

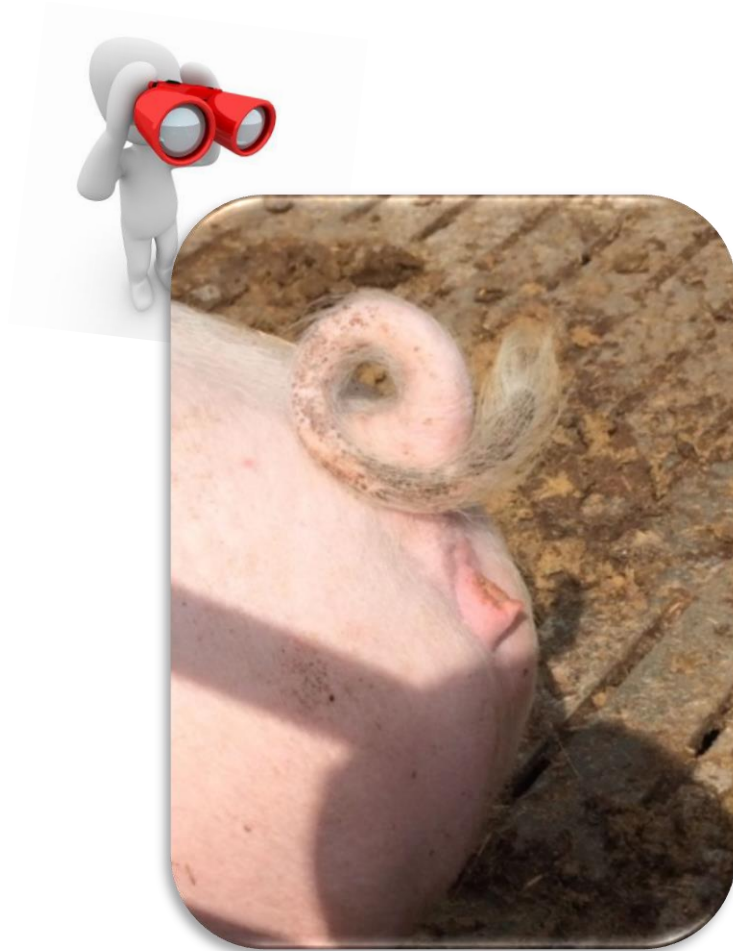
# Pig tail: A decade of research on the iceberg indicator



**Laura Boyle and Keelin O'Driscoll**

Animal and Grassland Research and Innovation Centre, Moorepark,  
Fermoy, Co. Cork, Ireland

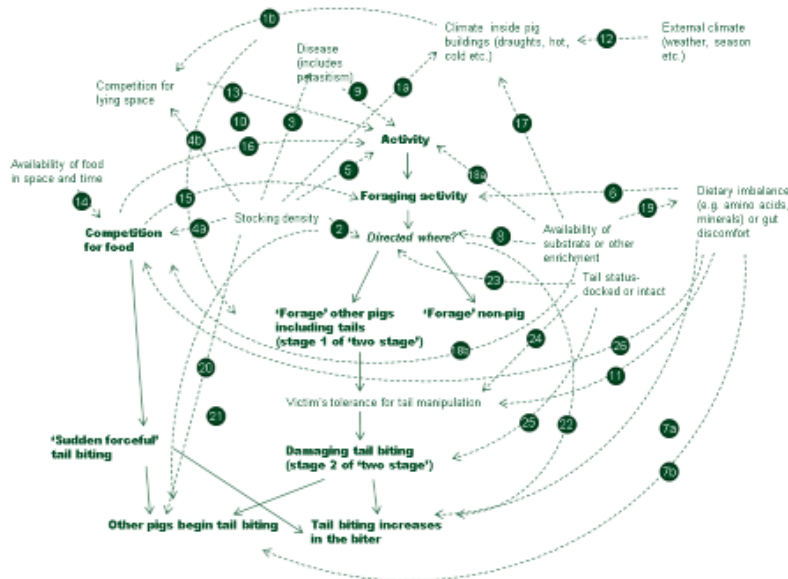
# The tail as an iceberg indicator





# Tail biting


- Major welfare problem in pig production
- Oral manipulation of tails
- Pain, fear, ↓ performance, disease, carcass condemnation
- ↓ welfare in bitten pig, reflects poor welfare in biter pig
- Re-directed foraging behaviour
- +80 risk factors for tail biting





# Tail docking

- Risk of tail biting lower in a population of docked pigs than in undocked pigs
- Docking causes injury, pain, fear etc.
- Routine tail docking banned in the EU (*Council Directive 2008/120/EC*)  
*‘before carrying out tail-docking other measures are to be taken to prevent tail-biting and other vices, **taking into account environment and stocking densities.** For that reason, **inadequate environmental conditions or management systems are to be changed**’*
- 99% of Irish pigs are docked





**animals**



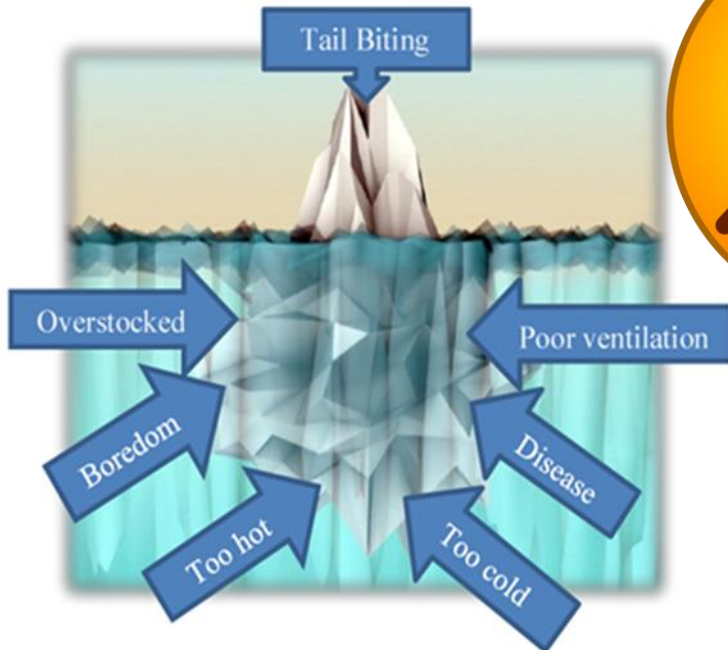
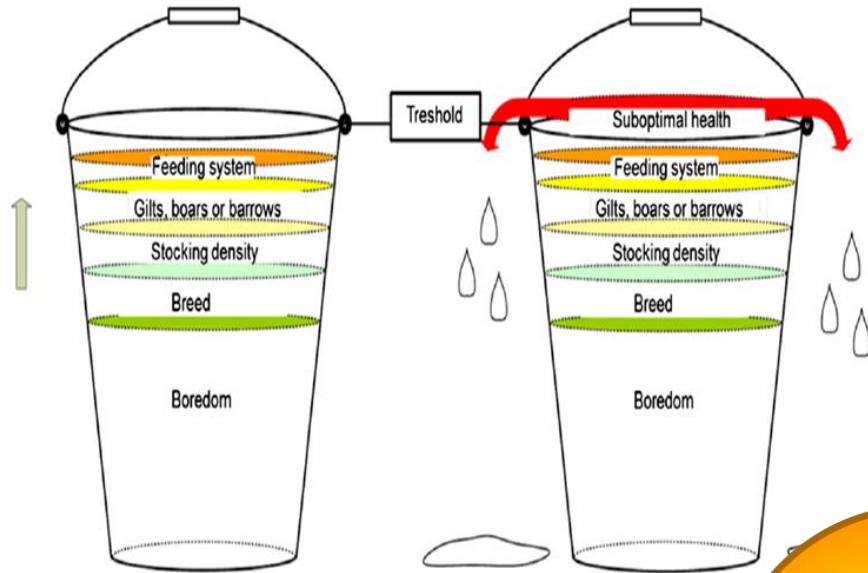


*Commentary*  
**Efforts to Ban the Routine Tail Docking of Pigs and to Give Pigs Enrichment Materials via EU Law: Where Do We Stand a Quarter of a Century on?**

Elena Nalon <sup>1,\*</sup> and Nancy De Briyne <sup>2,\*</sup>



# Challenges in addressing tail biting



# The objectives of our work



Valros and Heinonen *Porcine Health Management* 2015, 1:2  
<http://www.porcinehealthmanagement.com/content/1/1/2>



REVIEW

Open Access

## Save the pig tail

Anna Valros<sup>1\*</sup> and Mari Heinonen<sup>2</sup>

- Prevalence of tail biting
- Economic implications
- What are Irish pig producers perceptions about it?
- Identify solutions
  - Farm level
  - Slaughterhouse



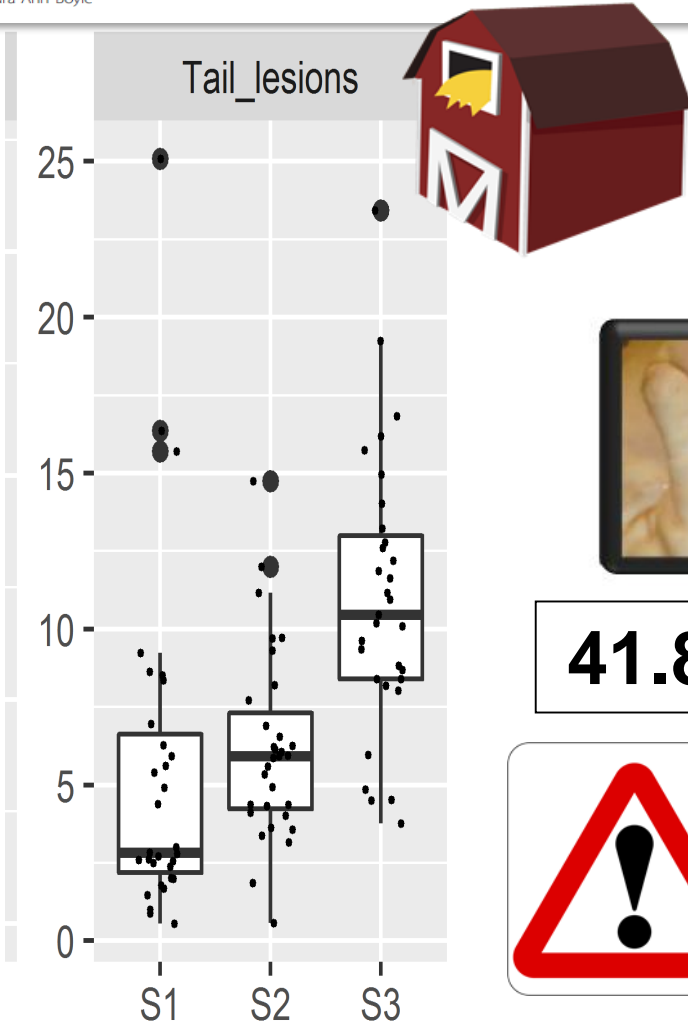
RESEARCH

Open Access



# Prevalence of welfare outcomes in the weaner and finisher stages of the production cycle on 31 Irish pig farms

Nienke van Staaveren<sup>1,2,3\*</sup>, Julia Adriana Calderón Díaz<sup>1</sup>, Edgar García Manzanilla<sup>1,2</sup>, Alison Hanlon<sup>2</sup> and Laura Ann Boyle<sup>1</sup>



## Paper

### Evaluating the prevalence of tail biting and carcase condemnations in slaughter pigs in the Republic and Northern Ireland, and the potential of abattoir meat inspection as a welfare surveillance tool

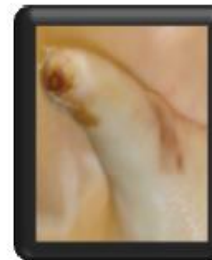
S. Harley, S. J. More, N. E. O'Connell, A. Hanlon, D. Tetxela, L. Boyle



41.8%



51.9%



5.2%



0.6%



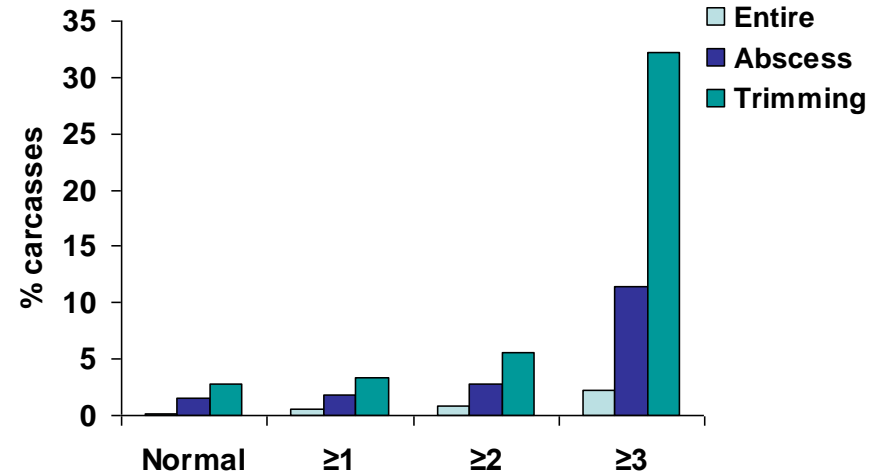
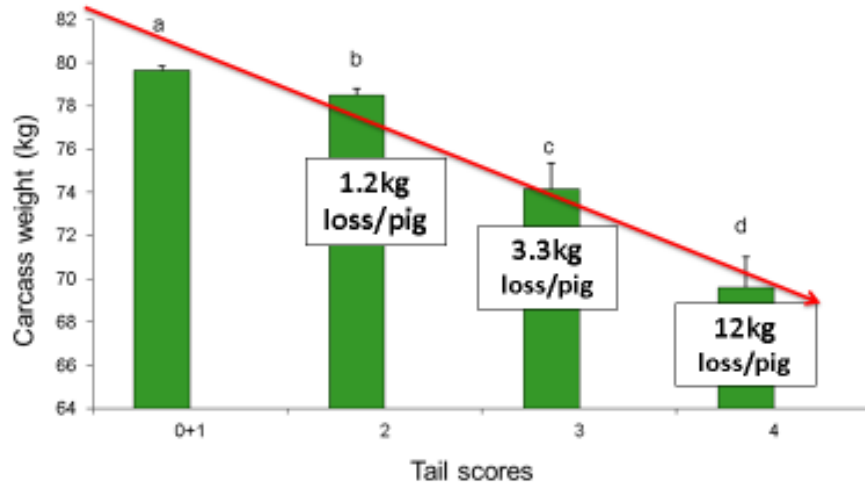
0.5%



**Docking of tails ≠ elimination of tail-biting**

## Docking the value of pigmeat? Prevalence and financial implications of welfare lesions in Irish slaughter pigs

S Harley<sup>†</sup>, LA Boyle<sup>‡</sup>, NE O'Connell<sup>§</sup>, SJ More<sup>#</sup>, DL Teixeira<sup>\*‡</sup> and A Hanlon<sup>#</sup>



2680kg of potential pigmeat was not achieved due to tail biting

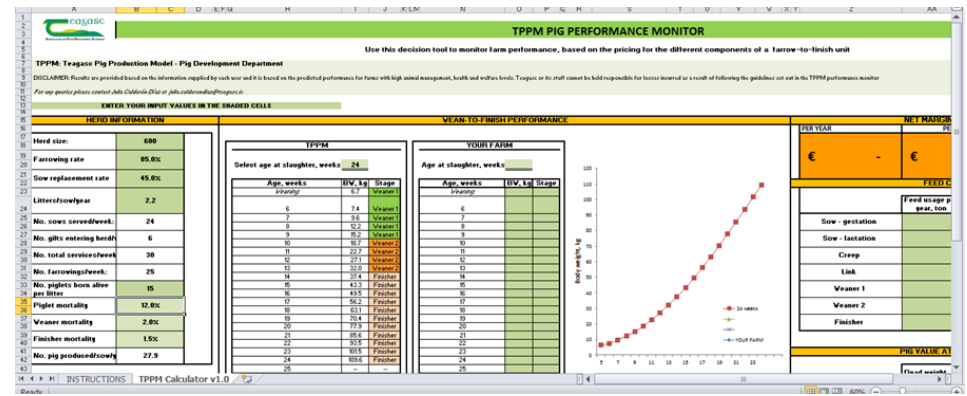
@ today's pigmeat price of €1.70/kg = €4556

or €1.33/study pig

Combined with CC (€1.40/pig) = **€2.73/pig**



# Costs of production?



- $\geq 0.86\%$  prevalence of severe tail lesions associated with a  $4.8\%$  ↓ in ADG
  - 7 extra days to reach target slaughter weight
  - 3.6% more weaner and 1.4% more finisher feed/year
  - Feed costs ↑  $1.5\%$
  - Annual farm profit ↓ by  $15.1\%$

Received: 11 July 2020 | Revised: 11 September 2020 | Accepted: 6 November 2020  
DOI: 10.1002/vetr.13

**ORIGINAL RESEARCH**

**VetRecord**

**Severe tail lesions in finisher pigs are associated with reduction in annual profit in farrow-to-finish pig farms**

Nienke van Staaveren<sup>1</sup> | Laura Ann Boyle<sup>2</sup> | Edgar García Manzanilla<sup>2,3</sup> | Keelin O'Driscoll<sup>2</sup> | Laurence Shalloo<sup>4</sup> | Julia Adriana Calderón Díaz<sup>2</sup>

## RESEARCH

## Open Access

# Irish pig farmer's perceptions and experiences of tail and ear biting



Amy Haigh<sup>1\*</sup>  and Keelin O'Driscoll<sup>2</sup>

- **96%** had tail biting on their farm
- **> 80%** considered **1-2 %** acceptable



# Enrichment



‘ensure that pigs have permanent access to a sufficient quantity of material to enable proper investigation and manipulation activities, such as **straw, hay, wood, sawdust, mushroom compost, peat or a mixture of such** (‘enrichment material’), which does not compromise the health of those animals.’

# Enrichment



RESEARCH

Open Access

## Irish pig farmer's perceptions and experiences of tail and ear biting

Amy Haigh<sup>1\*</sup> and Keelin O'Driscoll<sup>2</sup>





# Docked pigs and wood/basic enrichment



Livestock Science 213 (2018) 19–27

Contents lists available at ScienceDirect



Livestock Science

journal homepage: [www.elsevier.com/locate/livsci](http://www.elsevier.com/locate/livsci)



Use of different wood types as environmental enrichment to manage tail biting in docked pigs in a commercial fully-slatted system

Jen-Yun Chou<sup>a,b,c,\*</sup>, Rick B. D'Eath<sup>b</sup>, Dale A. Sandercock<sup>b</sup>, Natalie Waran<sup>c</sup>, Amy Haigh<sup>a</sup>, Keelin O'Driscoll<sup>a</sup>



Applied Animal Behaviour Science 224 (2020) 104944

Contents lists available at ScienceDirect



Applied Animal Behaviour Science

journal homepage: [www.elsevier.com/locate/applanim](http://www.elsevier.com/locate/applanim)



Enrichment use in finishing pigs and its relationship with damaging behaviours: Comparing three wood species and a rubber floor toy

Jen-Yun Chou<sup>a,b,c,\*</sup>, Rick B. D'Eath<sup>b</sup>, Dale A. Sandercock<sup>b</sup>, Keelin O'Driscoll<sup>a</sup>

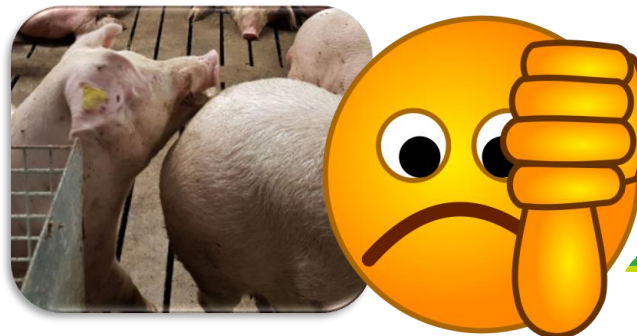


Animal, page 1 of 10 © The Animal Consortium 2019  
doi:10.1017/S1751751731119000715



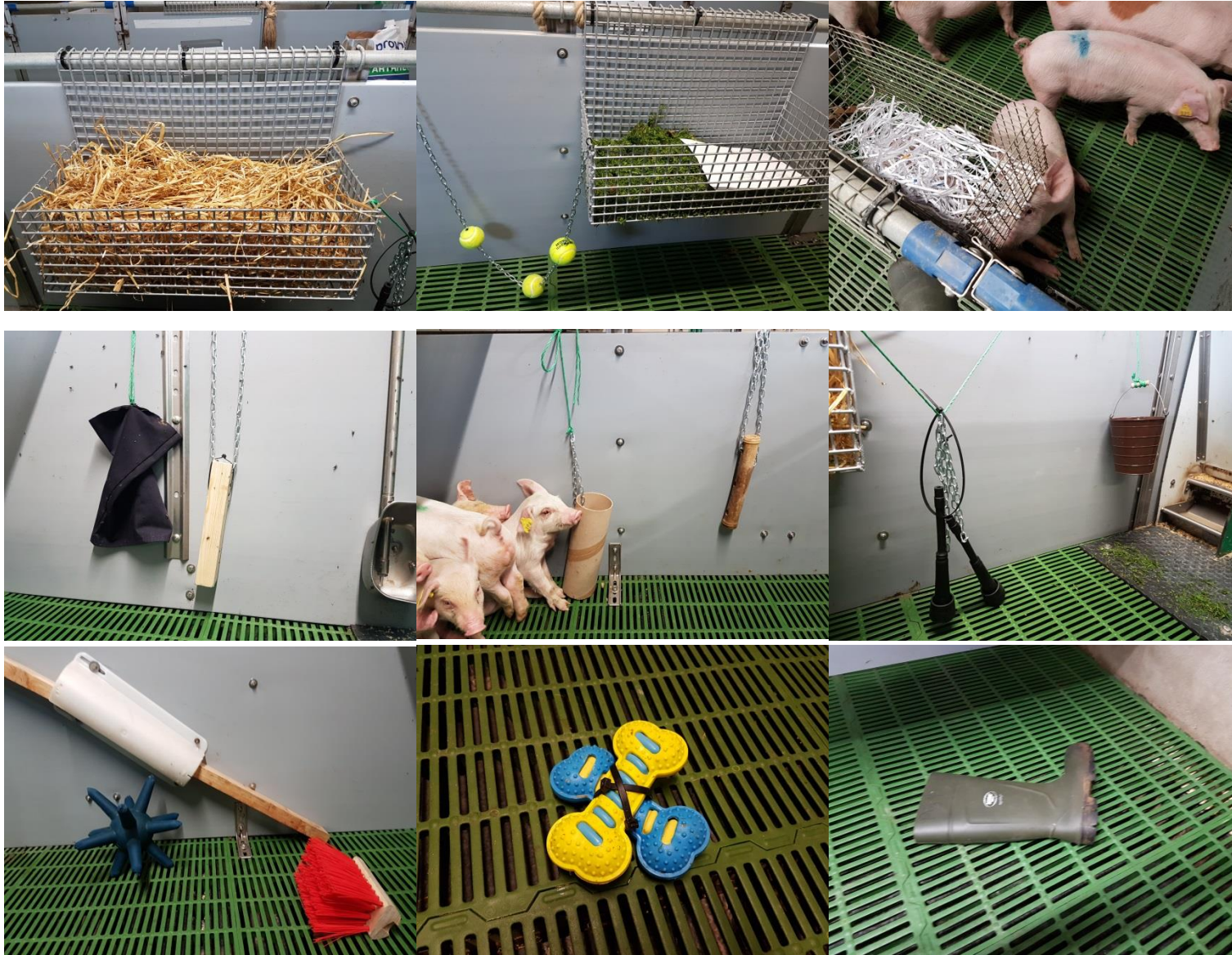
An investigation into the effectiveness of compressed straw blocks in reducing abnormal behaviour in growing pigs

A. Haigh<sup>1,a,†</sup>, J. Yun-Chou<sup>1,2,3</sup> and K. O'Driscoll<sup>1</sup>





# Slat-compatible enrichment






# Undocked pigs



Article

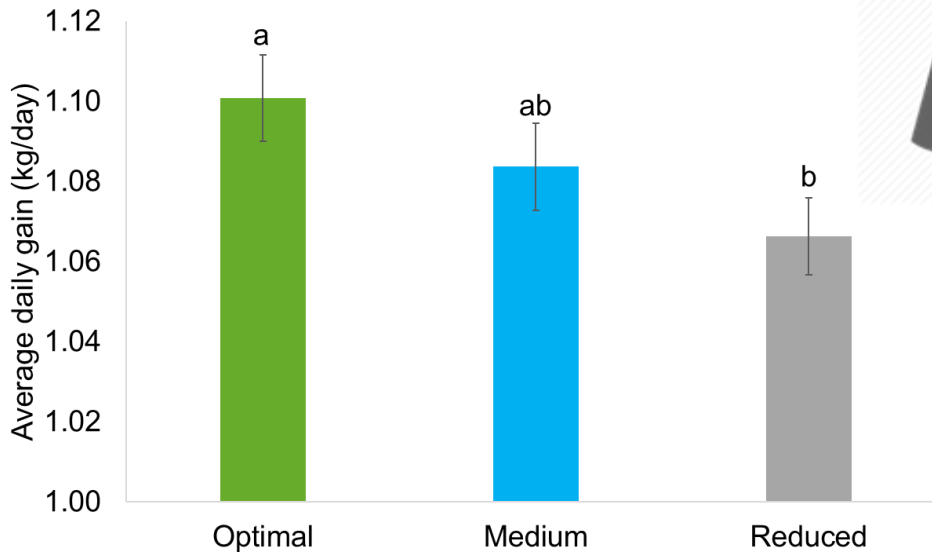
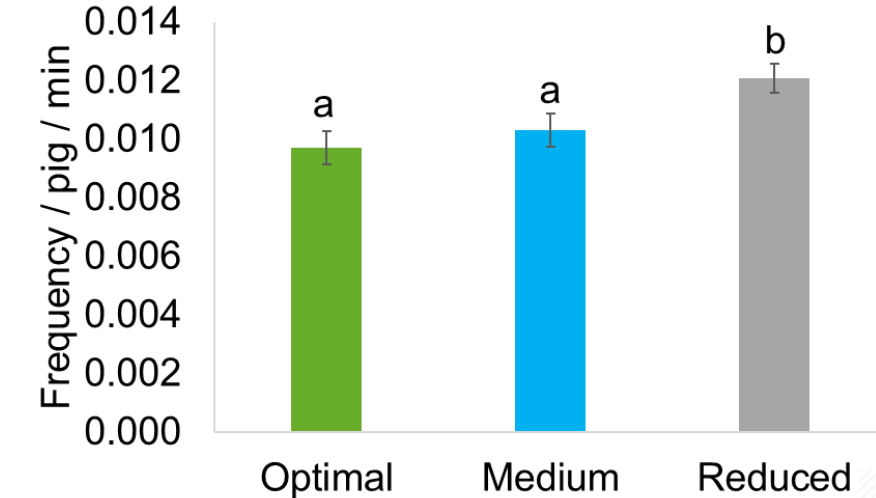
## Rearing Undocked Pigs on Fully Slatted Floors Using Multiple Types and Variations of Enrichment

Jen-Yun Chou <sup>1,2,3,\*</sup> , Constance M. V. Drique <sup>4</sup>, Dale A. Sandercock <sup>2</sup> , Rick B. D'Eath <sup>2</sup> and Keelin O'Driscoll <sup>1</sup> 





# Damaging behaviours



## A High Enrichment Replenishment Rate Reduces Damaging Behaviors and Increases Growth Rate in Undocked Pigs Kept in Fully Slatted Pens

Jen-Yun Chou<sup>1,2,3\*</sup>, Dale A. Sandercock<sup>2</sup>, Rick B. D'Eath<sup>2</sup> and Keelin O'Driscoll<sup>1</sup>

<sup>1</sup> The Development Department, Teagasc, Ireland & <sup>2</sup> Cleveland Research and Innovation Centre, Maywood, Canada, <sup>3</sup> Ireland





# Slaughterhouse solutions

Harley et al. *Irish Veterinary Journal* 2012, **65**:11  
<http://www.irishvetjournal.com/content/65/1/11>

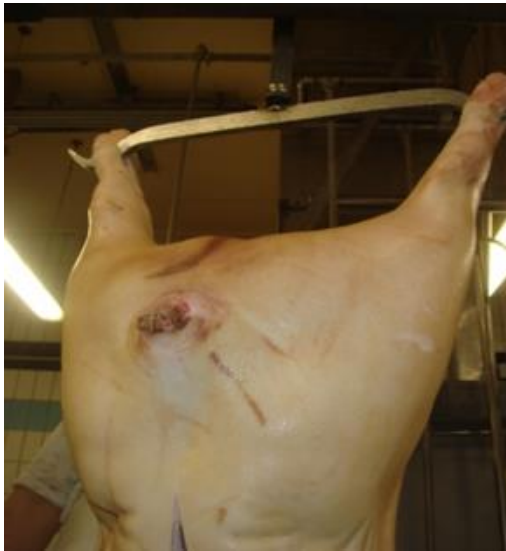


REVIEW

Open Access

Good animal welfare makes economic sense:  
potential of pig abattoir meat inspection as a  
welfare surveillance tool

Sarah Harley<sup>1\*</sup>, Simon More<sup>2</sup>, Laura Boyle<sup>3</sup>, Niamh O'Connell<sup>4</sup> and Alison Hanlon<sup>5</sup>



# Human in the loop!

Devitt et al. *Irish Veterinary Journal* (2016) 69:17  
DOI 10.1186/s13620-016-0076-3

Irish Veterinary Journal

## SHORT REPORT

Open Access



Stakeholder perspectives on the use of pig meat inspection as a health and welfare diagnostic tool in the Republic of Ireland and Northern Ireland; a SWOT analysis

C. Devitt<sup>1\*</sup>, L. Boyle<sup>2</sup>, D. L. Teixeira<sup>3</sup>, N. E. O'Connell<sup>4</sup>, M. Hawe<sup>5</sup> and A. Hanlon<sup>6</sup>

Devitt et al. *Irish Veterinary Journal* (2016) 69:2  
DOI 10.1186/s13620-015-0057-y

IRISH VETERINARY JOURNAL  
An Teidealachta Éireann

## RESEARCH

Open Access



Pig producer perspectives on the use of meat inspection as an animal health and welfare diagnostic tool in the Republic of Ireland and Northern Ireland

Catherine Devitt<sup>1\*</sup>, Laura Boyle<sup>2</sup>, D. L. Teixeira<sup>3</sup>, N. E. O'Connell<sup>4</sup>, M. Hawe<sup>5</sup> and Alison Hanlon<sup>6</sup>



Article

Multi-Stakeholder Focus Groups on Potential for Meat Inspection Data to Inform Management of Pig Health and Welfare on Farm

Nienke van Staaveren<sup>1</sup>, Bernadette Doyle<sup>2</sup>, Alison Hanlon<sup>3</sup> and Laura A. Boyle<sup>2,4,\*</sup>



# Slaughterhouse solutions



Animal (2016), 10:3, pp 460–467 © The Animal Consortium 2015  
doi:10.1017/S1751731115002037



## Effects of scalding and dehairing of pig carcasses at abattoirs on the visibility of welfare-related lesions

G. A. Carroll<sup>1</sup>\*, L. A. Boyle<sup>2</sup>, D. L. Teixeira<sup>2,3</sup>, N. van Staaveren<sup>2,3</sup>, A. Hanlon<sup>3</sup> and N. E. O'Connell<sup>1</sup>

<sup>1</sup>Institute for Global Food Security, Northern Ireland Technology Centre, Queens University Belfast, Malone Road, Belfast BT9 5HN, UK; <sup>2</sup>Animal & Grassland Research and Innovation Centre, Teagasc Moorepark, Fermoy, Co. Cork, Republic of Ireland; <sup>3</sup>School of Veterinary Medicine, University College Dublin, Belfield, Dublin 4, Republic of Ireland

Livestock Science 214 (2018) 98–105



Contents lists available at ScienceDirect

Livestock Science

journal homepage: [www.elsevier.com/locate/livsci](http://www.elsevier.com/locate/livsci)



What can carcass-based assessments tell us about the lifetime welfare status of pigs?

G.A. Carroll<sup>a,\*</sup>, L.A. Boyle<sup>b</sup>, A. Hanlon<sup>c</sup>, L. Collins<sup>d</sup>, K. Griffin<sup>e</sup>, M. Friel<sup>e</sup>, D. Armstrong<sup>f</sup>, N.E. O'Connell<sup>g</sup>

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doi:10.1017/S1751731116001117



## Pig carcass tail lesions: the influence of record keeping through an advisory service and the relationship with farm performance parameters

N. van Staaveren<sup>1,2†</sup>, D. L. Teixeira<sup>1a</sup>, A. Hanlon<sup>2</sup> and L. A. Boyle<sup>1</sup>

Preventive Veterinary Medicine 127 (2016) 21–26



Contents lists available at ScienceDirect

Preventive Veterinary Medicine

journal homepage: [www.elsevier.com/locate/prevetmed](http://www.elsevier.com/locate/prevetmed)



Relationship between tail lesions and lung health in slaughter pigs

Nienke van Staaveren<sup>a,b,\*</sup>, Ana P. Vale<sup>b</sup>, Edgar G. Manzanilla<sup>a</sup>, Dayane L. Teixeira<sup>a,1</sup>, Finola C. Leonard<sup>b</sup>, Alison Hanlon<sup>b</sup>, Laura A. Boyle<sup>a</sup>

<sup>a</sup>Pig Development Department, Teagasc Animal and Grassland Research and Innovation Centre, Moorepark, Fermoy, County Cork, Ireland  
<sup>b</sup>School of Veterinary Medicine, University College Dublin, Belfield, Dublin, Ireland



frontiers  
in Veterinary Science

ORIGINAL RESEARCH  
published: 14 March 2016  
doi: 10.3389/fvets.2016.00024



## Study on the Association between Tail Lesion Score, Cold Carcass Weight, and Viscera Condemnations in Slaughter Pigs

Dayane Lemos Teixeira<sup>1,2\*</sup>, Sarah Harley<sup>2</sup>, Alison Hanlon<sup>2</sup>, Niamh Elizabeth O'Connell<sup>2</sup>, Simon John More<sup>2</sup>, Edgar Garcia Manzanilla<sup>1</sup> and Laura Ann Boyle<sup>1</sup>

PLOS ONE

RESEARCH ARTICLE

## The Effect of Mixing Entire Male Pigs Prior to Transport to Slaughter on Behaviour, Welfare and Carcass Lesions

Nienke van Staaveren<sup>1,2\*</sup>, Dayane Lemos Teixeira<sup>1</sup>, Alison Hanlon<sup>2</sup>, Laura Ann Boyle<sup>1</sup>

<sup>1</sup> Pig Development Department, Teagasc Animal and Grassland Research and Innovation Centre, Moorepark, Fermoy, Co. Cork, Ireland; <sup>2</sup> School of Veterinary Medicine, University College Dublin, Belfield, Dublin, Ireland





# Validation of carcass lesions as indicators for on-farm health and welfare of pigs<sup>1</sup>

N. van Staaveren,<sup>\*†‡</sup> B. Doyle,<sup>\*</sup> E. G. Manzanilla,<sup>\*</sup> J. A. Calderón Díaz,<sup>\*‡</sup> A. Hanlon,<sup>†</sup> and L. A. Boyle<sup>\*</sup>

<sup>\*</sup>Pig Development Department, Teagasc Animal and Grassland Research and Innovation Centre, Moorepark, Fermoy, Co. Cork, P61 C996, Ireland; <sup>†</sup>School of Veterinary Medicine, University College Dublin, Belfield, Dublin, D04 W6F6, Ireland; <sup>‡</sup>Department of Animal Behaviour and Welfare, Institute of Genetics and Animal Breeding, Polish Academy of Sciences, ul. Postępu 36A, Jastrzębiec, 05-552 Magdalenka, Poland

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J. Anim. Sci. 2017.95:1528–1536  
doi:10.2527/jas2016.1180

**Table 5.** Performance [area under the curve (AUC) and 95% CI], sensitivity (Se) and specificity (Sp) at the optimal cut-off value of carcass lesions used to predict the presence of problem farms where the prevalence of the welfare outcome on farm exceeded the 75th percentile of the study farms (poor body condition in the first weaner stage, bursitis in the second weaner stage, huddling in the first weaner stage, severe tail lesions in the finisher stage and frequency of coughing in the second weaner stage)

Welfare outcome	AUC (95% CI)	Se, %	Sp, %	Optimal cut-off value, %
Poor body condition	0.80 (0.58 to 1.00)	75	87	62.4 Tail score 1
Bursitis	0.82 (0.67 to 0.97)	100	70	14.3 Skin score 2
Huddling	0.61 (0.40 to 0.83) <sup>1</sup>	88	61	49.1 Skin score 1
Severe tail lesions	0.81 (0.62 to 1.00)	88	74	0.98 Tail score ≥ 3
Coughing/pig	0.71 (0.45 to 0.96) <sup>1</sup>	100	50	44.0 Skin score 1

<sup>1</sup>Area under the curve (AUC) was not significantly ( $P > 0.05$ ) higher than 0.5





# What did we learn in past 10 years?

- Tail biting highly prevalent and costly problem in Ireland
- Farmers underestimate the impact of tail biting/lesions
- Challenge of fully slatted flooring but can be overcome
- Optimal enrichment regimes for slatted systems but costly and labour intensive
- Carcass tail lesions are iceberg indicators of pig welfare on farm
- Feedback to producers of findings on carcass tail lesions can inform herd health and welfare management plans and thereby ↓ tail biting
- Potential for huge benefits to pig welfare

# Thank you!



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