Association between serology for four respiratory pathogens and pig carcass traits

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Introduction

- Respiratory disease is a major production disease of slaughter age pigs\(^1\)
- Resulting in substantial financial losses\(^2,3\)
- On Irish farms, there is no information on the association between pathogen prevalence and carcase traits
- Compared to European counterparts, Irish pig herds tend to be
  - larger
  - more intensive production
- Analysis on respiratory disease tends to be based on a positive/negative interpretations

\(^1\)Merialdi et al., 2012 The Veterinary Journal 193, 234-239
\(^2\)Fraile et al., 2010 The Veterinary Journal 184, 326-333
\(^3\)Maes et al., 1999 Vaccine. 1999 Mar 5;17(9-10):1024-34
Objective

To investigate the associations between serology for four respiratory pathogens and pig carcass traits
**Materials**

### Farm
- 5 farrow-to-finish units
- Weekly farrowing batch
- Herd size 808 - 2354

### Pig
- 40 pigs tagged following farrowing
- Selected 24-48 hours after birth
- Selected by gender & dam parity
- 67 females / 61 males

### Serum
- Collected preslaughter
- 128 samples
- Jugular vein puncture
- Serum was processed

**CARCASS TRAITS**
- Cold Carcase Weight (CCW)
- Lean Meat Percentage (LM %)
Serology

BACTERIAL
- *A. pleuropneumoniae* (APP)
- *M. hyopneumoniae* (Mhyo)

VIRAL
- Swine Influenza Virus (SIV)
- PRRSv
- Analysed using pathogen specific ELISA kits
- Sample-to-positive (S/P) ratio value calculated
- Positive Interpretation determined

Statistical Analysis

MODEL
- Mixed models in SAS v9.3

FIXED EFFECT
- Gender

RANDOM EFFECT
- Pig within each farm

COVARIATES
- Age
- S/P value
Results – Pathogen S/P Ratio Value Response

Positive Interpretation
APP – 91%
Mhyo – 100%
PRRSv – 82%
SIV – 78%

67% of samples positive for all pathogens

Positive Interpretation APP ≥ 0.50, Mhyo > 0.40, PRRSv ≥ 0.40, SIV > 0.40
Results

• No association between

  • gender and carcass traits \( (P > 0.05) \)
  
  • slaughter age and CCW \( (P > 0.05) \)
  
  • LM\% and any of the pathogens investigated \( (P > 0.05) \)
  
  • CCW and SIV \( (P > 0.05) \)
Results – Association of CCW and APP S/P values

\[ Y = 62.22 - 9.6 \times \text{APP S/P} \]
\[ P = 0.005 \]

Monetary Value €€€ of APP

4.5kgs → €7.38
13.5kgs → €22.14

APP Positive Interpretation APP ≥ 0.50
Results – Association of CCW and Mhyo S/P values

\[ Y = 29.95 - 5.14 \times \text{Mhyo S/P} \]

\[ P = 0.06 \]

**Mhyo Positive Interpretation S/P > 0.40**

- Monetary Value €€€ of Mhyo
  - 1.95 kgs \(\rightarrow\) €3.20
  - 5.86 kgs \(\rightarrow\) €9.61
Results - Association of CCW and PRRSv S/P values

\[ Y = 39.98 - 6.60 \times \text{PRRSv S/P} \]
\[ P = <0.0001 \]

Monetary Value €€€ of PRRSv
- 5.74 kgs → €9.41
- 17.23 kgs → €28.25

PRRSv Positive Interpretation S/P ≥ 0.40
• High Disease Prevalence

• APP & PRRSv reduce carcass performance

• Not all “positive” are the same!
  • As S/P values increase by 1 SD, performance is more affected
  • Possible threshold?

• No association between lean meat% and pathogens
  • Fat-to-lean deposition rate not affected?
What’s next

- PCR, sequencing and phylogenetic analysis
- Study co-infection patterns
  - Between diseases
  - Across time
- Identify possible thresholds for the S/P values were performance start to be affected
- Study association between S/P values and lung lesions
Conclusion

• Results indicate that exposure to three of the respiratory pathogens analysed contributed negatively towards the growth performance traits.

• Recognition of poor CCW in slaughter age animals indicates that respiratory disease management strategies require review and intervention.

• Data will assist in improved farm profitability and animal welfare.
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