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## ASSESSMENT AND ALLEVIATION OF PAIN IN PIG PRODUCTION

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### The brief for this talk

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- What links:
  - Castration
  - Tail docking
  - Gastric ulcers



**PAIN**

# What do pigs need for good welfare? The Five Freedoms

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Freedom from hunger  
& thirst

Freedom from thermal &  
physical discomfort

Freedom from pain,  
injury & disease

Freedom from fear  
& distress



**DETECTION**  
**ASSESSMENT**  
**PREVENTION**  
**ALLEVIATION**

Freedom to express  
most normal behaviour

## Causes of pain in pig production

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- Painful procedures carried out deliberately for management reasons:
  - Castration
  - Tail docking
  - Tooth reduction
  - Nose ringing
  - Identification – tagging, tattooing, notching, implants
- Spontaneous health disorders:
  - Acute injuries and infections – lesions, mastitis
  - Chronic conditions – OCD, pneumonia, gastric ulceration

## Castration

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Historically (and often currently):  
A surgical procedure carried out on young piglets with no pain relief



## Does Castration Cause Pain?

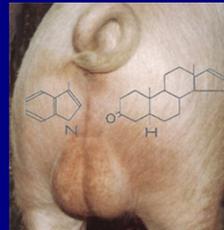
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- **YES!** – the evidence:
  - Vocalisation
  - Struggle
  - Elevated cortisol, ACTH, lactate
  - Pain behaviours post castration
  - Changes in time budget post castration



## Do benefits justify the procedure ?

- Benefits for humans
  - Mean quality
  - Production economics



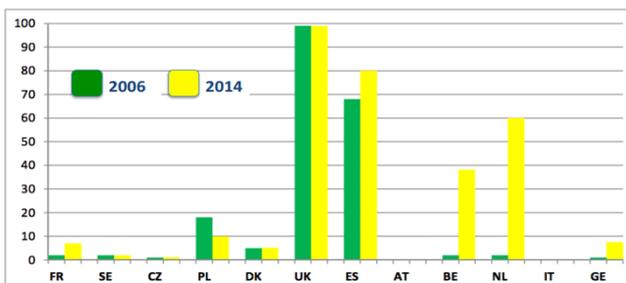
- Benefits for the pigs?
  - Reduced aggression and riding behaviour at puberty



## Is castration necessary?

- Not all countries now think so:

Non-castrated male pigs breakdown as of 2014



Source: 2006 data from PIGCAS, 2014 data based on best professional judgement country experts and members of the Expert group.<sup>3</sup>

Backus et al., 2014

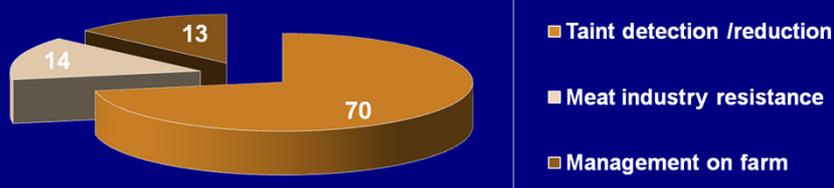
## 2010 European Declaration on alternatives to surgical castration of pigs

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- A voluntary agreement between all stakeholders
  - From 1 January 2012:
    - no surgical castration without pain relief
  - From 1 January 2018:
    - surgical castration abolished

## What is the first limiting factor to current adoption of entire males?

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PIGCAS Project  
Expert Workshop 2008

## Can we solve these problems?

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- Reduced taint risk:

- Genetic selection for low taint lines
- Diet modification to reduce taint compounds



- Automated taint detection:

- Electronic nose
- Novel in-abattoir systems



## Castration may sometimes still be necessary

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- Entire male systems may not be ready by 2018
- In some systems they may never be possible
  - Heavy pigs
  - Traditional breeds



## Options for castration

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- Surgical castration with pain relief
  - anaesthesia
  - analgesia



- Immunocastration
  - licenced product available
  - efficacy proven
  - concerns about consumer acceptability



Both violate the ethical principle of animal integrity

## Tail docking

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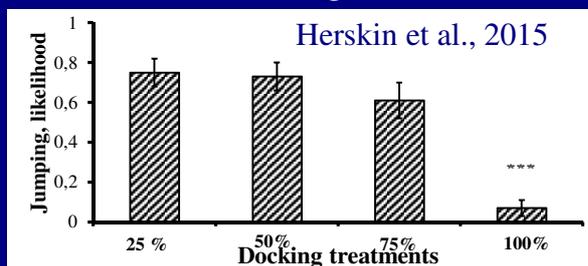
Historically (and often currently):  
A surgical procedure carried out on young piglets with no pain relief



## Does Tail docking Cause Pain?

- **Less consensus:**

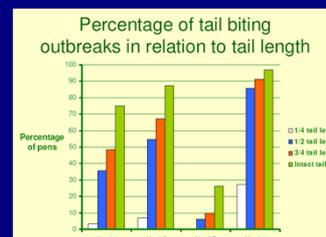
- Many farmers believe not (or only insignificant)
- Stress physiology measures not always elevated above handling stress



BUT detailed behavioural study suggests **YES**

## Do benefits justify the procedure ?

- Benefits for the pigs
  - Reduction in tail biting risk
- Benefits for humans
  - Production economics



Thodberg et al (2010)

# Quantifying the welfare balance

- For being tail docking vs. being tail bitten

“exposure assessment”:

no of animals involved x risk of harm occurring

“hazard characterisation”:

degree of pain and distress if harm occurs



The answer depends on understanding the severity and duration of pain experienced

acute pain of injury

inflammatory pain

chronic pain from damaged nerves

## Assessing pain ([www.farewelldock.eu](http://www.farewelldock.eu))



### Behavioural Assessment

- General behaviours
- Pain faces/expression



Lonardi et al, 2013

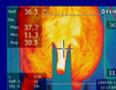
### Nociceptive assessment

- Von Frey filament
- Pressure algometer (PAM)



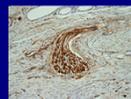
### Physiological assessment

- Stress hormones
- Thermography



### Post mortem tissue analysis

- Histology (tails)
- Gene/protein expression (tails/spinal cord/dorsal root ganglia)



ATF3 (peripheral nerve damage)  
CGRP (inflammatory pain)  
GRIN2B (chronic pain processing)

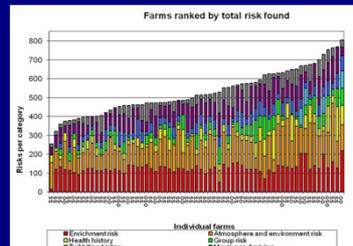


## Can we solve the problem in other ways?

- Tail biting has a multifactorial causation

Review of scientific and technical literature yielded >100 different current and developmental causal factors

- Genetics
- Nutrition
- Climate
- Health
- Social competition
- Lack of functional enrichment



Max possible risk = 2085

- Most farms have some risk present

## How can progress be made?

- Reducing risk factors on farm

- HAT = spreadsheet decision support tool (Taylor et al, 2012)
- SchwIP (Dippel et al – poster at this meeting)

- Selecting for reduced tail biting predisposition

- heritability=0.27 (Breuer et al, 2005)

- Developing automated early warning of outbreaks

- Behavioural changes precede clinical outbreaks

- Developing pharmacological outbreak-control products

- Brain serotonin linked to biting



G.Rudolph

## Which are the real pain problems?

- Pain from management procedures (mutilations)

- Primarily acute
- Predictable in time
- Amenable to planned pain control interventions



- Pain from health conditions

- Often chronic
- Unpredictable in time
- Difficult to detect and quantify



## Oesophago-gastric Ulcers



Damage to the stomach lining with different degrees of severity

- No damage

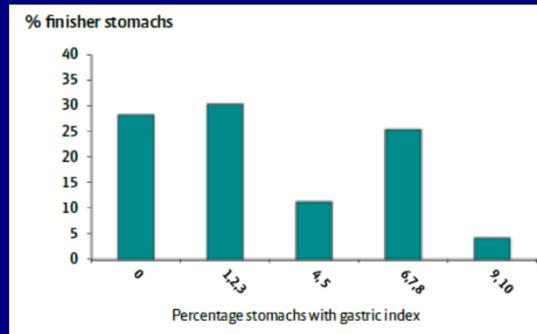


- Thickening and staining



- Erosion and bleeding

## How big a problem are they?



Gastric index	
0	Normal stomach
1-3	Cornification of the gastric mucous membrane
4-5	Superficial damages to mucous membrane
6-8	Ulcers or scars from previous ulcers
9-10	Oesophageal stricture

30% of finishing pigs have score of >6

51% of cull sows have score of >6

Danish Pig Research Centre Reports

## Do gastric ulcers cause pain?

- **We do not know!**
  - Acutely painful in humans, so by analogy it is likely that they do
  - Only pigs with more severe ulcers (Score >6) show reduced growth rate

## The challenge of understanding ulcers

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- We cannot easily measure severity in the live pig
  - They are normally measured at the abattoir
  - **BUT**: we know they can change quickly
  - exacerbated by feed withdrawal
  - exacerbated by transport stress

How well do abattoir data reflect farm practice?

## Production practices affect Gastric Ulcers (0-5 scale of severity)

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Housing	SLATS		STRAW		Signif	
	DRY PELLET	LIQUID	DRY PELLET	LIQUID	H	F
TRIAL 1	3.2	1.7	2.8	0.9	**	***
TRIAL 2		2.7		1.6	***	
TRIAL 3		1.5		0.7	***	
TRIAL 4		1.7		0.9	**	



(Scott et al, 2005)

## What are the risk factors for gastric ulcers?

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- **Feed type**
  - Finely ground feeds
  - Pelleted feeds
  - High wheat inclusion
  - Low fibre
  - Deficiencies: Vit E, Se, Zn
  - Excesses: Fe, Ca
- **Housing**
  - Slatted systems
- **Social stress**
  - Mixing
  - High stocking density
- **Feeding interval?**
- **Health**
- **Genetic predisposition**

## How can progress be made?

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- **Reducing risk factors on farm**
  - Decision support tool for risk identification
  - Quantifying the trade off of low risk diets with feed efficiency
- **Developing diagnostics and therapies**
  - When are interventions required and what forms are effective
- **Selecting for reduced ulcer predisposition?**

## Conclusions

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1. The occurrence of pain compromises animal welfare
  - It must be actively addressed.
  - “Suppress, Substitute, Soothe”
  
2. Where pain arises from deliberate management decisions:
  - an ethical justification is needed
  - underpinned by objective scientific assessment of pain
  
3. This assessment can be problematic
  - our understanding of the subjective experience of pain in animals is still lacking
  - multidisciplinary methods need to be employed

## Conclusions

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5. The goal must be to remove the sources of pain
  - by modification of production practice
  - by reduction in known risk factors
  - BUT: this may not always be completely effective
  
6. A reliable method for on-farm pain assessment is needed
  - an essential prerequisite for effective alleviation
  - a pressing subject for research