

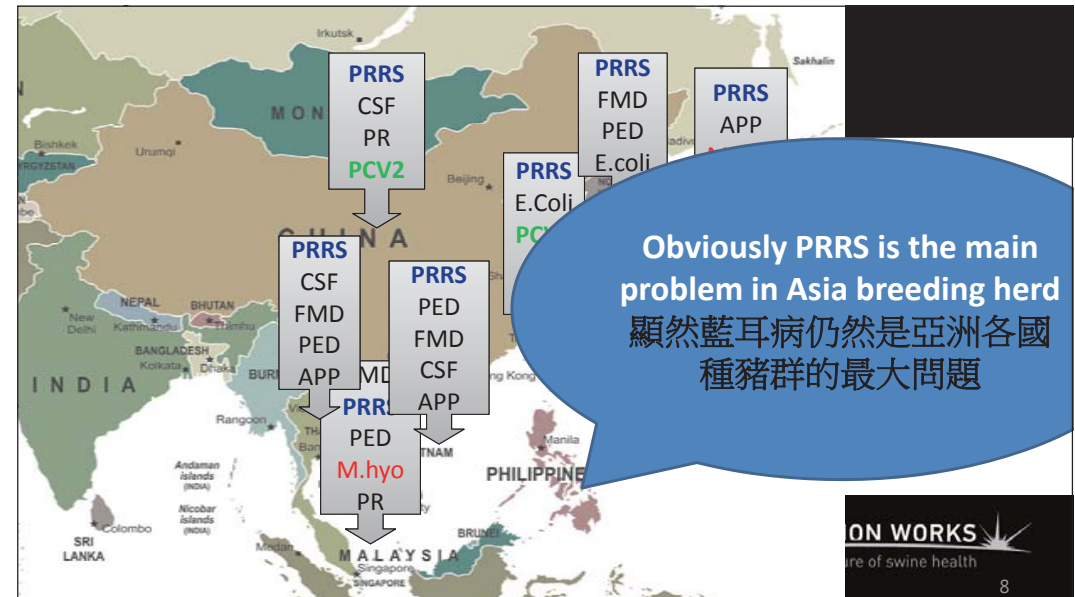
These epidemic pathogens can not disrupt spermatogenesis directly/indirectly, however, all of these can be shed in semen of infected boars, potentially allowing disease to spread into the sow breeding herd.  
上述這些流行的病原並不會直接/間接阻斷造精作用，但卻會藉由被感染的公豬精液排毒，可能因此將疾病傳播帶入母豬群

# Differential diagnosis 類症鑑別

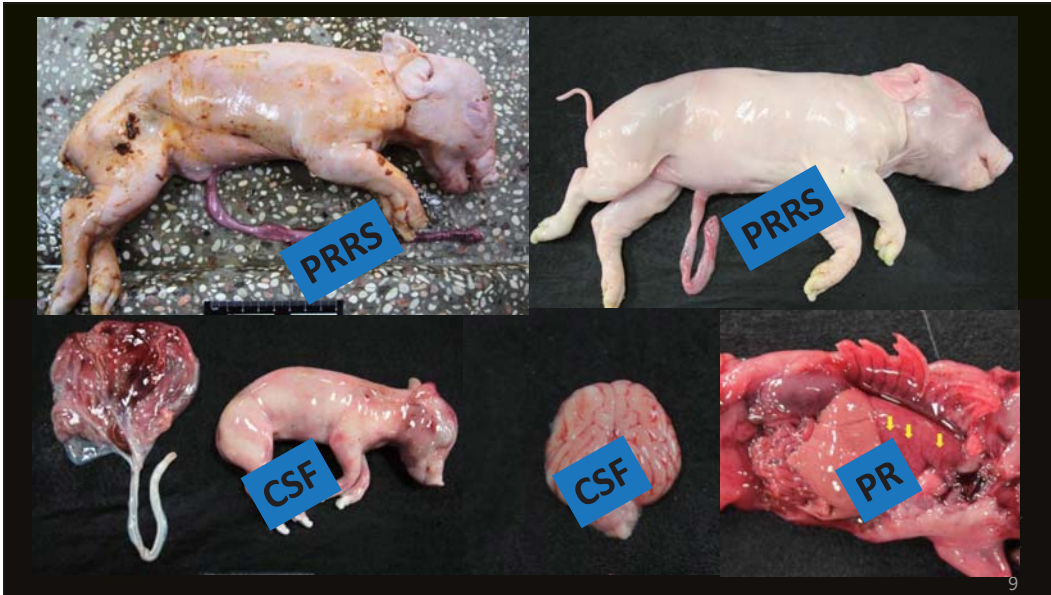
| Disease 疾病 | Signs in sow 母豬症狀  | Reproductive manifestation 繁殖障礙現象   |
|------------|--|---|
| PRRS       | Mild depression, anorexia, fever<br>輕微精神沉鬱, 厭食, 發燒   | Late-term abortion, stillbirths, weak-born pigs<br>後期流產, 死產, 虛弱仔豬   |
| PCV2       | None<br>無症狀  | Weak births, stillbirths, fetal mummification<br>虛弱仔豬, 死產, 木乃伊胎   |
| PR         | Generally none<br>一般無症狀  | Embryonic death, fetal mummification, abortion, stillborn, and weak-born pigs<br>胚胎死亡, 木乃伊胎, 流產, 死產, 虛弱仔豬   |
| CSF        | Fever, reduced feed intake, depression, ataxia, conjunctivitis, constipation, cachexia, and cutaneous erythema<br>發燒, 食慾下降, 精神沉鬱, 共濟失調, 結膜炎, 便秘, 惡病質, 皮膚紅斑 | Embryonic death and resorption, abortion, mummification, stillbirths, fetal malformations, and increased neonatal mortality<br>胚胎死亡以及重吸收, 流產, 木乃伊胎, 死產, 畸形, 新生仔豬死亡率增加 |

# Differential diagnosis 類症鑑別

| Disease 疾病 | Gross fetal lesions 流產胎肉眼病變  |
|------------|--|
| PRRS       | Meconium staining of fetal skin, umbilical cord edema and segmental hemorrhage<br>體表沾附胎糞, 臍帶水腫及片段性出血   |
| PCV2       | Dilated and hypertrophied heart; fluid in body cavities; enlarged congested liver<br>心臟擴張及肥大; 體腔內液體蓄積, 肝臟腫大鬱血  |
| PR         | Multifocal, random, pinpoint white foci necrosis in liver, spleen, and possibly lungs<br>肝, 脾臟, 甚至肺臟可見多發局部, 散發, 針點狀壞死  |
| CSF        | Ascities, widespread petechiation, pulmonary hypoplasia, malformations, micrognathia, cerebellar hypoplasia, microcephaly<br>腹水, 廣泛出血點, 肺臟發育不全, 畸形, 小顎, 小腦發育不全, 小頭畸形 |







# Do not forget the PED...

will always impress you by bring other problems  
although it can not lead to reproductive disorder directly

|                         |                          |   |
|-------------------------|--------------------------|---|
| 梭狀桿菌感染<br>Clostridiosis | 大腸桿菌感染<br>Colibacillosis | 母豬重發情/配種率下降<br>Return to estrus/<br>Decrease inseminated rate |
|                         |                          |   |

Boehringer Ingelheim

**PREVENTION WORKS**  
Shaping the future of swine health

10

# PRRS 藍耳病

PRRS virus

Boehringer Ingelheim

**PREVENTION WORKS**  
Shaping the future of swine health

11

# PRRS has been endemic for more than 20 YEARS

藍耳病已經流行超過20年

- PRRS was first identified in the US and central Europe **in the late 1980s**. 藍耳病在1980年代後期的美國及中歐首次被確認
- The North American (Type 2) and European (Type 1) PRRSV strains cause similar clinical symptoms, but represent two distinct viral genotypes whose genomes diverge by approximately 40%. 北美型(第二型)及歐洲型(第一型)的藍耳病毒株能造成相似的症狀,但在基因上則有將近40%的差異,故可區分為2種不同的病毒基因型別
- In the early 2000s, a highly pathogenic strain of the North American genotype emerged in China 在2000年早期,中國出現高致病性的北美型藍耳病毒
- PRRS **remains endemic** across North America, Europe and Asia. 現在藍耳病在北美,歐洲及亞洲仍普遍流行

Boehringer Ingelheim

**PREVENTION WORKS**  
Shaping the future of swine health

# ¿What is the problem?

藍耳病造成什麼問題?

- Abortions 流產
- Stillborn piglets 死產
- Less piglets 窩仔數下降
- Smaller piglets 弱小仔豬
- Reduce growth rate 降低生長速率
- Anorexia 厭食
- Mortality 死亡率
- Secondary infections 繼發性感染



PREVENTION WORKS  
Shaping the future of swine health



# PRRS is a costly disease 藍耳病造成重大的經濟損失

PRRS costs millions in productivity losses every year 藍耳病每年造成重大的生產效益損失

In the USA, the total PRRS cost was estimated in \$ 664 million annually 1.8 million per day 估計藍耳病在美國每年造成6.6億美金(每天180萬美金)的損失

## Estimated annual financial cost in the USA

\$114.71 每頭在養母豬 114.71美金 Per inventoried sow



\$4.67 每頭上市肉豬 4.67美金 Per marketed pig



Additionally \$477.8 million annually cost in animal health expenses, biosecurity and other outbreak related 每年增加額外動物醫療成本、生物安全投資及其他疾病爆發造成損失共約477.8百萬美金

生長肥育豬佔55% 55% Grow-Finish



母豬群佔45% 45% Breeding Herd

PREVENTION WORKS  
Shaping the future of swine health



Source: Holtkamp DJ, et al. Journal of Swine Health and Production, 21 (2), pp 72 - 84.

## PRRS epidemiology 藍耳病的流行病學

PREVENTION WORKS  
Shaping the future of swine health

# Various methods of shedding of PRRS virus 藍耳病病毒可以多種方式排毒

How does PRRSV get out of the pig? 藍耳病病毒如何離開豬隻?

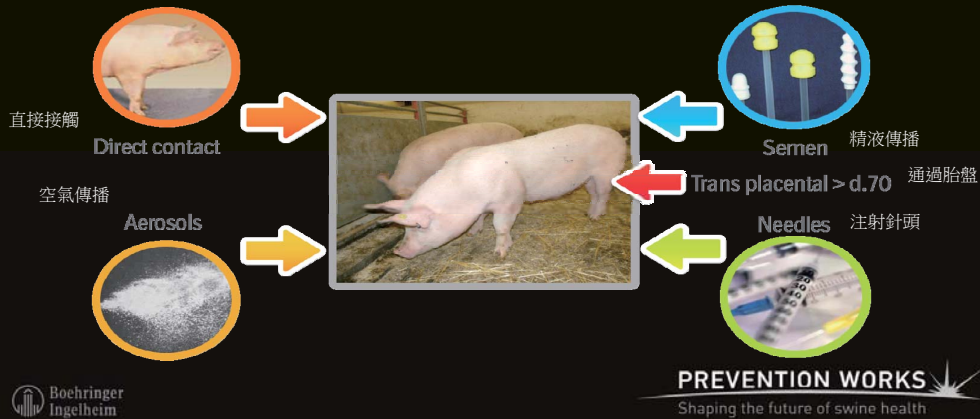
|      | 感染後經過時間-天 | How long - days            | 文獻作者 Author                      |
|------|-----------|----------------------------|----------------------------------|
| 鼻分泌物 |           | 21                         | Benfield et. al 1994             |
| 口腔液  |           | 42                         | Wills et. al 1997                |
| 尿液   |           | 28                         | Rossov et. al 1994               |
| 精液   |           | 92                         | Christopher-Hennings et. al 1995 |
| 扁桃腺  |           | 175                        | Molina et. al 2007               |
| 糞便   |           | <35                        | Yoon et. al 1993                 |
| 乳汁   |           | Lactation 泌乳               | Wagstrom et. al 2001             |
| 呼吸道  |           | Difficult to quantify 難以定量 | Hermann et. al 2007              |



PREVENTION WORKS  
Shaping the future of swine health



# How does PRRS get into the pig? 藍耳病病毒如何感染豬隻?



# Different exposures, different risks 不同的暴露方式造成不同的風險

| ID <sub>50</sub> , dose that infects 50 % of pigs | Factor 風險因子 | ID <sub>50</sub> 半數豬隻感染劑量                                |
|---|-------------|--|
| Parenteral, breaks in skin 皮膚創口                   | 1           | 10 <sup>1</sup>  |
| Aerosols 空氣                                       | 125         | 10 <sup>1</sup> - 10 <sup>3</sup> (depending on isolate) |
| Intranasal 鼻腔內                                    | 1000        | 10 <sup>3,9</sup>  |
| Artificial insemination 人工授精                      | 3000        | 10 <sup>4,5</sup>  |
| Oral 口腔   | 15.000      | 10 <sup>5,2</sup>  |

Boehringer Ingelheim PREVENTION WORKS Shaping the future of swine health

# PRRS Transmission 藍耳病傳播

- ▶ Carrier animals 帶原動物
    - ▶ Transmission between pigs 豬隻間傳播
    - ▶ Transmission within herds/farms
  - ▶ Transmission between herds/farms 豬群間/豬場間傳播
    - ▶ Transmission by non-porcine species 從豬以外動物傳播
- Boehringer Ingelheim PREVENTION WORKS Shaping the future of swine health

# PRRS Transmission: Risk and Routes 藍耳病傳播: 風險與途徑

**Routes of PRRSV transmission 藍耳病傳播途徑**

- Entry of new animals (gilts) 引進新動物(女豬)
- Semen 精液
- Fomites, including boots and coveralls 器械設備, 包含雨鞋及工作服
- Vehicles transporting live animals, collecting dead animals, or delivering feed or semen 運輸活豬或死豬的交通工具, 或是運送飼料/精液的車輛
- Pests, including rodents and insects such as houseflies 啮齒類和昆蟲

**Risk factors for PRRSV transmission 藍耳病傳播風險因子**

- High pig density area 豬隻高飼養密度區域
- Larger herd size 大規模飼養豬場
- New animals frequently brought into the herd (e.g. every 2 months) 頻繁引進豬隻(每2個月)
- New animals brought into the herd without prior isolation or vaccination 引進豬隻時未對其隔離或接種疫苗
- Dead animals not properly disposed of on site 病死豬未妥善處理

Boehringer Ingelheim PREVENTION WORKS Shaping the future of swine health



• Infection/Production/Prevention Chain  
生產/感染/預防鏈

Boehringer Ingelheim

**PREVENTION WORKS**  
Shaping the future of swine health

21

# Infection / Production / Prevention Chain 生產/感染/預防鏈

Each sequential phase of production – the production chain – can be matched with epidemiological events associated with PRRSV infection and transmission – the infection chain 完整豬隻生產互相連結的每個階段稱為生產鏈，臨床上生產鏈可與感染鏈(藍耳病毒)感染與傳播相關的流行病學事件)相呼應

The Infection / prevention chain

感染/預防鏈

Horizontal transmission 水平傳播

Vertical transmission 垂直傳播

**Gilt source** 新女豬引進

**Gilt development** 新女豬育成

**Sow herd** 母豬群

**Farrowing/rearing** 分娩/哺乳

**Wean to finish** 斷乳/育肥

**Output Market** 上市出售

Minimise exposure & Maximise immunity

Linking the production chain with the infection chain results in a comprehensive understanding of the infection problem and the need for a systematic approach to PRRS prevention and control. 將生產鏈與感染鏈連結有助於全面性了解藍耳病感染的問題，這對於藍耳病系統性的預防與控制是必需的

As a result, intervention strategies are implemented across every stage of the production system – the whole herd approach to PRRS control. 因此，控制策略需考量到生產系統的各個階段與種群的系統性控制方案

**PREVENTION WORKS**  
Shaping the future of swine health

## Our Ingelvac PRRS MLV

百靈佳 藍耳病滅毒活毒疫苗



**Piglets**  
One dose around weaning  
仔豬 離乳前後1劑

**Gilts**  
Vaccination before being integrated into the sow herd, 2-5 weeks prior to breeding  
新女豬 與母豬群混養之前進行免疫 配種前2-5週進行免疫

**Sows**  
Mass vaccination, including all pregnant and non-pregnant sows, every 3-4 months  
母豬 每3-4個月群體免疫 包含所有懷孕的以及未懷孕的母豬

Gilt and sow vaccination that minimises the reproductive impact of PRRS across all stages of the breeding herd

新女豬與母豬均接種疫苗可將藍耳病對於種豬群各階段造成的繁殖方面影響降到最低



Boehringer Ingelheim

**PREVENTION WORKS**  
Shaping the future of swine health

# Ingelvac PRRS MLV 百靈佳藍耳病減毒活毒疫苗



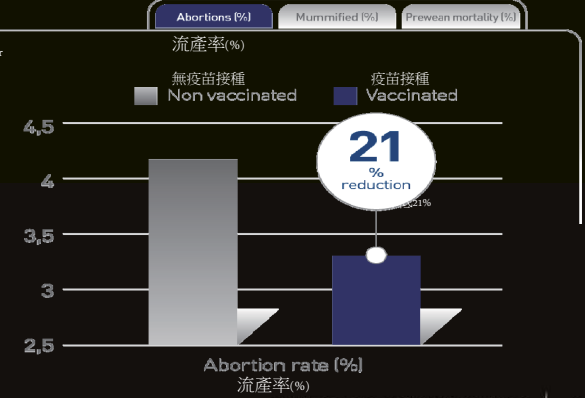
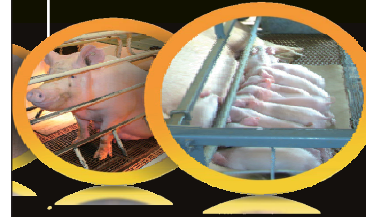
- For active immunization of clinically healthy pigs in PRRSV-positive herds.
- 提供藍耳病陽性豬場健康豬隻主動免疫
- to **reduce clinical symptoms of the** respiratory and **reproductive** forms of PRRS virus infections
- 減低藍耳病病毒感染所造成的呼吸道及繁殖道臨床症狀
- **One 2 ml dose** administered via a single intramuscular injection
- 2毫升單次肌肉注射投予
- Sows in seropositive herds can be vaccinated at **any stage**.
- 可接種在血清陽性豬場的任何階段母豬
- **whole-herd vaccination is recommended** at the start of a vaccination programme.
- 豬場在開始使用藍耳病疫苗時建議執行全場免疫
- **Onset of immunity at 40 days with a duration of 154 days**
- 免疫後40天產生保護力,並可持續154天

**PREVENTION WORKS**  
Shaping the future of swine health

# Ingelvac PRRS MLV 百靈佳藍耳病減毒活毒疫苗

REPRODUCTIVE IMPROVEMENT 改善繁殖性能

Sow herd stabilization achieved with Ingelvac® PRRS MLV (14 weeks after 1st mass vaccination). 母豬群使用百靈佳藍耳病減毒活毒疫苗達到藍耳病穩定狀態 (於初次全體免疫14週後)  
Significant Improvement of productivity  
可見生產性能的顯著改善



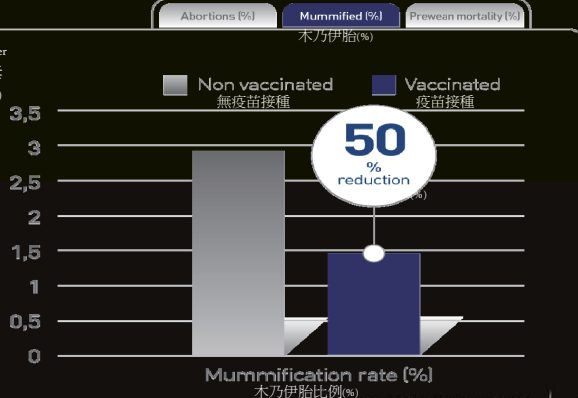
Diaz E. et al. 2011. AASV, Page 173-177  
Boehringer Ingelheim

**PREVENTION WORKS**  
Shaping the future of swine health

# Ingelvac PRRS MLV 百靈佳藍耳病減毒活毒疫苗

REPRODUCTIVE IMPROVEMENT 改善繁殖性能

Sow herd stabilization achieved with Ingelvac® PRRS MLV (14 weeks after 1st mass vaccination). 母豬群使用百靈佳藍耳病減毒活毒疫苗達到藍耳病穩定狀態 (於初次全體免疫14週後)  
Significant Improvement of productivity  
可見生產性能的顯著改善



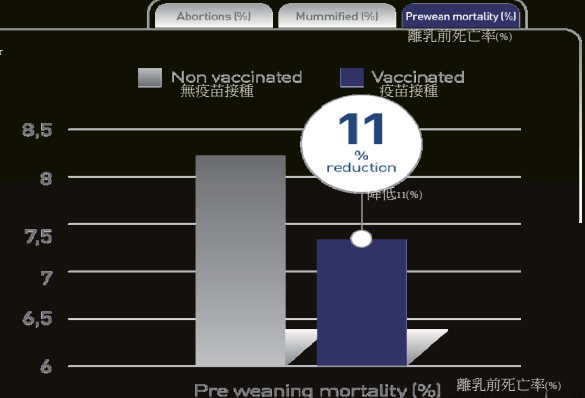
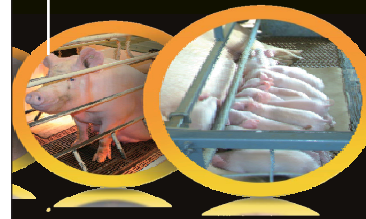
Diaz E. et al. 2011. AASV, Page 173-177  
Boehringer Ingelheim

**PREVENTION WORKS**  
Shaping the future of swine health

# Ingelvac PRRS MLV 百靈佳藍耳病減毒活毒疫苗

REPRODUCTIVE IMPROVEMENT 改善繁殖性能

Sow herd stabilization achieved with Ingelvac® PRRS MLV (14 weeks after 1st mass vaccination). 母豬群使用百靈佳藍耳病減毒活毒疫苗達到藍耳病穩定狀態 (於初次全體免疫14週後)  
Significant Improvement of productivity  
可見生產性能的顯著改善



Diaz E. et al. 2011. AASV, Page 173-177  
Boehringer Ingelheim

**PREVENTION WORKS**  
Shaping the future of swine health



# Take-home messages

## Effective diseases control

- Good knowledge on the pathogenesis
- Scientific diagnosis data
- Right tool and partner

Thank you