Overview of pig health and welfare projects

PathSurvPigs
DAFM RSF 2014

WELPIG
Teagasc GIA
VCI

PIGWELFIND
DAFM RSF 2012

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PathSurvPigs
Investigation of respiratory disease on Irish pig farms, associated risk factors, and the relationship with performance, welfare and antibiotic use

N. Leonard, J. Moriarty, L. Boyle, E. Manzanilla, H. O’Shea, M. McElroy
Introduction to PathSurvPigs

- Respiratory disease is among the most NB infectious disease leading to production losses in the pig industry
- Few Irish data available on associated pathogens, morbidity and mortality
- Background of high levels of antibiotic use and the need to improve production efficiency, health and welfare

Overall objective

To develop effective sustainable low cost solutions to address the control of respiratory diseases to improve pig health and welfare, farm profitability and to reduce antibiotic usage
Objectives of PathSurvPigs

1. Establish prevalence and risk factors
2. Prioritise diseases
3. ID gaps in diagnostics
4. Develop diagnostic technology/expertise
5. Establish the reasons for, and antimicrobial usage in, pigs which are removed from their peer-group early (‘pull-outs’)
6. Examine r’ship between welfare indicator lesions, standards of care and disease status of pigs that die on Irish farms
7. Cost-benefit analysis of control measures versus current losses due to disease (tail biting, ill-thrift, morbidity and mortality)
Tasks in PathSurvPigs

- Pathology at slaughter
- On-farm longitudinal studies
- Welfare and pathology of fallen pigs
- Diagnostics
- Risk factors for disease
- Cost benefit analysis
- Dissemination
PIGWELFIND
The development of ante and post mortem meat inspection as a pig health and welfare diagnostic tool

L. Boyle¹, D. Teixeira¹, E. Manzanilla¹, N. van Staaveren¹, S. Harley², A. Hanlon², S. More², N. O’Connell³, G. Carroll³ and M. Hawe⁴

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Measuring pig health and welfare outcomes at meat inspection (MI)

Abattoir data are ‘greatly under utilised’ and consideration must be given to the potential contribution of MI to pig health and welfare surveillance (EFSA, 2011)

- Dissatisfaction with the current system of feedback amongst producers
- Agreement of the potential usefulness of MI data to contribute to herd health and welfare plans
- However, concerns relating to use of data collected
- Unwillingness to accept responsibility for the financial support/implementation of such a tool
- Distrust, communication and relationship difficulties between stakeholders

(Devitt et al., 2014)
PIGWELFIND

Overall objective
To develop ante and post mortem meat inspection (MI) as a diagnostic tool to help inform on-farm pig health and welfare management plans

- Acronym for ‘Pig Welfare Indicators’ (or ‘Finding Pigs Well’!)
- Develop animal/carcass based indicators which reflect pig health and welfare on-farm
- Mix of farm and factory based studies
- Qualitative research (social science)
- Develop on line scoring systems and training tools for VI
- Cost benefit analysis
Carcass lesions: Strong focus on tail and skin lesions
Why tail lesions?

- Tail biting is much less of a priority amongst producers compared to other health issues such as lung disease (Devitt et al., 2015)
  
  “Irregular nature” and “causes outside” of the producer’s control

  “Inherent part of pig production” and not a cause of concern if occurring at low levels

- An intact, uninjured tail illustrates that a pig experienced a high standard of health, housing and management over its lifetime (Spoolder et al., 2011)

- Carcass lesions also much easier to standardise, easier and faster to observe and document than viscera lesions

- Carcass tail lesions as a potential ‘iceberg indicator’ of pig health and welfare (UK FAWC)
Impact of tail score on carcass weight

- 0+1: 1.2kg loss/pig
- 2: 3.3kg loss/pig
- 3: 12kg loss/pig

The Irish Agriculture and Food Development Authority
As the % of pigs in a batch with:

- Tail lesions \( \uparrow \) CCW \( \downarrow \)
- Skin lesions \( \uparrow \) CCW \( \downarrow \)
- Loin bruising \( \uparrow \) CCW \( \downarrow \)

\( p < 0.001 \)
Impact of tail lesion score on carcass condemnation (CC) outcome

Strong relationship between tail lesion score & CC outcome
July 2014 tail lesion study

- 2 factories
- 13,133 pigs
- 73 batches
- 61 farms

High proportion (25%) and considerable variation (5-70%) in the numbers of pigs affected by moderate tail lesions.
Influence of processing stage on the prevalence of tail lesions detectable at slaughter

<table>
<thead>
<tr>
<th>Tail lesions (%)</th>
<th>Sticking</th>
<th>Post scald/de-hair</th>
<th>% change</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absent</td>
<td>85.3</td>
<td>69.2</td>
<td>-18.9</td>
<td>***</td>
</tr>
<tr>
<td>Mild</td>
<td>11.8</td>
<td>27.3</td>
<td>+131.4</td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>1.4</td>
<td>1.9</td>
<td>+35.7</td>
<td></td>
</tr>
<tr>
<td>Severe</td>
<td>1.5</td>
<td>1.6</td>
<td>+7.0</td>
<td></td>
</tr>
<tr>
<td>Total prevalence</td>
<td>14.7</td>
<td>30.8</td>
<td>+109.5</td>
<td></td>
</tr>
</tbody>
</table>

Mild to moderate tail lesions are difficult to see on the live animal; visibility increases after scalding and de-hairing

*(Carroll et al., in preparation)*
Influence of region of origin on prevalence of carcass lesions in pigs slaughtered in one NI factory

<table>
<thead>
<tr>
<th>Region of origin*</th>
<th>NI (%)</th>
<th>ROI (%)</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin lesions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>63.3</td>
<td>53.5</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>24.6</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>8.4</td>
<td>14.3</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1.9</td>
<td>1.2</td>
<td></td>
</tr>
<tr>
<td>Total prevalence</td>
<td>34.9</td>
<td>46.5</td>
<td>P &lt; 0.001</td>
</tr>
<tr>
<td>Tail lesions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>82.8</td>
<td>79.2</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>14.3</td>
<td>16.4</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1.7</td>
<td>1.9</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>0.6</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>0.6</td>
<td>2.1</td>
<td></td>
</tr>
<tr>
<td>Total prevalence</td>
<td>17.2</td>
<td>20.9</td>
<td>P &lt; 0.001</td>
</tr>
<tr>
<td>Loin bruising</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total prevalence</td>
<td>7.1</td>
<td>13.0</td>
<td>P &lt; 0.001</td>
</tr>
</tbody>
</table>

*within NI abattoir
NI vs. ROI condemnations

Batches of pigs sent to the ROI abattoir were:

- **5 times** more likely to be partially condemned at slaughter than those sent to the NI abattoir
- **10 times** more likely to be recorded as having abscessation at slaughter than those sent to the NI abattoir

Supports findings of 2010 survey of 5 factories in NI/ROI (Harley et al., 2012)
Do carcass lesions reflect pigs lifetime health and welfare?

• 720 pigs (10 batches) assessed for welfare (tail and skin lesions) at 7, 9, 10, 15 & 20 wks of age
• Categorised as having good or poor welfare
• Carcass of each pig scored for tail length, tail lesions and fresh (red) and old (non-red) skin lesions

Results
• Poor welfare pigs had significantly shorter tails, more severe tail lesions and more old (non-red) skin lesions on the carcass
• Old (non-red) lesions reflected moderate and severe skin lesions acquired by the pigs after mixing at 10 wks

Carcass lesions reflected pigs lifetime welfare

(Carroll et al., 2015 ICPW – Denmark)
Relationship between carcass tail lesion scores and viscera condemnations for disease lesions

- Recorded tail lesion score (TS), sex and herd in one ROI slaughter plant (3,143 pigs from 61 batches)
- Disease lesions responsible for viscera condemnations (based on the decision of the acting Veterinary Inspector [VI])

Results

- 1,114 cases of viscera condemnation
- 72% lung, 8% heart and 16% liver disease (4% other)
- Highest batch level prevalence: Pleurisy (13.7%), pneumonia (10.4%) and ascariasis (7.3%)
- Ascariasis = greatest variation between batches (0 to 75%)
Relationship between VI, gender and carcass tail lesion scores and disease lesions responsible for viscera condemnations

<table>
<thead>
<tr>
<th>Viscera condemnation</th>
<th>VI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pleurisy</td>
<td>ns</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>0.022</td>
</tr>
<tr>
<td>Pleuropneumonia</td>
<td>0.001</td>
</tr>
<tr>
<td>Abscess</td>
<td>ns</td>
</tr>
<tr>
<td>Pericarditis</td>
<td>0.005</td>
</tr>
<tr>
<td>Ascariasis</td>
<td>0.034</td>
</tr>
</tbody>
</table>

- VI shift influenced viscera condemnation outcomes
- More consistency in condemning for abscesses and pleurisy
- Batch level tail lesion score influenced the likelihood of lungs being condemned for respiratory disease
Relationship between carcass tail lesion scores and pneumonia lesions responsible for lung condemnation.

Poor health = poor welfare

BUT

Poor welfare ≠ poor health
Detailed study of relationship between tail lesion severity and lung health scores

**Lung lesion scores (modified from BPEX)**

- **Enzootic pneumonia (EP-like lesions)**: 0-50
- **Pleuropneumonia (APP)**: 0/1
- **Pleurisy**: 0-2
- **Abscess**: 0/1
- **Pyaemia**: 0/1

- Spring 2015 – factory based research (6400 pigs from 28 farms)
- 1 person recording tail lesion scores, herd and sex and 2nd person on viscera line scoring lung lesions
- **Challenging work**: Line speed, how to record when you need to palpate lungs, matching lungs to carcass (and therefore herd no.)
Conclusions

- Prevalence of and costs associated with tail lesions are underestimated
- Good potential for incorporating tail and skin lesion severity scores into the MI process
- Directly reflect pig welfare on-farm and may serve as indirect indicators of pig health
- Considerable challenges associated with scoring viscera lesions
- Need for standardisation of terminology and training of VI
- Reasons for regional differences requires investigation
WELPIG
Exploring the link between poor welfare, production diseases, antimicrobial usage and resistance on Irish pig farms

Introduction to WELPIG

- Resistance to antibiotics (ABR) poses a major concern for human & animal health
- Ireland has high usage of AB listed as NB for human health by WHO
- In-feed antibiotics (AB) are commonly used in pig production
  - to treat pathologies
  - to improve animal performance
- EU will be promoting drastic reductions in AB use in the coming years
  - Legal action
  - Government-industry collaboration
Problems of AB mis/over use and therefore ABR

- 80% of farmers do not realise that AB use in animals may lead to increased problems of ABR in human medicine (Stevens et al., 2007)
- Prescribing practices by PVP and use of AB by farm staff
- 20% of producer respondents to recent survey have ≥3 PVPs providing services
- Poor housing, management and therefore poor health and welfare of pigs

Introduction to WELPIG
WELPIG: Objectives

- In order to assist the pig industry to reduce AB use there is a need
  - to understand social factors and attitudes to AB prescribing/use
  - to ID management practices which underlie AB usage
  - to ID changes in management which can simultaneously reduce AB usage and improve pig health and welfare
  - for information on levels of resistance to the critically important AB agents
  - to understand how ABR is assoc. with AB usage, management practices, pig health and welfare on farms
  - for an ‘audit tool’ to assist in reducing AB usage
WELPIG: Tasks

1. **Survey** of management, housing and ‘animal care’ practices in relation to AB usage on pig farms
2. **Social science**: Investigation of the underlying social factors driving prescribing practices among PVPs and staff of pig farms
3. **On-farm work**: 1) Investigation of r’ship between AB usage, ABR and pig health and welfare indicators and 2) Implementation of strategies associated with prudent use of AB on selected high AB usage farms
4. **Cost/benefit analysis** of strategies
5. **Factory work**: R’ship between AB usage and disease on-farm and intestinal and thoracic lesions detected at slaughter
6. **Lab work**: Detailed characterization of ABR organisms and r’ships with antimicrobial usage
7. ‘**Audit tool development**’: to assist in improving pig health and welfare and reducing AB usage on pig farms
WELPIG: Work to date

- Producer questionnaire survey (see Ana Vale poster)
- On-farm trial looking at effects of removing antibiotics from weaner feed on:
  - Pig behaviour and welfare (see Alessia Diana’s poster)
  - Pig performance and health (talk from Edgar will follow with results)
General conclusions

- Multidisciplinary, cross project, cross centre and cross border collaborative research to address pig health and welfare problems
- Considerable stakeholder involvement (surveys, interviews, on-farm/factory work)
- DAFM funding of +€1m (but also Teagasc, VCI)
- In line with current national initiatives and international priorities for the pig industry
- Widespread dissemination via conferences, workshops and discussion groups in the coming years

The Irish Agriculture and Food Development Authority
Effect of removal of in-feed antibiotics on performance and health indicators in a commercial farm

Edgar G. Manzanilla
Alessia Diana
Remi Vial
Nola Leonard
Laura Boyle
Introduction

- What are the options for reducing AB use at a farm level?
- Not a single solution!!! Each case has to be studied individually
- 0 use of AB is impossible
  - Parenteral (INJECTED)
  - Water dosers
An Irish farmer approached Teagasc because he wanted to remove AB from the feed and produce a differentiated product.

The farm was visited by Teagasc personnel and the PVP, the nutritionist, the farmer and Teagasc researchers agreed an action plan:

- Reduction of stocking density (undergoing changes)
- Enrichment in the pens
- Removal of antibiotics but keeping ZnO
- Close monitoring of disease outbreaks
The trial (Sept 2014-Feb 2015)

Objective:
Quantify the effects of removing in-feed AB on pig health and performance through to slaughter on a commercial farm

THE FARM

- 300 sow farrow-to-finish farm working on weekly batches
- +ve to Influenza, PRRS and APP; regular ear and tail biting
- Sulfa-Trimethoprim (14.4 mg/kg BW) during 1\textsuperscript{st} & 2\textsuperscript{nd} weaning stage
- Therapeutic ZnO in feed
- 6 batches of 140 pigs were followed from weaning to slaughter
- Pigs were tagged, weighed and sorted into 2 groups with (AB) and without AB (No AB)
Measurements

- Injected antibiotics
- Productive performance
- Mortality

- Slaughter house lesions
## Results

<table>
<thead>
<tr>
<th></th>
<th>Liveweight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Weanling</td>
</tr>
<tr>
<td>No AB</td>
<td>9.2</td>
</tr>
<tr>
<td>AB</td>
<td>9.2</td>
</tr>
<tr>
<td>Difference</td>
<td>0.0</td>
</tr>
</tbody>
</table>
## Results

### Average daily gain, g/day

<table>
<thead>
<tr>
<th></th>
<th>1st Stage</th>
<th>2nd Stage</th>
<th>Finishing</th>
</tr>
</thead>
<tbody>
<tr>
<td>No AB</td>
<td>397</td>
<td>719</td>
<td>865</td>
</tr>
<tr>
<td>AB</td>
<td>431</td>
<td>752</td>
<td>882</td>
</tr>
<tr>
<td>Difference</td>
<td>34</td>
<td>33</td>
<td>17</td>
</tr>
</tbody>
</table>
## Results

**Average daily feed intake, g/day**

<table>
<thead>
<tr>
<th></th>
<th>1st Stage</th>
<th>2nd Stage</th>
<th>Finishing</th>
</tr>
</thead>
<tbody>
<tr>
<td>No AB</td>
<td>578</td>
<td>1396</td>
<td>1810</td>
</tr>
<tr>
<td>AB</td>
<td>641</td>
<td>1455</td>
<td>1820</td>
</tr>
<tr>
<td>Difference</td>
<td>63</td>
<td>59</td>
<td>10</td>
</tr>
</tbody>
</table>
## Results

**Feed conversion ratio**

<table>
<thead>
<tr>
<th></th>
<th>1st Stage</th>
<th>2nd Stage</th>
<th>Finishing</th>
</tr>
</thead>
<tbody>
<tr>
<td>No AB</td>
<td>1.49</td>
<td>1.95</td>
<td>2.10</td>
</tr>
<tr>
<td>AB</td>
<td>1.52</td>
<td>1.95</td>
<td>2.07</td>
</tr>
<tr>
<td><strong>Difference</strong></td>
<td><strong>0.03</strong></td>
<td><strong>0.00</strong></td>
<td><strong>0.03</strong></td>
</tr>
</tbody>
</table>

The Irish Agriculture and Food Development Authority
Injections and mortality rate, 1st stage

No difference

Mortality

Injections

The Irish Agriculture and Food Development Authority
## Lung lesions

<table>
<thead>
<tr>
<th>Date</th>
<th>Pleurisy %</th>
</tr>
</thead>
<tbody>
<tr>
<td>05/06/2014</td>
<td>33%</td>
</tr>
<tr>
<td>13/11/2014</td>
<td>6%</td>
</tr>
<tr>
<td>04/12/2014</td>
<td>3%</td>
</tr>
<tr>
<td>11/12/2014</td>
<td>5%</td>
</tr>
</tbody>
</table>
Conclusions

Removing in-feed antimicrobials:

- Reduced final weight by 2 kilos
- Did not affect FCR or mortality rate (weaner stage)
- Increased injected antibiotics
- Reduced total antibiotic use by more than 90%
Acknowledgements

Pig slaughter factories
Veterinary inspectors
Pig producers
Summer students
Farm staff
Private pig vets