

Addressing lameness in group housed sows

L. Boyle¹, A. Quinn^{1,2}, J. Calderón-Díaz^{1,3}, P. Lawlor¹, A. Fahey³, L. Green², A. KilBride²

¹ *Pig Development Dept., Teagasc Animal and Grassland Research and Innovation Centre, Moorepark, Fermoy, Co. Cork, Ireland*

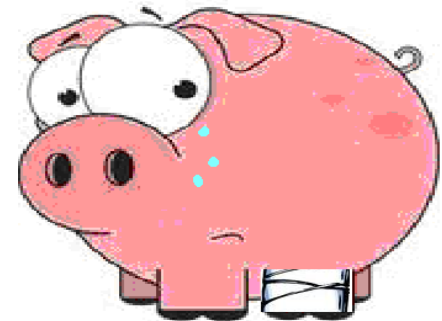
² *School of Life Sciences, University of Warwick, Coventry, CV4 7AL, UK*

³ *School of Agriculture and Food Science, University College Dublin, Belfield, Dublin 4, Ireland*



The problem of lameness in sows

- Lameness is a major production disease
- 2nd most important reason for culling (*Anil et al., 2005*)
- 32% of animals culled for lameness have only produced one litter (*Boyle et al., 1998*)
- Replacement rate = 50% (*Irish PigSys data*)
- Welfare problem
 - Pain/discomfort
 - Reduced mobility
 - Difficulty competing for resources



Claw lesions

- Highly prevalent: 100% of sows affected
- Account for 5 to 20% of sow lameness



Toe
overgrowth

Heel
overgrowth/
erosion

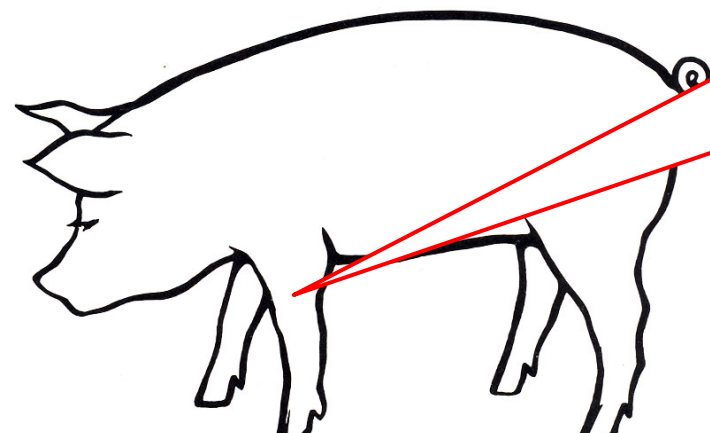
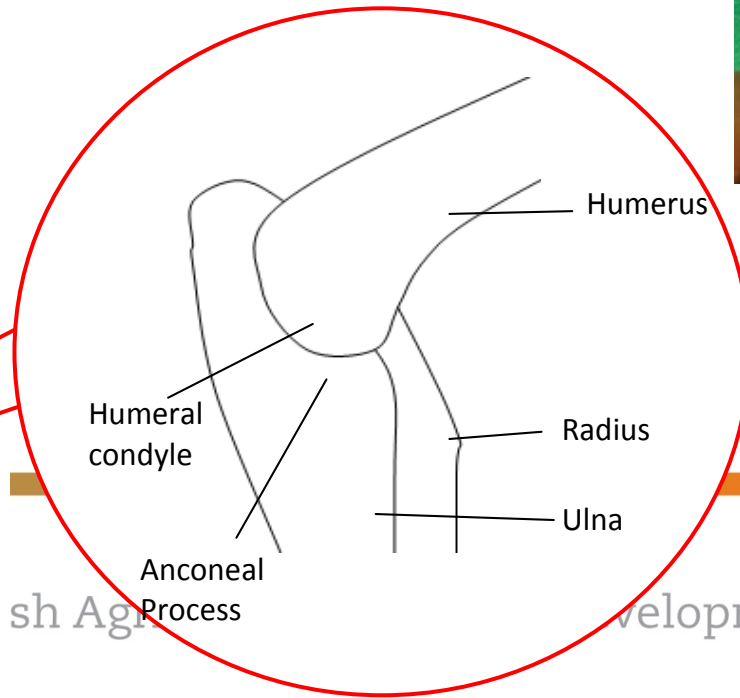
White line
disease

Heel-sole crack
Dew claw
injuries

Score 0 = normal to 3 = severe injury (FeetFirst™ – Zinpro Corp.)

Osteochondrosis

- Main contributor to leg weakness/lameness in pigs
- **Non-infectious** disease of the **joint surface**; resulting in **deterioration** of quality of **cartilage** & underlying **bone**
- Increased pressure on the joint surface
- Risk factors:
 - High growth rate
 - Joint stress



Locomotion/lameness scoring



Scored as *per Main et al., 2000*

0 = Normal

1 = Pig appears stiff

2 = Shortened stride

3 = No weight bearing on affected limb

4 = Affected limb elevated off floor

5 = Pig does not move

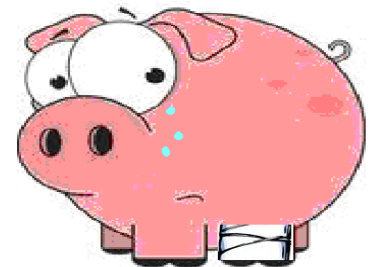
Categorised as lame as
~~per~~ **KilBride et al. (2009)**

Lame

Objectives

To evaluate risk factors for lameness in sows and to establish nutritional and environmental means of addressing lameness

- Improve nutrition of replacement gilts to reduce lameness/increase longevity
- Improve flooring to reduce injury and improve comfort



Lameness in stall vs. group housed sows



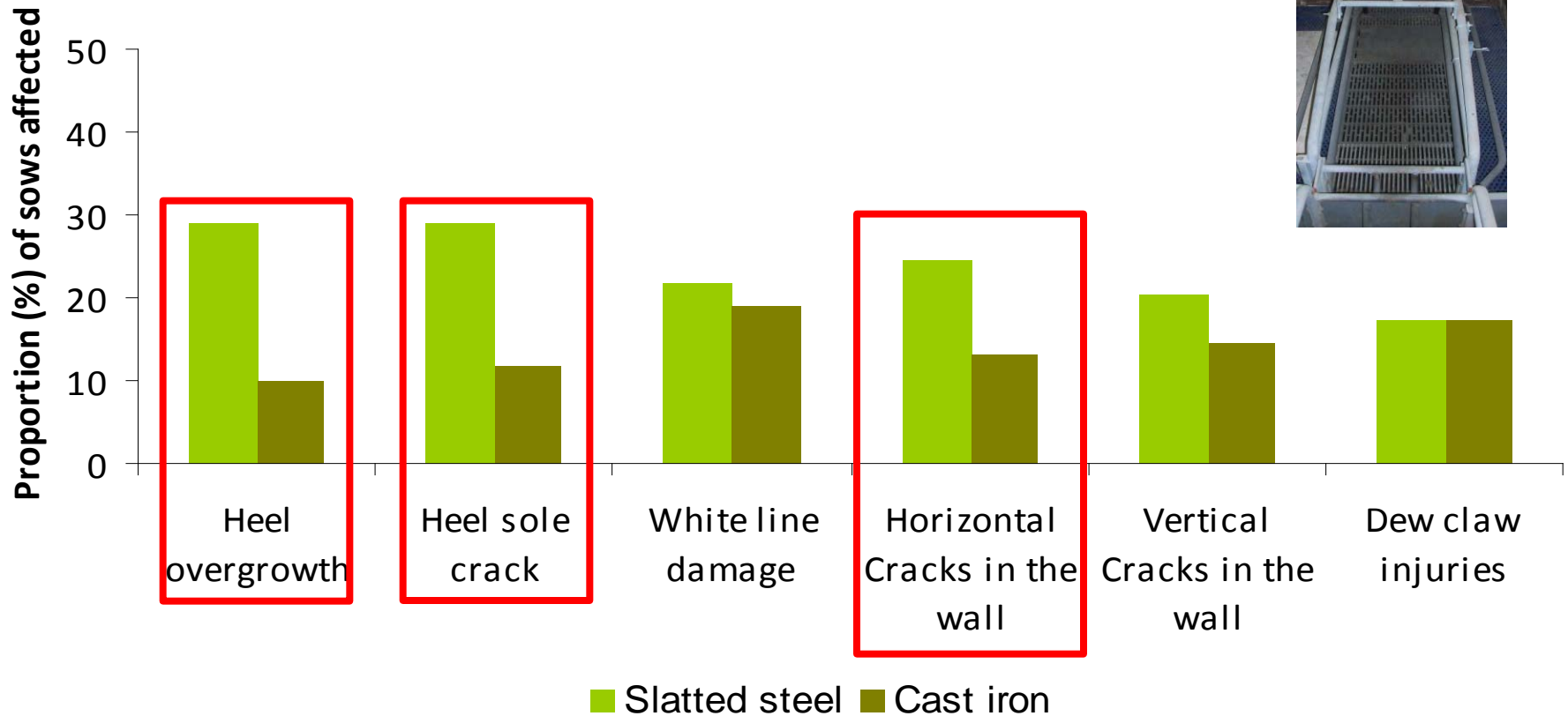
Compared lameness scores at transfer to the farrowing house (d110)

Score	Odds ratios	95% CI
0.1	0.42	0.067 - 0.439

Lameness score	Group housing		Gestation stalls	
0	0		5	
1	11		23	
2	19	74%	11	33%
≥3	13		3	

Lameness is likely to become a bigger problem now that sows are group housed

Claw lesions recorded in sows on slatted steel or cast iron floors in the farrowing crate

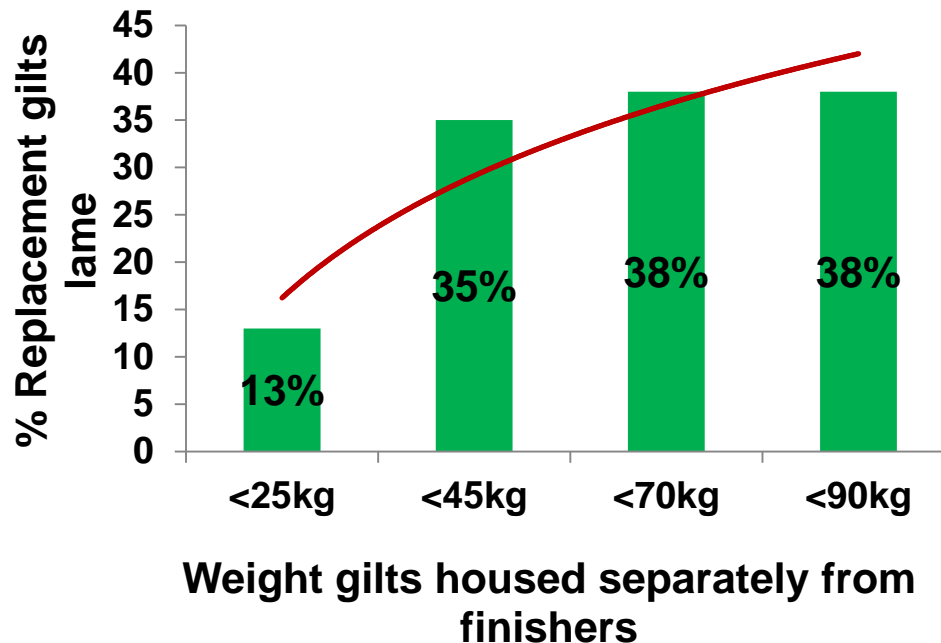


Slatted steel (Tribar type) flooring detrimental to claw health irrespective of way sows housed during gestation

Calderon Diaz et al. submitted to JAS

Lameness survey: Risk factors for lameness

- Visits and questionnaires to 68 pig farms
- +10,000 pigs inspected (including 525 replacement gilts)



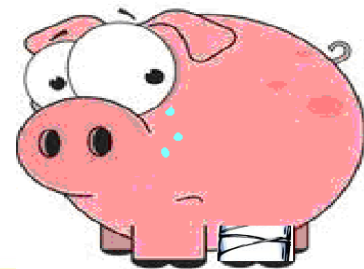
The earlier replacement gilts were housed/fed differently to the finisher pigs the less likely they were to be lame

Management of replacement gilts

- Strategies practised on Irish farms
 1. House and feed gilts as finisher stock up to service
 2. House/feed as finishers up to 100kg; then gestating sow diet
- Replacement gilt: Bone development & fat deposition NB

“Developer” diets

- Gradual weight gain: energy:lysine (OCD)
- Bone development: Ca:P (BMD)
- Claw strength: Zn, Cu & Mn



Materials and methods

- 36 Large White X Landrace gilts at ~65kg
- Housed individually
- 3 dietary treatments:
 1. Developer
 2. Finisher
 3. Gestating sow
- Carried out over 12 weeks until c. 140kg

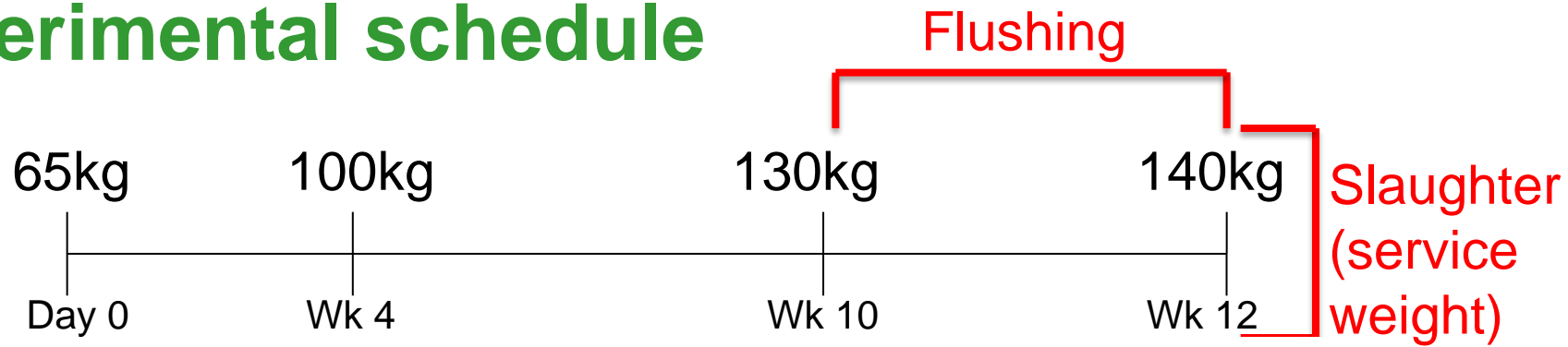


Diets fed to replacement gilts from 65 to 140kg

<i>Chemical composition</i>	Developer	Finisher	Gestating sow
Digestible energy (MJ of DE/kg)	14.0	13.5	13.0
Lysine (g/kg)	7.0	9.8	6.4
Calcium (g/kg)	7.6	6.1	7.0
Phosphorous (g/kg)	5.0	3.7	4.6
Digestible phosphorus (g/kg)	3.3	2.4	3.2

- Developer diet Avalia sow[®] inclusion @ 850g/tonne

Experimental schedule

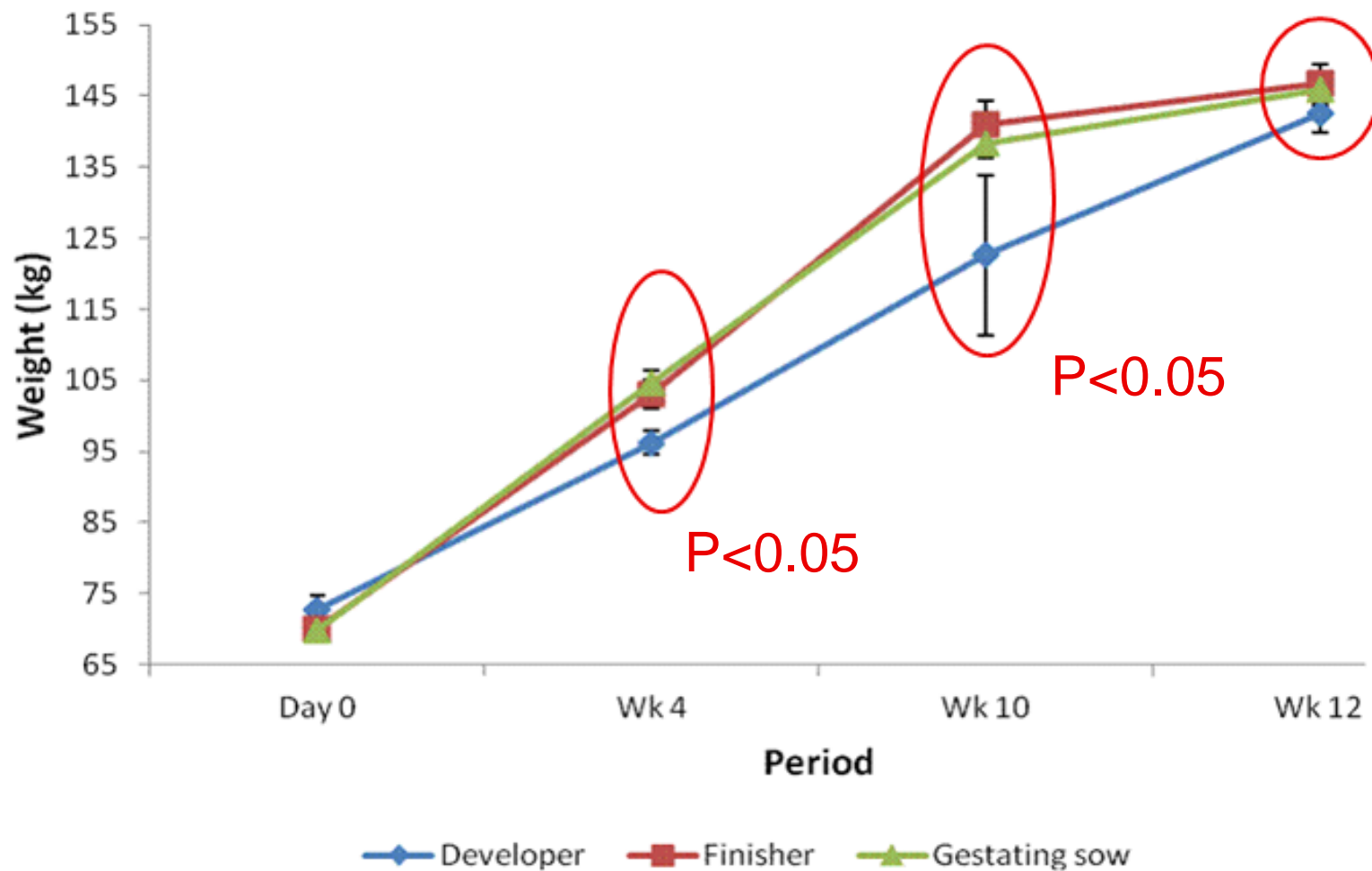


Lameness

	Developer ¹	Finisher		Pregnant sow	
	OR	OR	95% CI	OR	95% CI
Wk 1-4	1	2.68	0.01, 7.11	7.71	0.97, 16.99
Wk 5-8	1 ^a	3.25 ^b	0.40, 5.95	4.56 ^c	1.40, 14.86 P<0.05
Wk 9-12	1 ^a	3.65 ^b	0.15, 5.44	3.78 ^c	0.28, 6.38 P<0.05

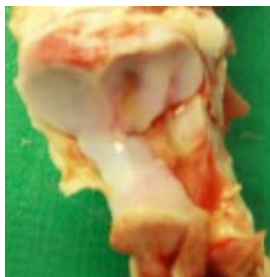
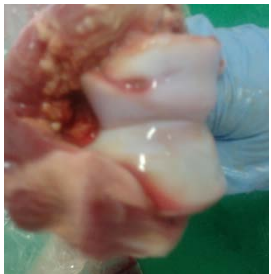
¹Developer is reference category, OR = Odds ratio CI = Confidence interval

Body weight




Joint lesions

	Developer		Finisher		Pregnant sow	
	OR	OR	95% CI	OR	95% CI	
Humeral Condyle	1 ^a	11.6 ^b	0.60, 18.30	9.52 ^c	0.46, 14.05	P<0.05
Anconeal Process	1	3.2	-0.62, 2.94	1.68	-1.13, 2.17	



- No effect of dietary regime on claw lesions (P>0.05)

Claw lesions in group housed gilts fed a developer diet *ad libitum*

	Developer		Finisher		Gestating sow		
	Wk	OR	OR	95% CI	OR	95% CI	
Claw lesions	6	1	1.12	0.41, 3.12	1.38	0.52, 3.64	
	12	1 ^a	3.15 ^b	2.27, 6.80	3.91 ^c	1.51, 10.14	P<0.05

- No effect of dietary regime on joint lesions but developer diet not associated with slower growth rate (P>0.05)



Conclusions

- Restricted feeding of a developer diet reduced joint lesions - slower growth rate?
- Claw lesions reduced – mineral supplementation?
- Feeding a developer diet from 65kg reduced lameness in replacement gilts
- Need to study individual components of developer diet & long term impact on reprod. performance/longevity

Concrete slatted flooring in group housing



- Major risk factor for lameness (*KilBride et al., 2009*)
- Labour/cost, availability, hygiene issues with straw
- Growing interest in rubber flooring for pigs
- More yielding/compressible and lower thermal conductivity than concrete (*Boe et al., 2007; Platz et al, 2008*)
- Greater area of contact between claw and floor (*Flower et al., 2007*) and protective → fewer claw lesions

Longitudinal study of the effect of rubber slat mats on indicators of sow welfare and lameness



- 2000 sow commercial herd
- 160 replacement gilts → 2 parities
- Oct. '10 – Mar. '12



Rubber; n=80 gilts



Concrete; n=80 gilts

Calderon-Diaz et al., 2013. JAS 19: 1-15

Risk associated with lameness and claw lesions in sows on rubber vs. concrete slats during two parities

Variable	Parity 1		Parity 2	
	OR ¹	CI ²	OR	CI
<i>Reference category: concrete flooring</i>				
Lameness	0.32 ^a	0.21-0.50	0.56 ^a	0.35-0.91
Toe overgrowth	3.81 ^a	1.17-9.28	3.17 ^a	1.34-7.47
Dew claw overgrowth	1.05	0.34-3.26	1.60	0.64-4.01
Heel overgrowth/erosion	1.21	0.58-2.54	0.99	0.45-2.21
Heel sole crack	6.77 ^a	1.95-23.49	6.68 ^a	2.99-14.92
White line damage	3.01	0.72-12.52	4.85 ^a	1.73-13.54
Cracs in the wall	3.18 ^a	1.52-6.64	0.78	0.32-1.88
Dew claw injuries	1.48	0.43-5.02	0.74	0.32-1.71

Protective benefit of rubber on limb lesions (calluses
 ↓wounds and swellings P<0.05)

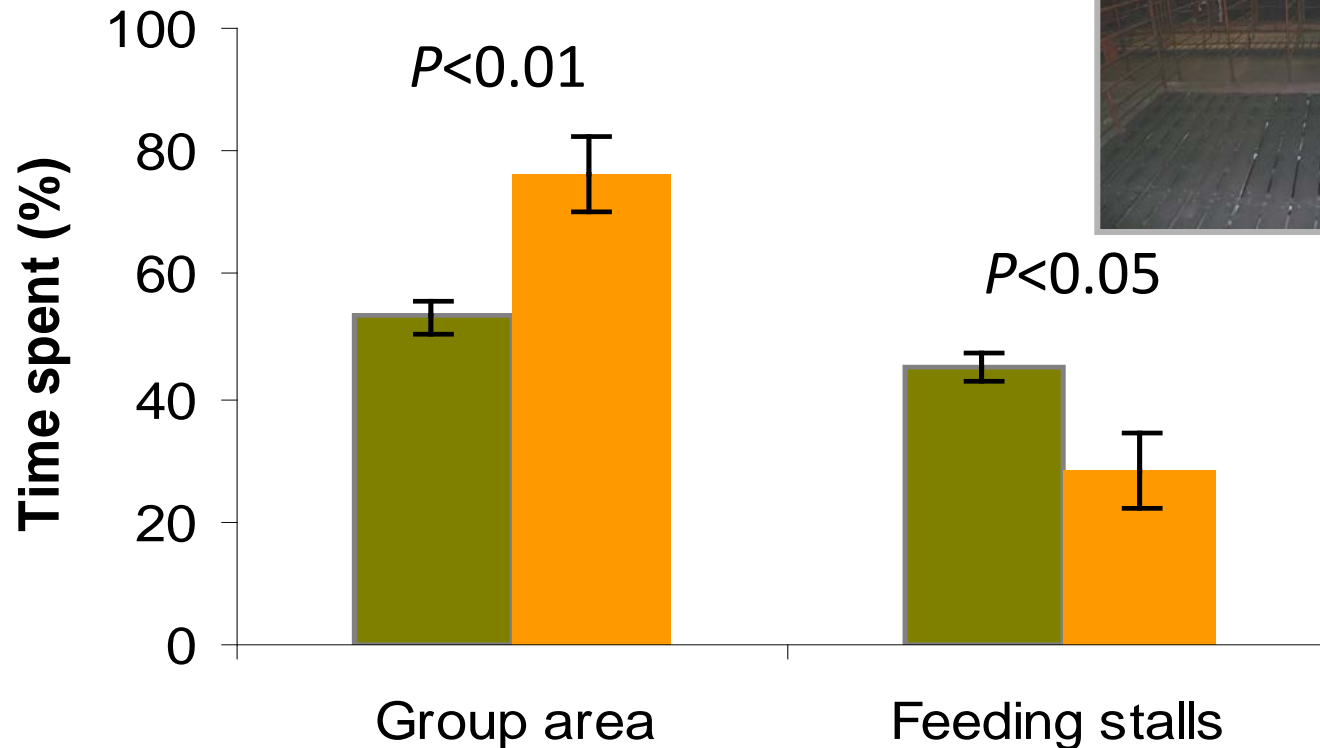


Dirtiness of sows

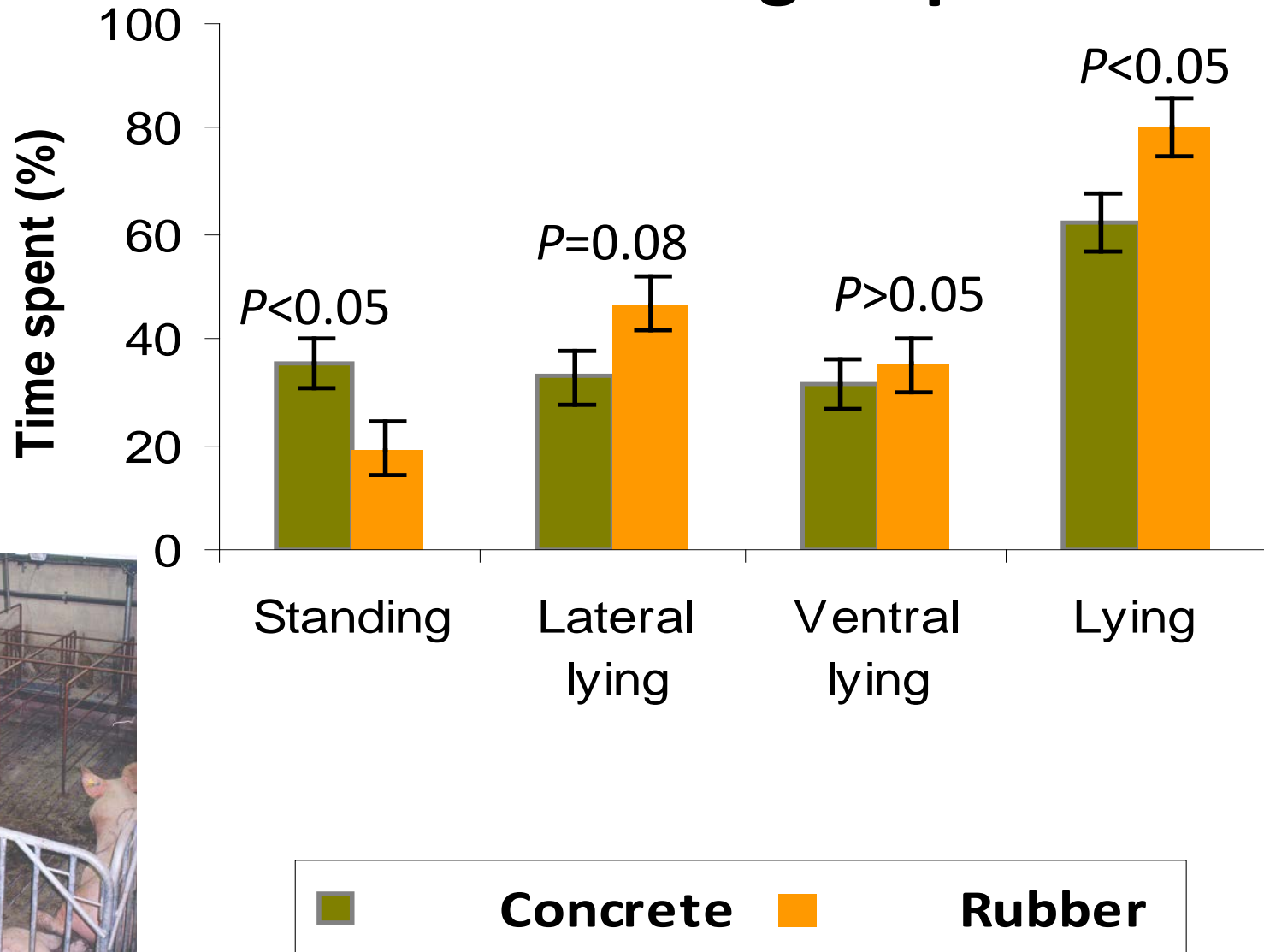
No effect of floor ($P > 0.05$)

Dirtiness of pen: Rubber floors were more soiled ($P < 0.05$)

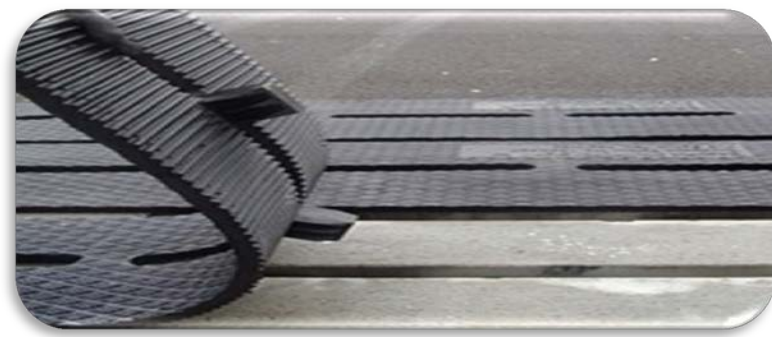
Effect of rubber flooring on the time (%) spent in different pen locations



Effect of rubber flooring on postural behaviour in the group area



Conclusions



- Rubber flooring reduces lameness in group housed sows
- Mediated by better comfort while lying/posture changing rather than by protection of the foot from the floor
- Caution re. lack of abrasion of claws, potential for dirtiness and heat stress with rubber flooring!

Overall conclusions



- Lameness is a major threat to the sustainability of group housing systems operated in the absence of bedding
- Lameness can be addressed by
 - Improving sow comfort and offering protection to the feet/skin from the floor (e.g. rubber slat mats)
 - Improving the nutritional management and housing of replacement gilts during rearing

Acknowledgements



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A photograph of several pink pigs in a farm enclosure. The pigs are standing on a dark, textured floor. In the background, there are metal railings and a concrete wall. The lighting is somewhat dim, typical of an indoor farm setting. The text "Thank you!" is overlaid in white, bold font in the lower-left quadrant of the image.

Thank you!