

A paradigm shift within animal welfare

A close-up photograph of a pig's face, showing its large ears and snout, set against a dark background. The pig has light brown skin and is looking slightly to the left. The image is used as a background for the text.

18 September 2017
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From farm to slaughter

- Definition of animal welfare
- Why animal welfare?
- Perception of animal welfare
- Pre-slaughter handling
- Surveillance and documentation of animal welfare
- Improved value of the livestock



Definition of animal welfare

Five freedoms, Farm Animal Welfare Council

1. Freedom from hunger and thirst,
2. Freedom from discomfort,
3. Freedom from pain, disease or injury,
4. Freedom to express normal behaviour,
5. Freedom from fear and distress

Welfare Quality® – four principles

1. Good feeding,
2. Good housing,
3. Good health,
4. Appropriate behaviour

(Welfare Quality®, 2009)

Why animal welfare?

- Ethical responsibility
- Demands from the market and authorities
- Improvement of value/less loss due to injuries

Points of action

- ✓ Documentation of animal welfare
- ✓ Optimization of handling on the day of slaughter
 - Transport and delivery to the slaughterhouse
 - Lairage
 - Stunning and sticking



Regulations



Council Regulation (EC) No 1099/2009 of 24 September 2009 - on the protection of animals at the time of killing

General requirements

- Animals shall be spared any avoidable pain, distress or suffering during killing and related operations
- Business operators shall take the necessary measures to ensure compliance with the obligation mentioned above
- Facilities used for killing and related operations shall be designed, constructed, maintained and operated so as to ensure compliance with the obligations mentioned above

Market driven animal welfare



altijd beter





Animal welfare & the consumer

– focus group interviews in DK, S and UK

- **Welfare is about freedom from pain and stress, but especially about naturalness**
- **Animal welfare is seen as a quality as such**
 - L: "If I know how the animal has been cared for, it's easier for me to put my teeth into it" (Fuglebjerg, DK)
- **Animal welfare is often related to eating quality**
 - C: "Obviously you want your animal to have had a nice life but that's not really my main motivation, it's more well if they've had a good diet then it's better, it tastes better, it's nicer to eat" (Rye, UK)

Cecilie Thorslund (2016), Copenhagen University



Examples from focus group interviews



"The flavour is really what it's all about!"

"It just feels better to eat a happy pig"

"I also have some good intentions, but my finances and my intentions are generally not consistent!"

Cecilie Thorslund (2016), Copenhagen University



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A good animal welfare standard is good business



From farm to slaughterhouse

- Pigs in small groups (15)
- Groups only mixed once when loaded on the transport vehicle
- Uniform delivery at the slaughterhouse
- Little mixing of pigs
- Low incidence of fighting

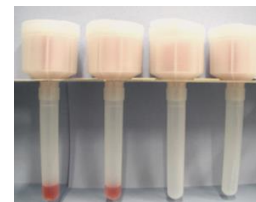


Transport/lairage

Group size	15	45
Skin damage		
Legs	3.9%	5.2%
Shoulder	16.1%	23.7%

Gade & Christensen, 1999

Uses the instinct of the animals
Considerate treatment
Improves meat quality



Pre-slaughter handling
Pigs

Group-based principle



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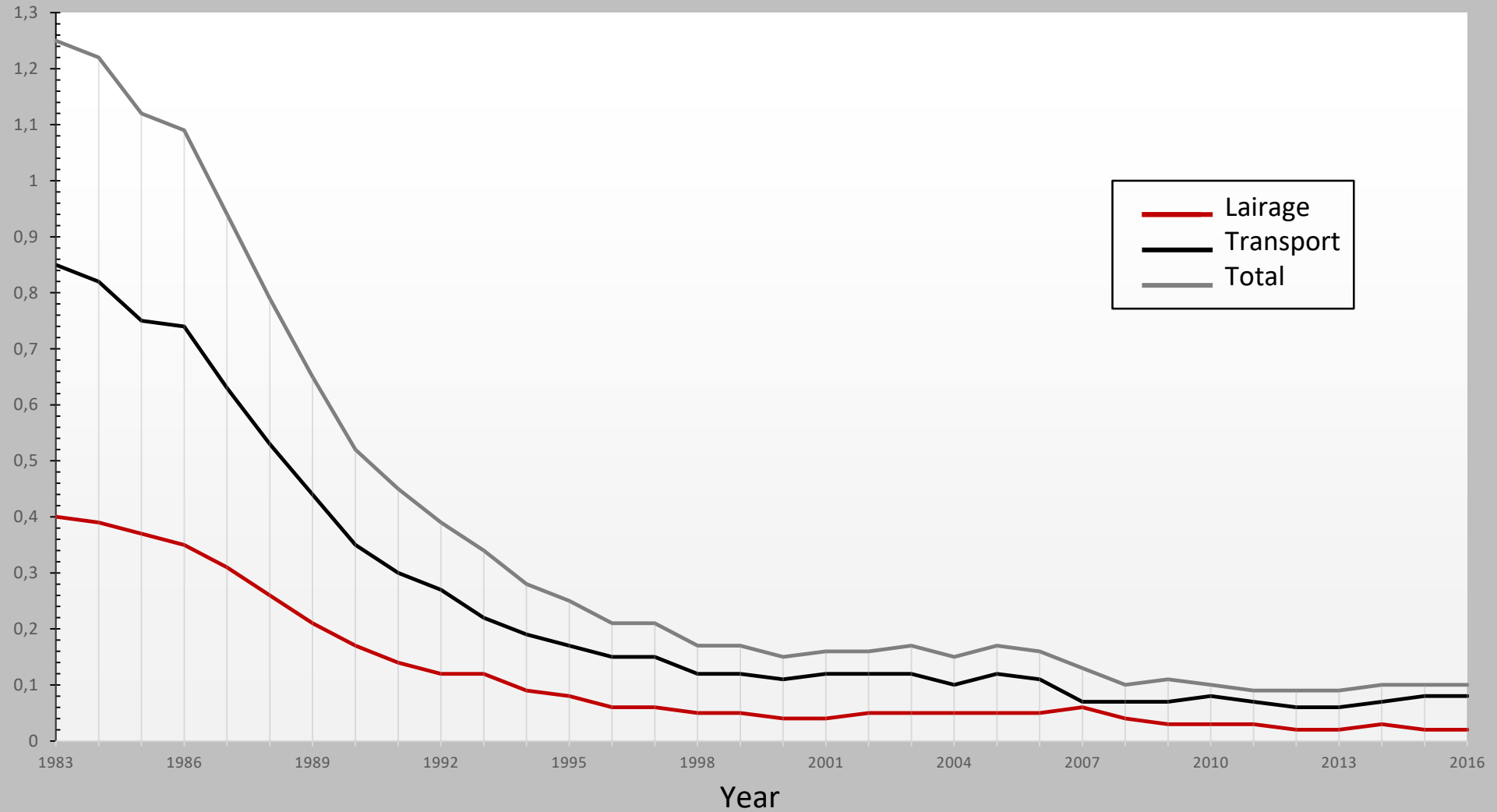
The handling of pigs at the Danish slaughterhouses are optimized with respect for the animal

DMRI

Pre-slaughter handling
Pigs

Mortality during transport and lairage Slaughter pigs

Mortality o/oo





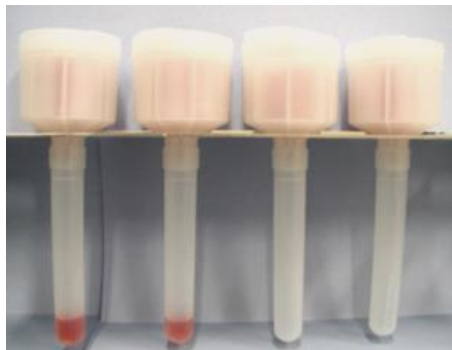
Lairage



Lairage time to optimize production or as short as possible



Aggressions increase after three hours



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Pre-slaughter handling
Pigs

CO₂ stunning

- Allow the group-based principle
- Avoid restraining of pigs
- Improve meat quality (fewer haemorrhages, lower drip loss)
- Signs of aversion to the gas a few seconds before unconsciousness occurs



Stunning procedure

- CO₂ concentration
- Stunning time
- Stun to stick interval

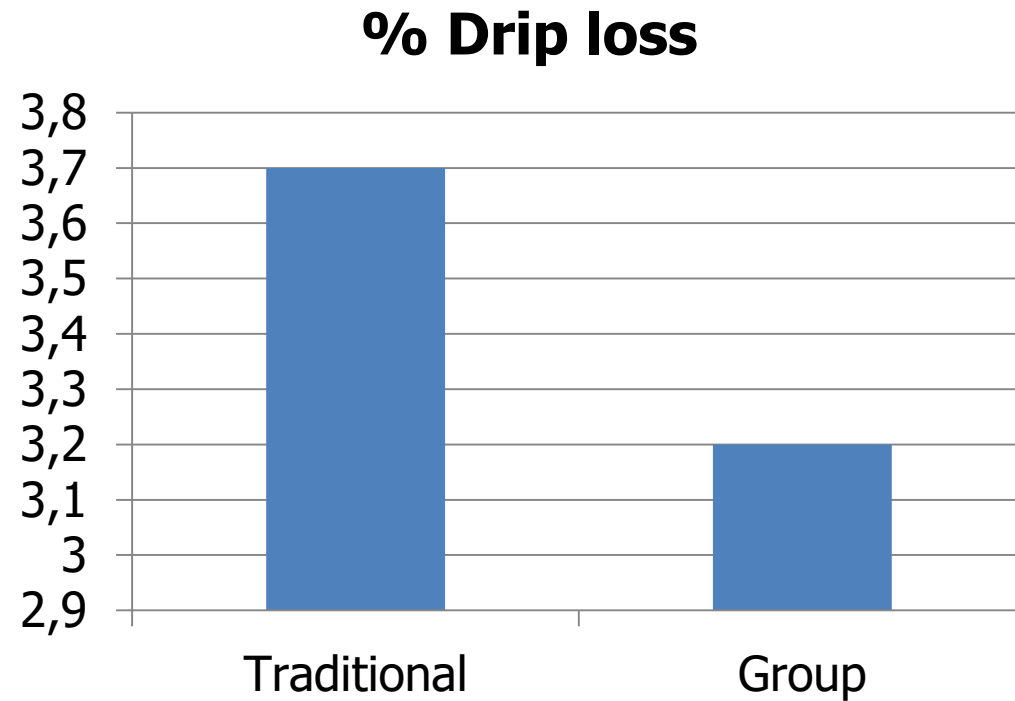
Stunning quality

- No conscious movements
- No respiration
- Cornea reflex
- No vocalisation

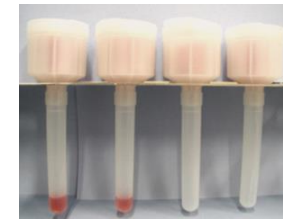


Pre-slaughter handling
Pigs

Driving and stunning



Støier, S., Aaslyng, M.D., Olsen, E.V. & Henckel, P., 2001. The effect of stress during lairage and stunning on metabolism and drip loss in Danish Pork. Meat Science, 59, 127-131.

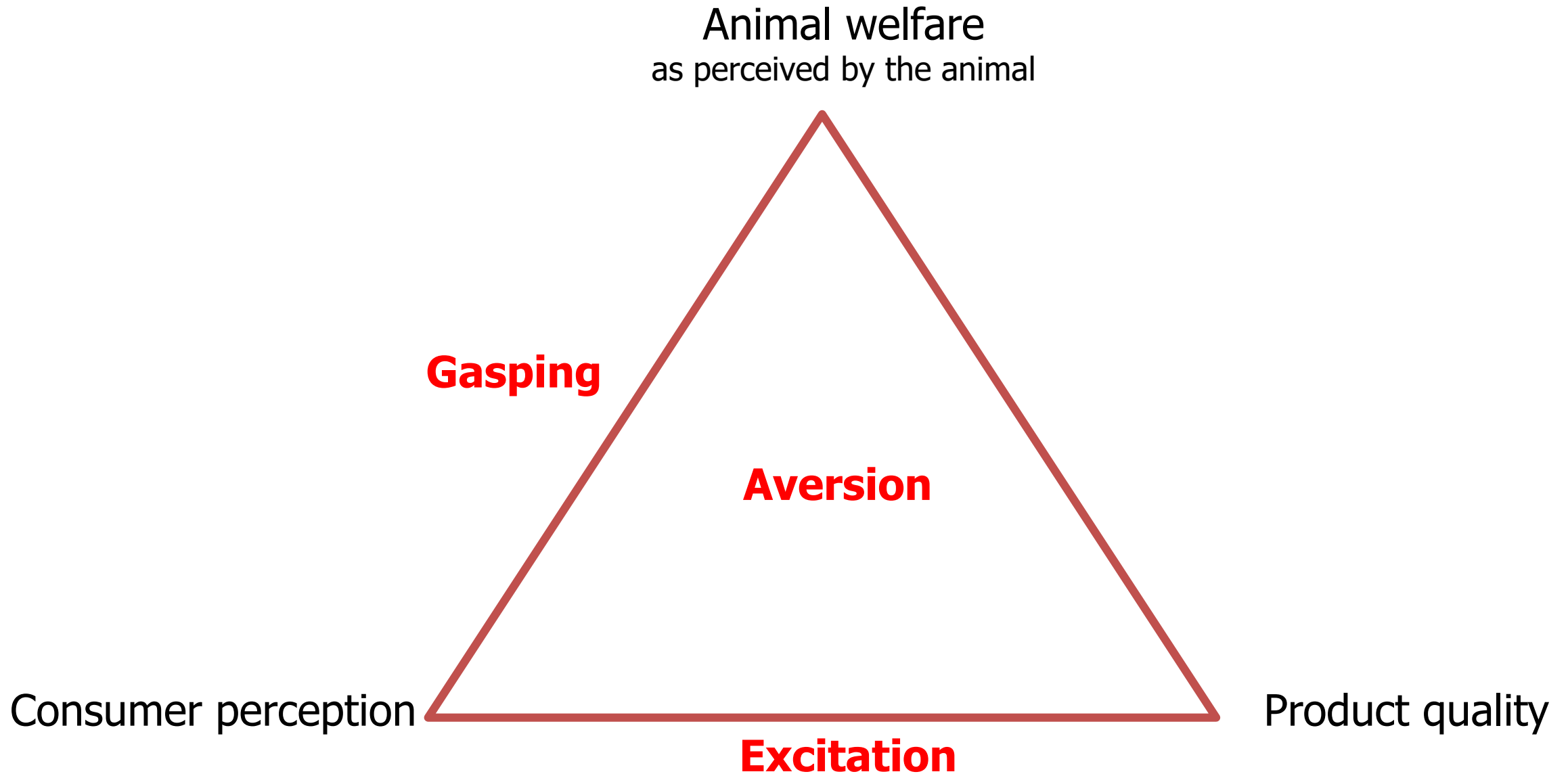


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Pre-slaughter handling
Pigs

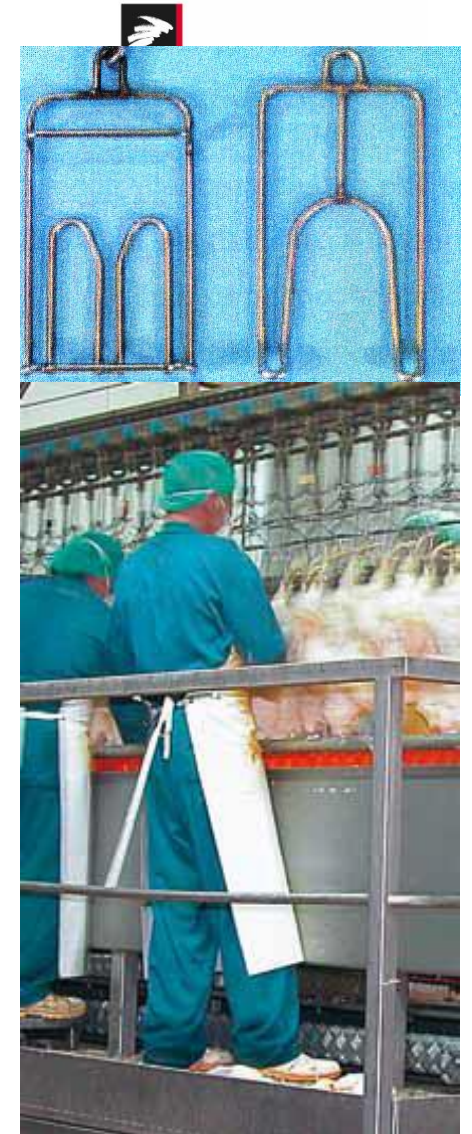
Ethical quality of CO₂ stunning



Slaughter process – critical points

- Collection
- Transport conditions
- Shackling
 - Risk of inducing or increasing pain/shackling of live birds causes them to struggle, flap their wings and vocalise
 - Condition and size of shackles
 - Suspended birds should not hang conscious for more than one minute
- Stunning methods
- Head cutting/debleeding
 - Correct manual or automatic cutting of neck veins
 - Automatic cutting has to be followed by inspection

Technology combined with management can improve animal welfare and quality



Pre-slaughter handling
Poultry

Electrical stunning in water bath

System

- Head to body electrical stunning

Comments

- Shackling of living birds
- Actual current received by each bird depends on its resistance that varies
- Electro-immobilization instead of loss of consciousness
- Risk of pre-stun shock



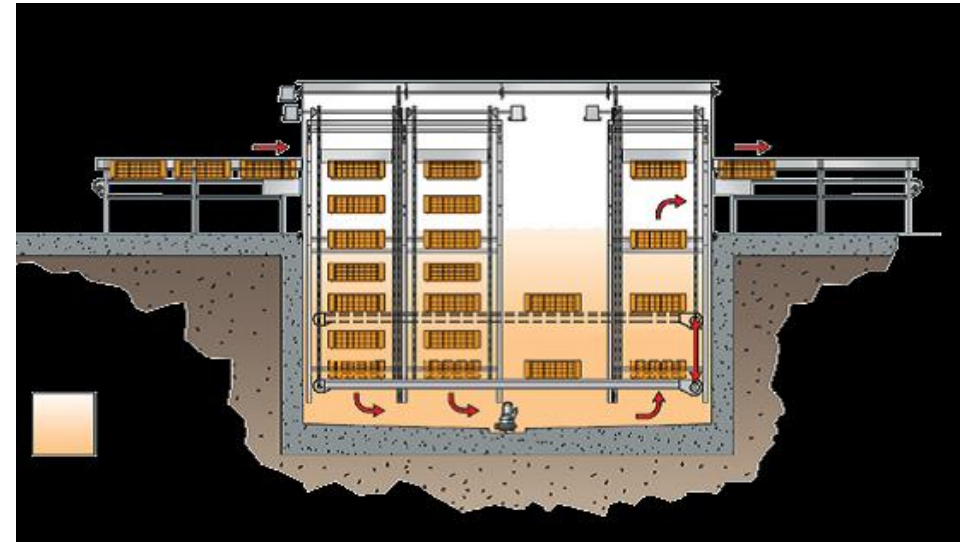
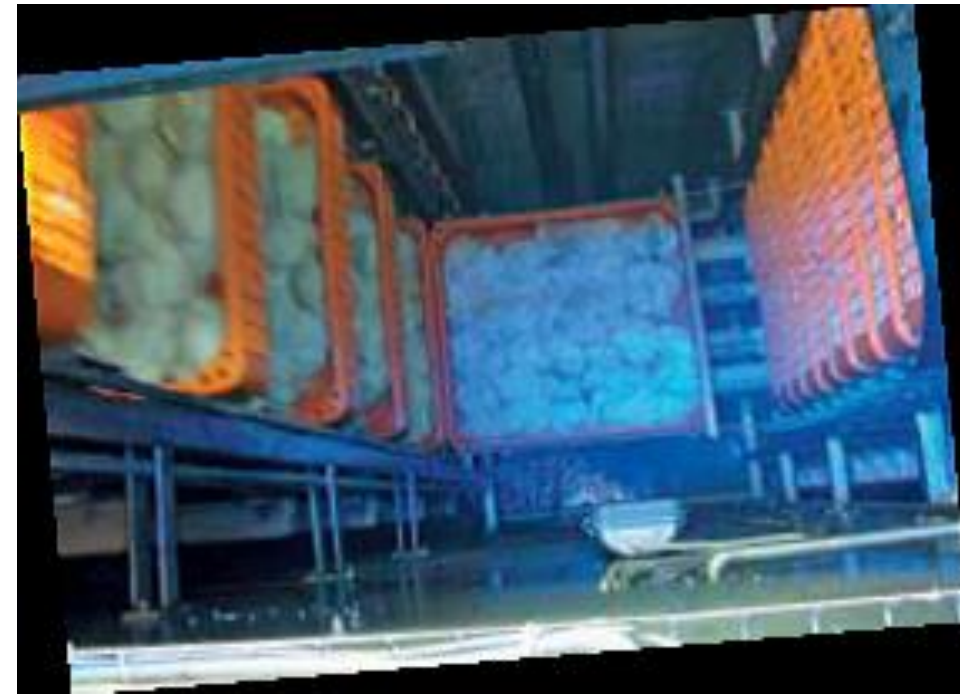
Controlled Atmosphere Stunning (CAS)

System

- CO₂ - multiphase systems using O₂ and CO₂. 1st phase, low concentrations of CO₂ (max. 40%) are induced to reduce aversiveness, 2nd phase, CO₂ concentrations are increased (80%)

Comments

- Less damage (bone fractures, bruises and haemorrhages) compared with electrical stunning (Gigaud et al., 2010)
- Withdrawal reaction -> more damage
- Admixture of oxygen -> less damage
- Possible to stun in transport modules
- Sorting out 'dead' bodies – thermography?



Pre-slaughter handling
Poultry

Stunning – welfare advantages and challenges

	Electrical stunning	Controlled Atmosphere Stunning
Industrial use	80%	20%
Advantages	Rapid onset of unconsciousness Limited operation cost	Stunning in transport modules Shackling post-stun Fewer haemorrhages
Challenges	Shackling Potential for pre-stun shock Electro-immobilization vs. unconscious	Operation cost Unconsciousness is not rapid Detection of bodies that died during transport Consciousness at loss of posture

Ref. Buhr (2009)

Surveillance of animal welfare

Why?

- Internal inspection and product responsibility
- Feedback to staff, haulier, farmer etc.
- Demands from market and authorities

How?

- Behavioural studies
- Ethical audits
- Continuous monitoring of animal welfare - possibilities:
 - Video recording/Vision systems
 - Sound recording - vocalization by the animals
 - Temperature measurements
 - Blood analysis
 - Etc.

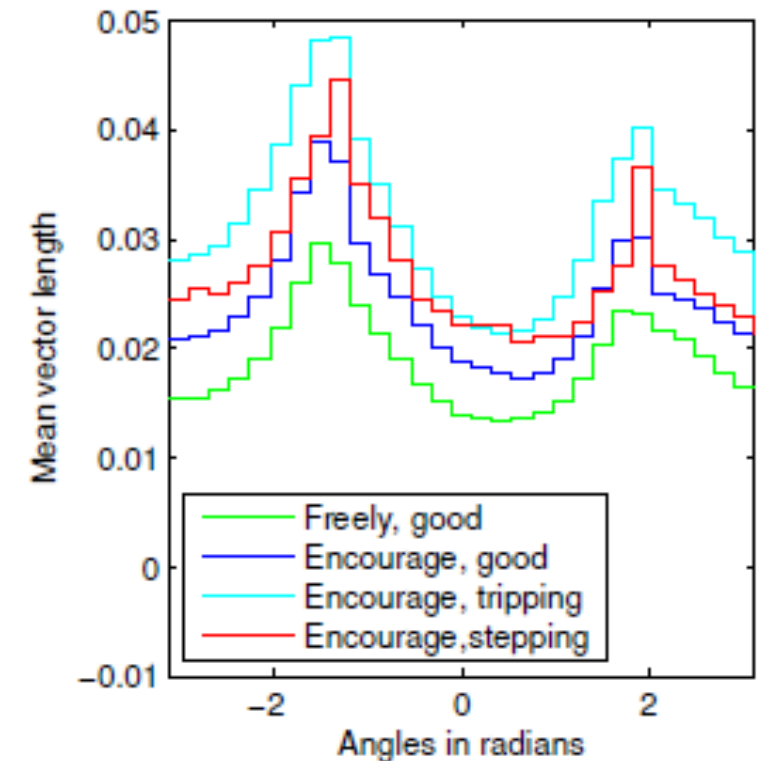
Monitoring motion of pigs – Vision for animal welfare



Movement analysis can give information about the health and welfare of farm animals.

Motion of animals is estimated using optical flow (OF).

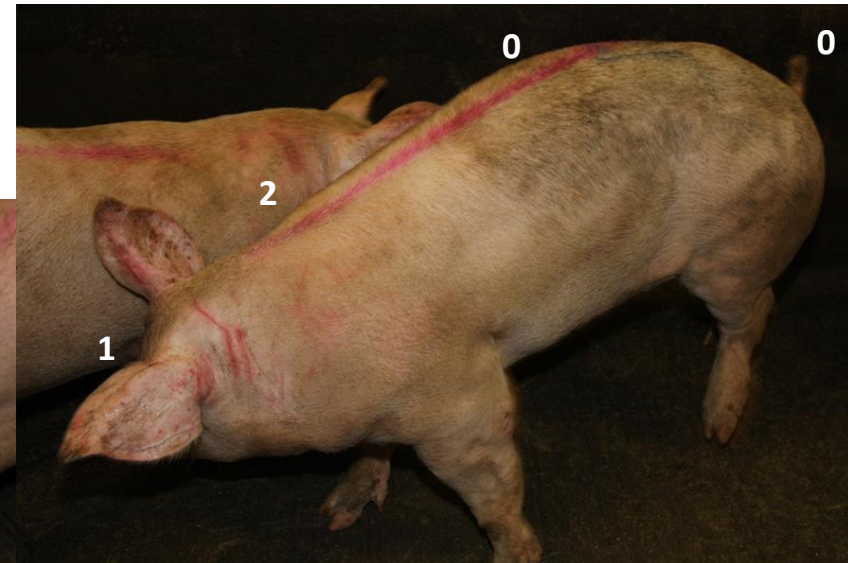
A modified angular histogram (MAH) is used to summarize the length of the vectors within a small range of angles.



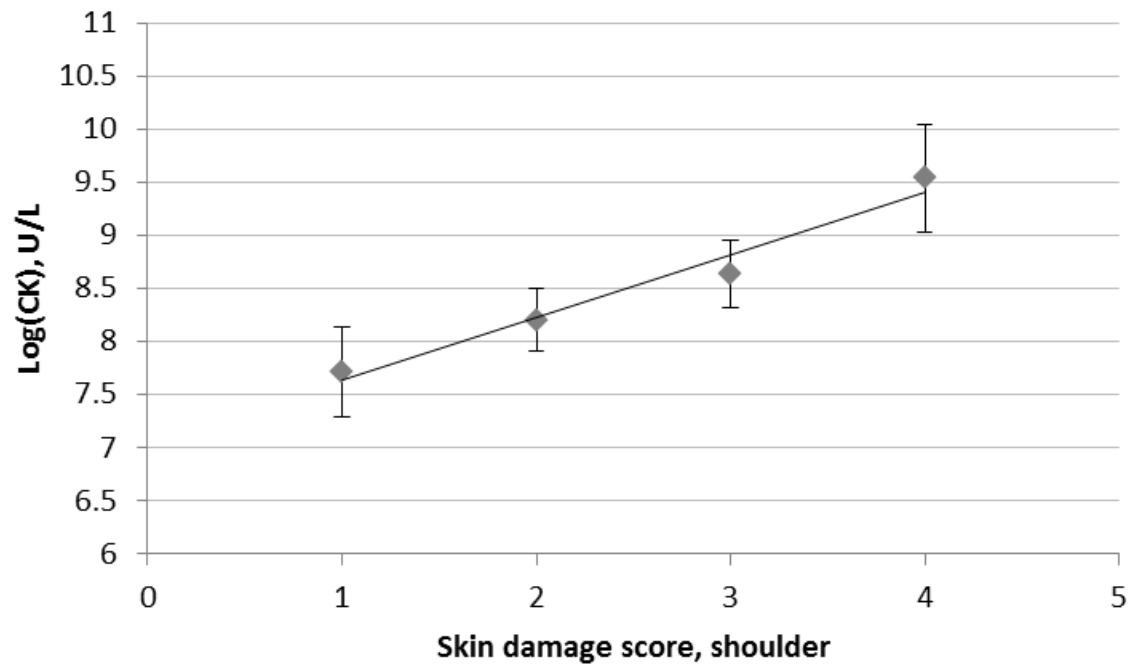
Modified from Gronskyte (2014)

Skin damage

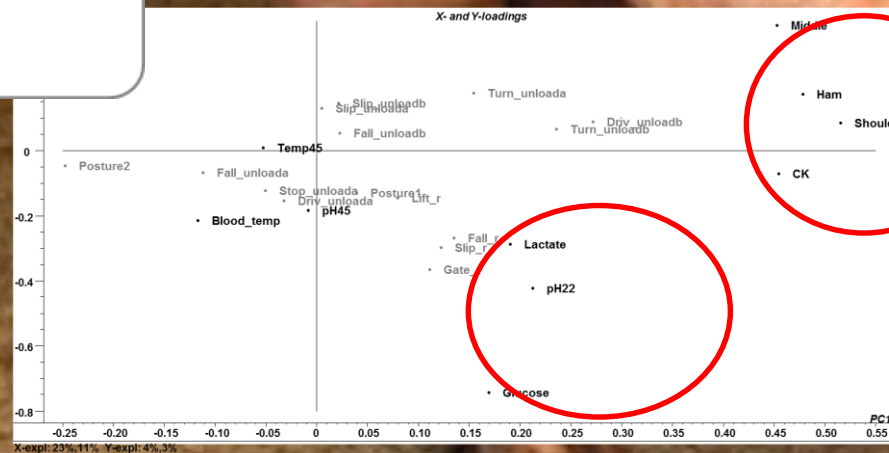
- 0 None or a little superficial damage
- 1 Some superficial damage
- 2 Clear deep and/or long damage
- 3 Much deep damage



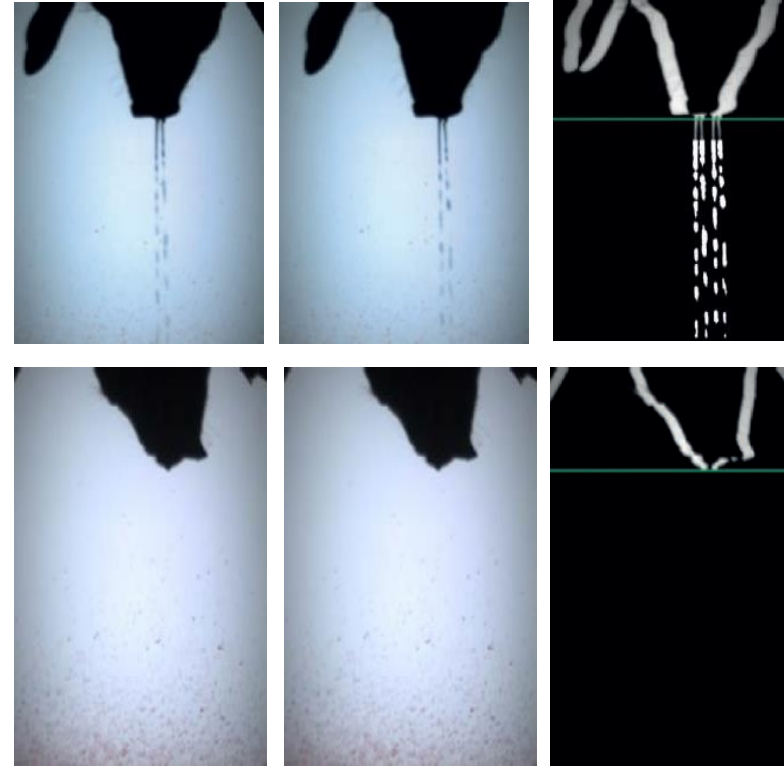
Automated blood analyses of lactate and creatine kinase (CK)



Brandt, P., Rousing, T., Herskin M. S., Aaslyng, M. D., 2013. Identification of *post-mortem* indicators of welfare of finishing pigs on the day of slaughter. *Livestock Science* 157, 535-544.



VisStick – monitoring the sticking procedure



Detection range: 98 to 100%
False positive: 0 to 0.064%
(Borggaard et al., 2011)



Footpad dermatitis – an indicator of welfare problems

- Danish broilers have been checked for footpad dermatitis since 2002
- Inspected Danish flocks with a low score:

2003: 30 %

2013: 75 %

(Danish Veterinary and Food Administration)

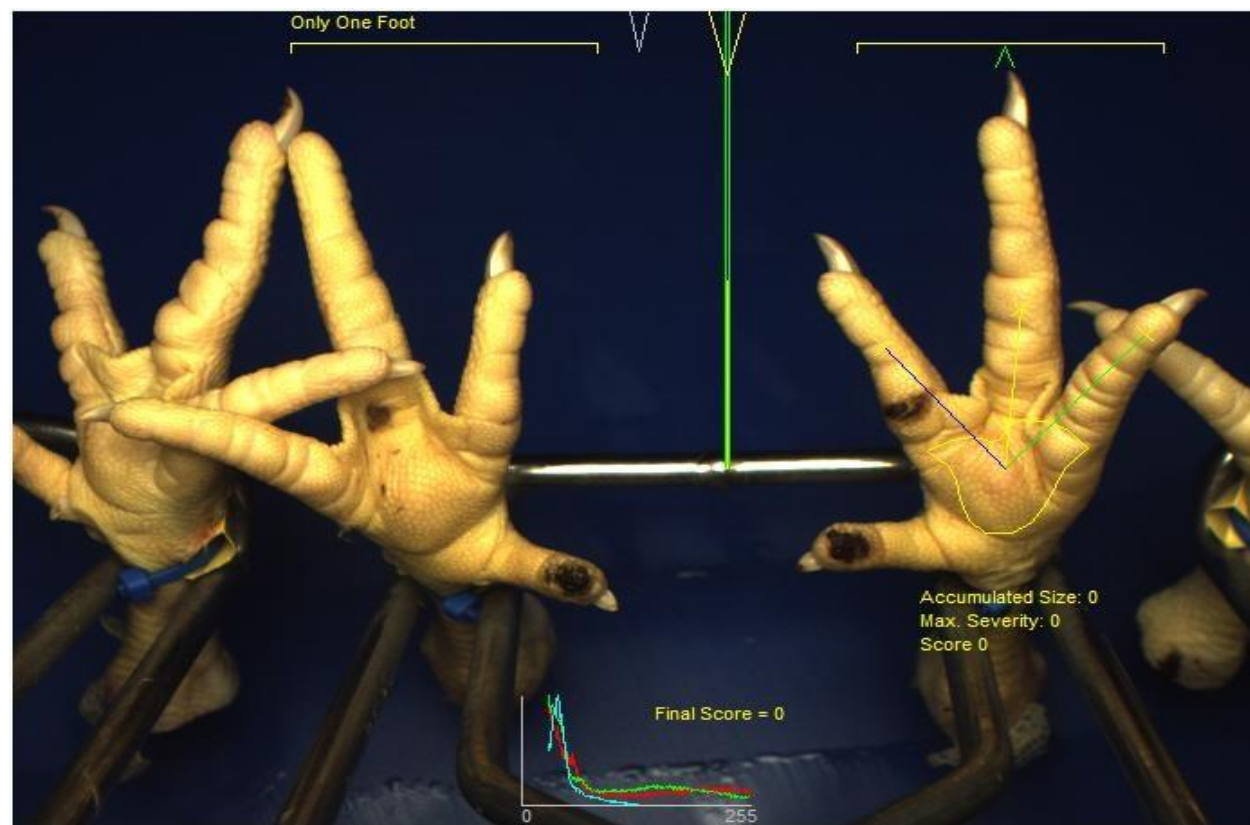


Surveillance of animal welfare
Poultry

Footpad lesions – automatic measurement



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Surveillance of animal welfare
Poultry



Improved value of slaughter pigs at commercial slaughterhouses

Improvement of pre-slaughter handling incl. optimization of the stunning systems – change from electrical to CO₂ stunning

- Less PSE
- Lower drip loss
- Fewer haemorrhages
- Increased value of the cuts and more products acceptable for high price markets

~ **\$ 4,600,000** for a slaughterhouse killing 4,000,000 pigs a year

~ **\$ 1.15 per pig**



Improved value of livestock



Improved value of broilers

Demand for high-quality paws
Chicken paw prices have escalated in the US
Paws accounting for approx. \$ 280 million a year

US Poultry & Egg Export Council, 2009



Improved value of livestock



Sum up

- Animal welfare is good business
- Market driven animal welfare – a trend
- Technology and management improve animal welfare and product quality
- More smart systems for surveillance are needed



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Thank you for your attention!

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www.animalwelfare.dk