

*Animal Welfare at Transport and at Slaughter of Livestock  
and Poultry*

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## *Plan of the talk*

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- **Animal welfare assessment (general principles)**
- **Assessing animal welfare during transport**
- **Some welfare problems during transport**
- **Animal welfare at slaughter**
- **Concluding remarks**



## General principles:

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- *AW indicators must be reliable, valid and practical*
- *Animal based vs. environment based indicators*
- *There is no AW indicator that can be used on its own*
- *AW indicators must cover different approaches to welfare*

# What is animal welfare?

## Definition of animal welfare

Duncan and Fraser (1997)

- **Feeling-based**
- **Functioning-based**
- **Animal's inherent "nature"**

# What is animal welfare?

## The five freedoms concept

**Freedom from thirst, hunger and malnutrition**

**Freedom from discomfort**

**Freedom from pain, injury and disease**

**Freedom to express normal behaviour**

**Freedom from fear and distress**

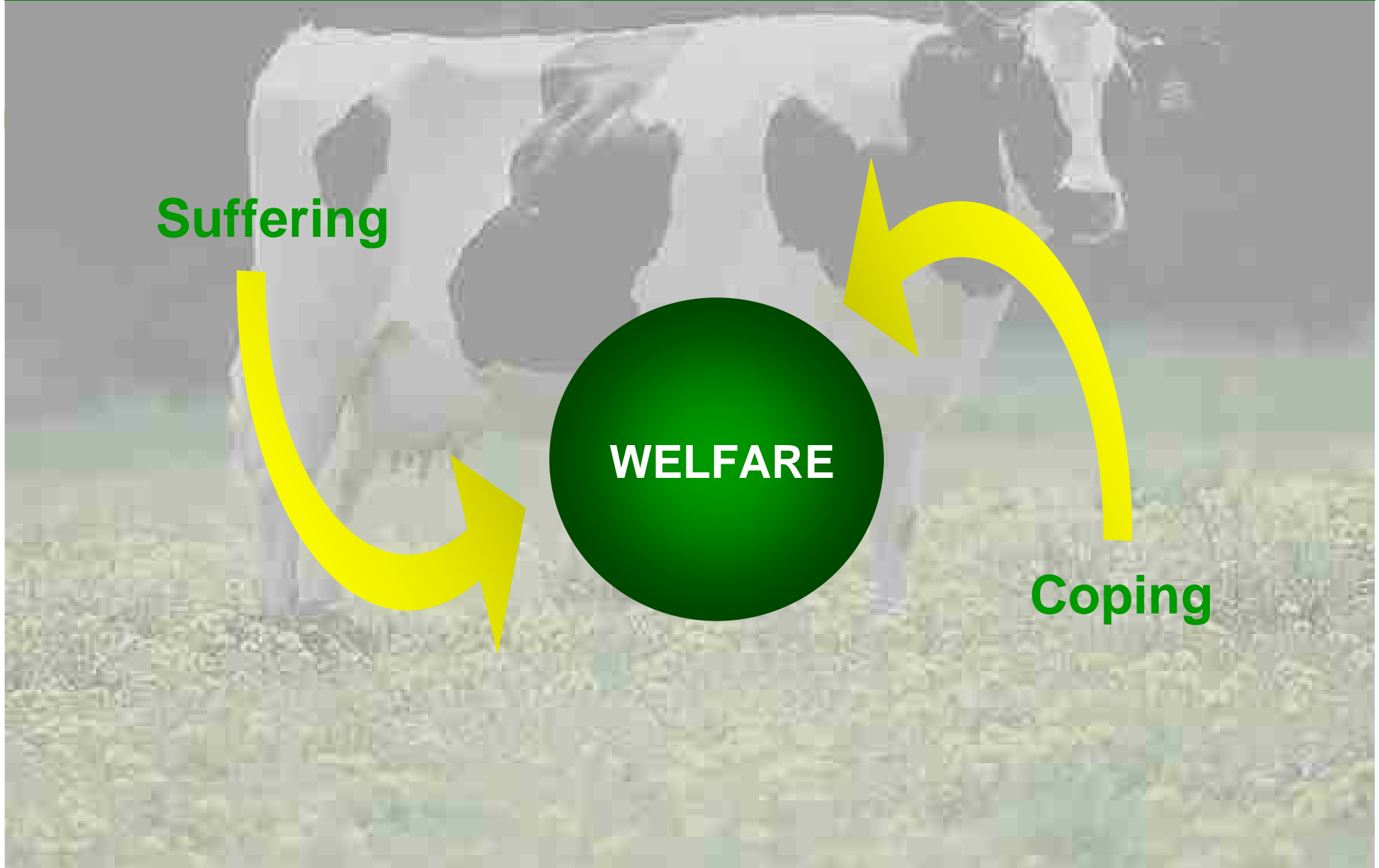
**Brambell FWR (1965) Report of the Technical Committee to Enquire into the Welfare of Livestock Kept Under Intensive Husbandry Systems. HMSO, London.**

# What is animal welfare?

Suffering

WELFARE

Coping



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# Animal based AW indicators in transport

- Physiological indicators
- Behavioural indicators
- Lesions
- Meat and carcass quality
- Mortality



## Cortisol /corticosterone levels

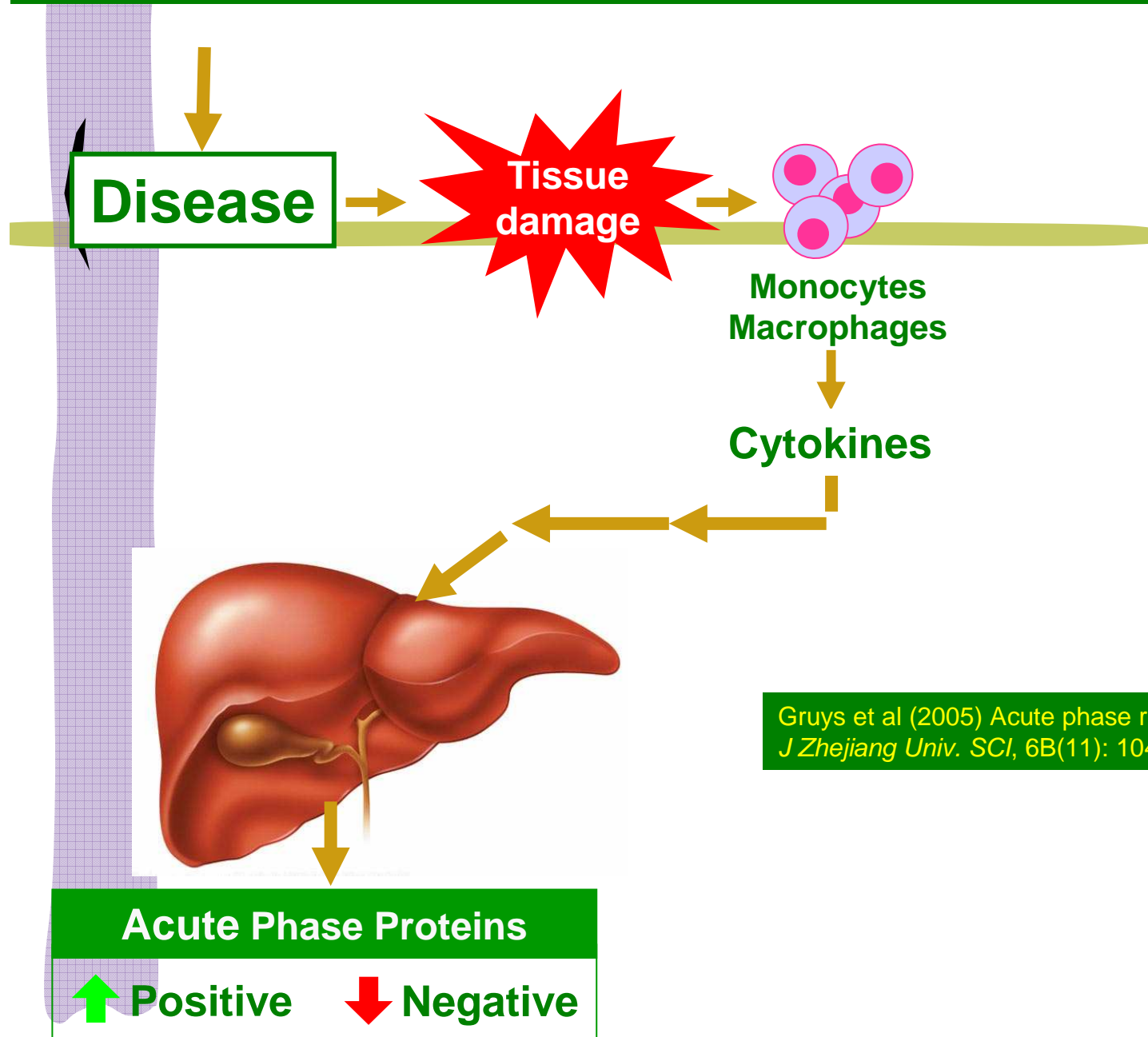
✱ *Free vs. total glucocorticoids*

✱ *Large individual variability*

✱ *Biological rhythms*

✱ *Effect of sampling on glucocorticoid levels*

# Acute phase proteins



Gruys et al (2005) Acute phase reaction and acute phase proteins. *J Zhejiang Univ. SCI*, 6B(11): 1045-1056



## **Acute phase proteins**

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**Short (3 h) vs. long (20 h) transport**

**Results:**

**Cortisol: no differences**

**APP: long > short**

# Behaviour



## Lesions caused by handling



- Rough treatment of animals
- Animals slipping or falling

## Lesions caused by other animals



- Fighting or mounting due to mixing.
- Competition for space or other resources (lairage)

# Skin damage

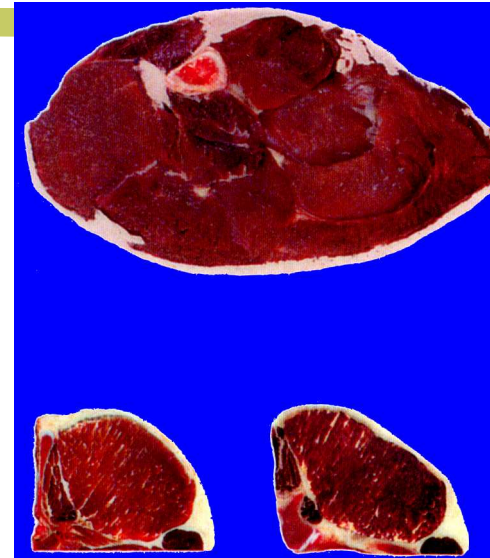
	None	Moderate	Severe	Very severe
PQM	3.95	4.40	4.17	4.08
PHu	5.64	5.80	5.87	5.86
Lactate	105.4	119.1	124.9	126.4
Cortisol	7.6	8.2	8.8	9.5
CPK	3.7	3.9	4.0	4.2

(Guardia et al 2002)

PSE ← Normal meat → DFD



- Stress before slaughter
- Halothane gen



- Sex
- Breed
- Fasting
- Activity and long-lasting stress



# DOA (pigs)

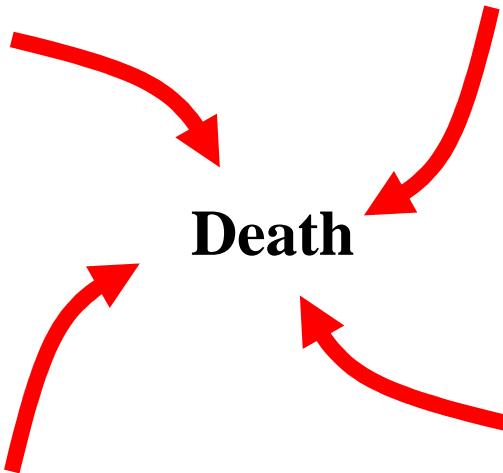
**Exercise**

**Heat stress**

**Death**

**Genotype**

**Other sources of stress**



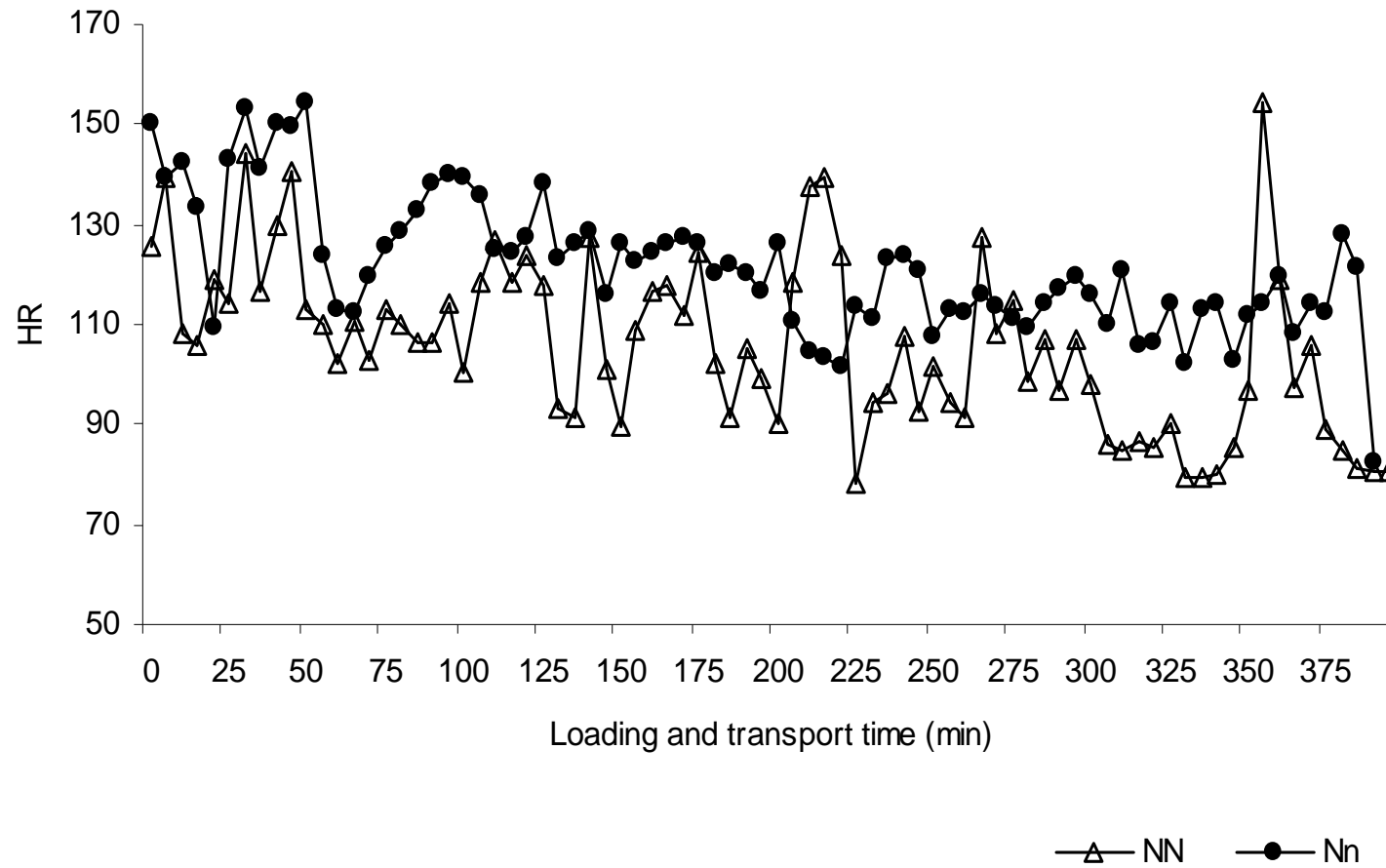
## **% of deaths during transport and lairage as affected by the halothane gene**

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- **NN: 0,05% mortality**
- **Nn: 0,25% mortality**
- **nn: 9% mortality**

**11-fold reduction in mortality if the gen were eliminated**

## HR of Nn y NN pigs during transport and loading



(Fàbrega et al 2002)

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## Possible causes of poor welfare

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Handling

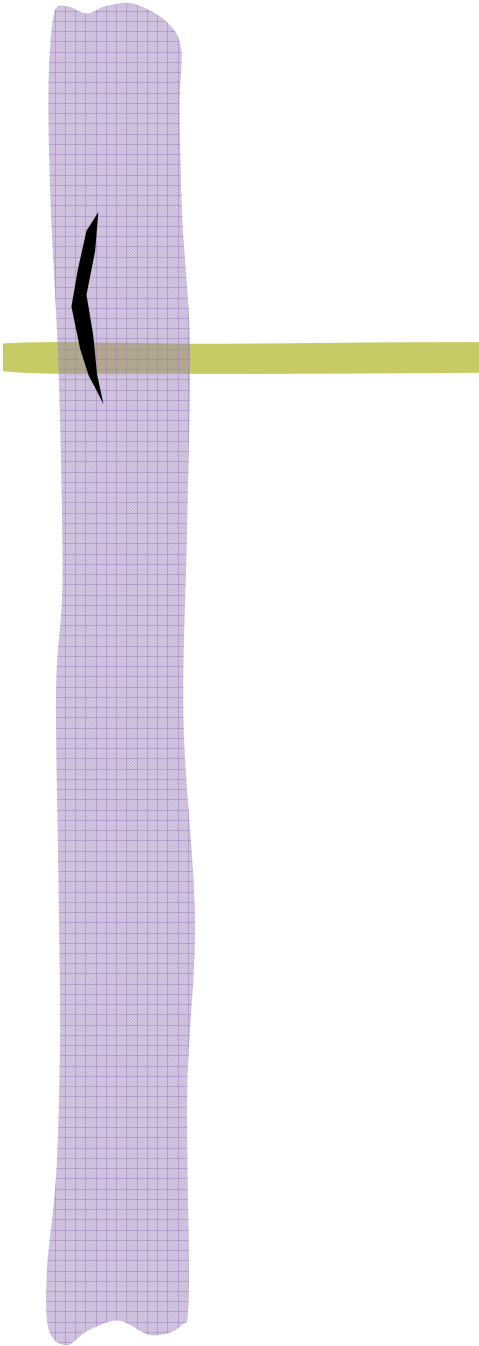
Mixing

Novelty

Movement of the vehicle

Microclimate

Lack of food and water





# Driving type / Road conditions

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## · Road conditions

(accelerations  $> 7 \text{ m/s}^2$ )

Smooth  $0,8 \pm 0,1$

Rough  $15,1 \pm 3,2$

( $p < 0.001$ )

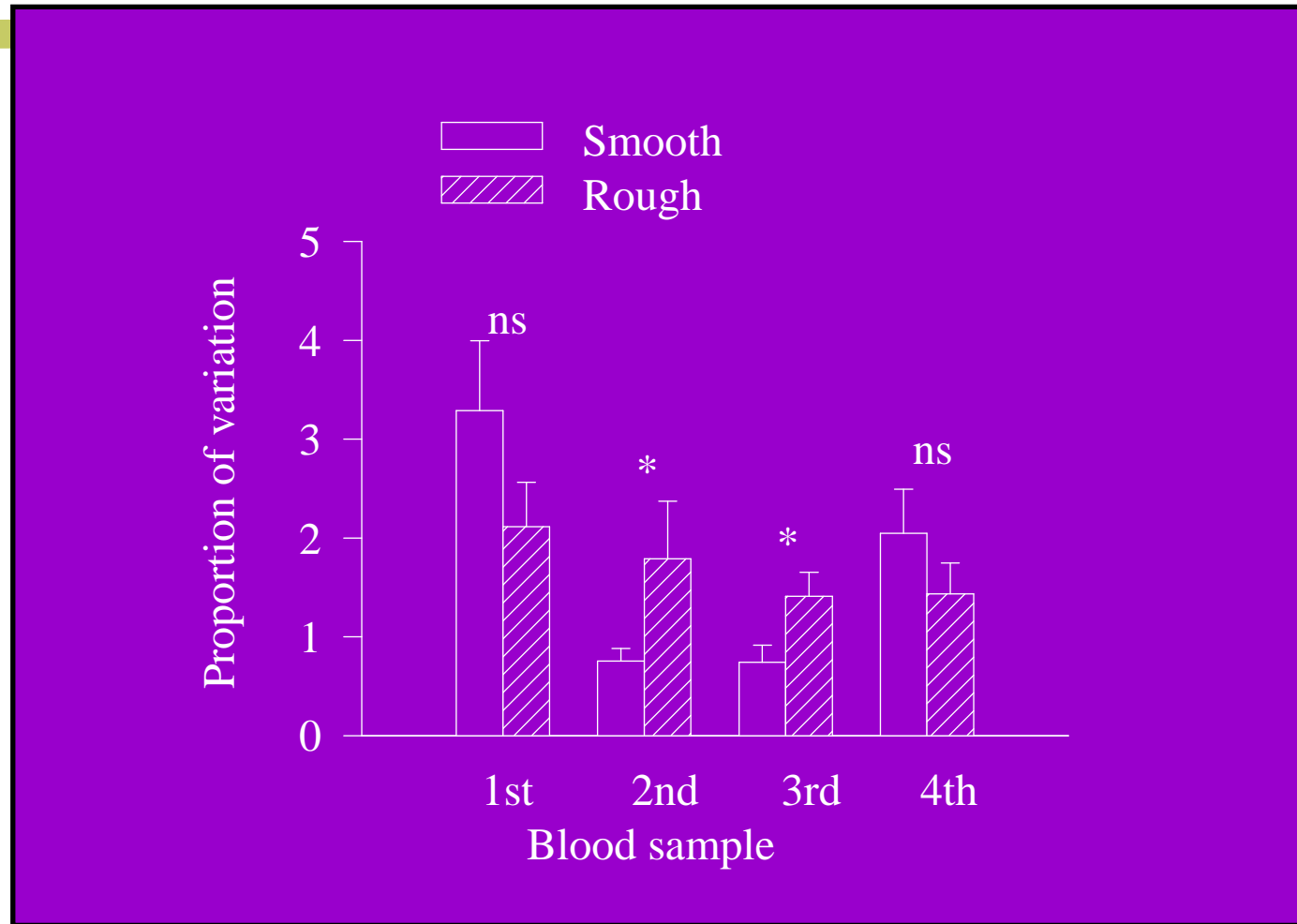
## · Animals activity

Smooth  $0,25 \pm 0,03$

Rough  $0,55 \pm 0,03$

( $p < 0,001$ )

## Glucocorticoids



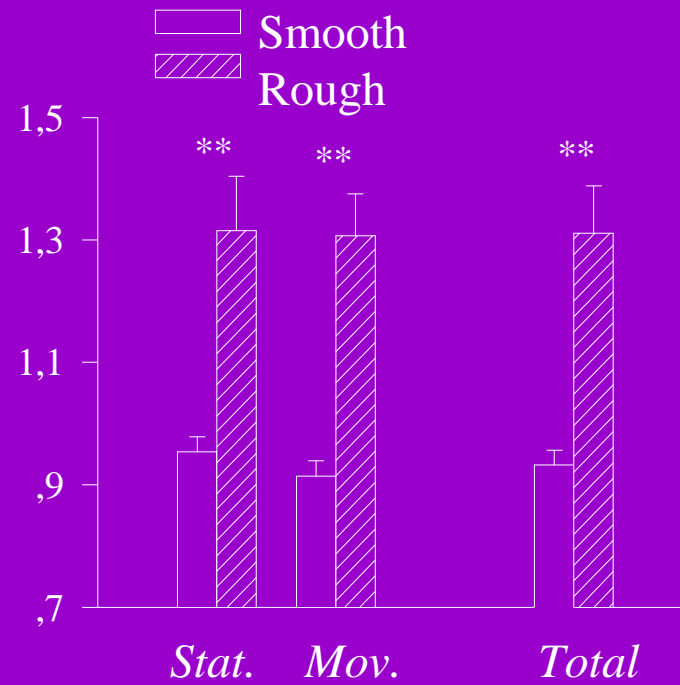


# Heart rate



# Heart rate

Proportion of variation in heart rate





# Behavioural measures

## Aggressive behaviour

**Regrouping is a problem in pigs,  
but not in lambs**

(Arey & Franklin, 1995, Ruiz de la Torre & Manteca, 1999)

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## Stunning

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Any process which, when applied to an animal causes immediate loss of consciousness which lasts until death.

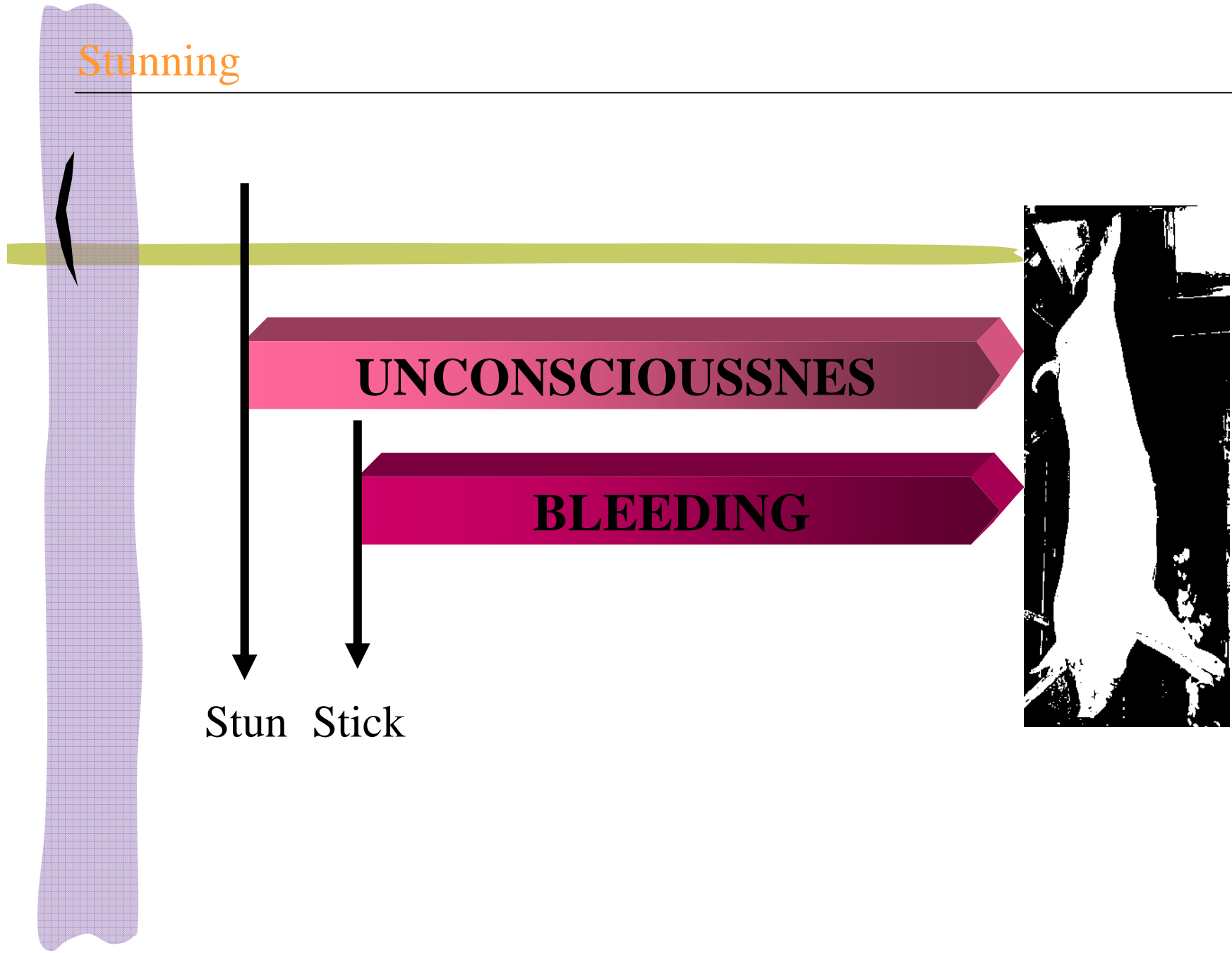
(Council Directive 93/119/EEC)

### AIMS:

- Animal Welfare: Insensibility induction
- Meat Quality
- Operator safety

# Stunning

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**UNCONSCIOUSNESS**

**BLEEDING**

Stun Stick



## Animal Welfare

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Electrical Stunning:

Current intensity

Electrode placement

Application time

Recovery

Carbon dioxide Stunning:

[CO<sub>2</sub>]

Exposure time

Recovery

## Electrical Stunning

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10 FNW ( tongs in frontal position, wet skin, no wool)

11 FW (tongs in frontal position, wet skin, wool)

11 FDNW (tongs in frontal position, dry skin, no wool)

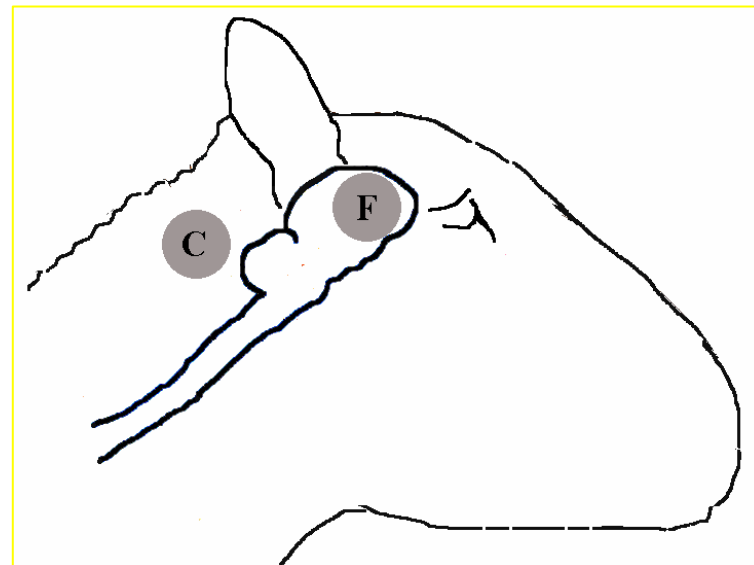
10 FDW (tongs in frontal position, dry skin, wool)

12 CNW (tongs in caudal position, wet skin, no wool)

12 CW (tongs in caudal position, wet skin, wool)

12 CDNW (tongs in caudal position, dry skin, no wool )

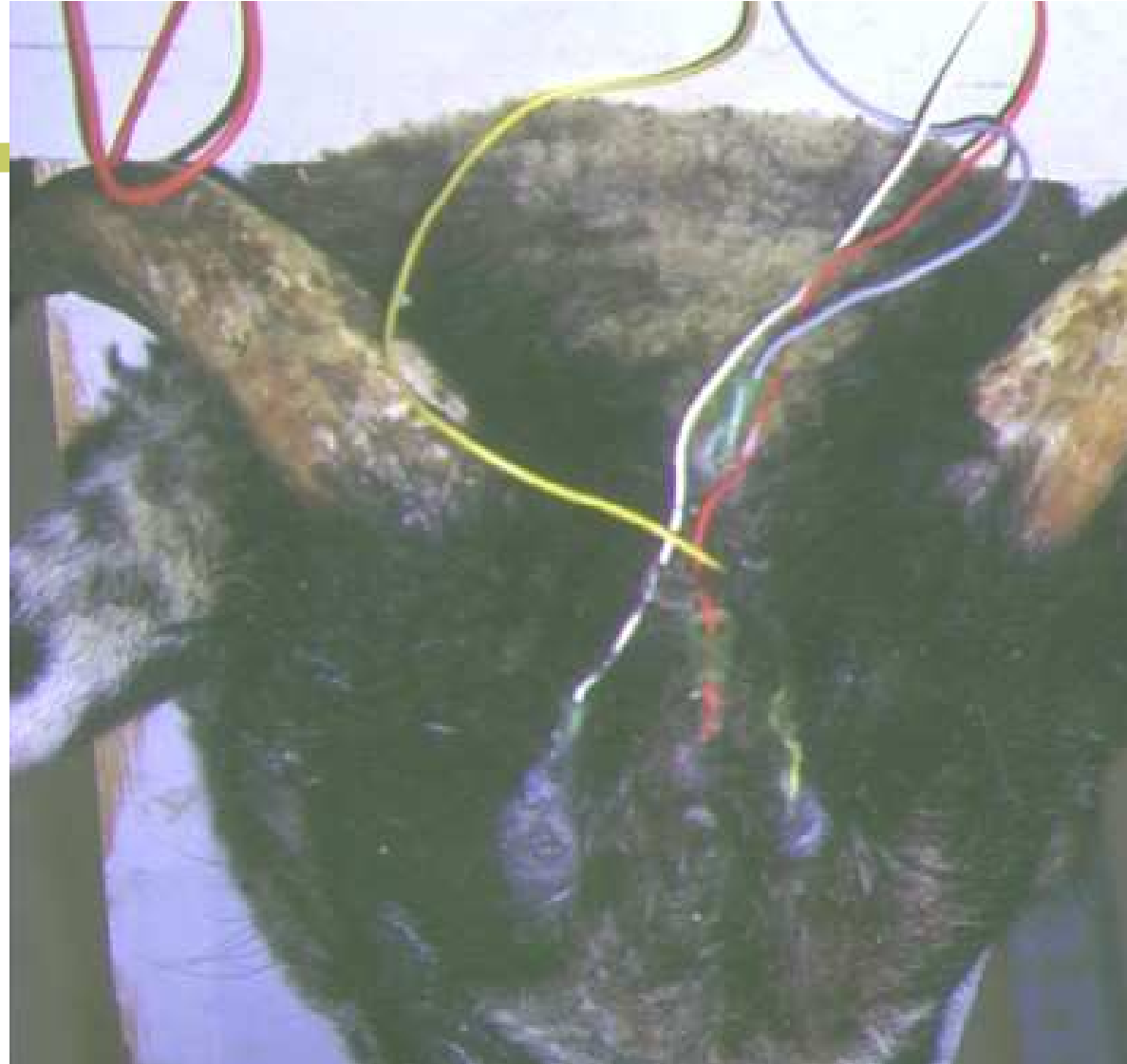
11 CDW (tongs in caudal position, dry skin, wool)





# Instrumentation

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# Instrumentation

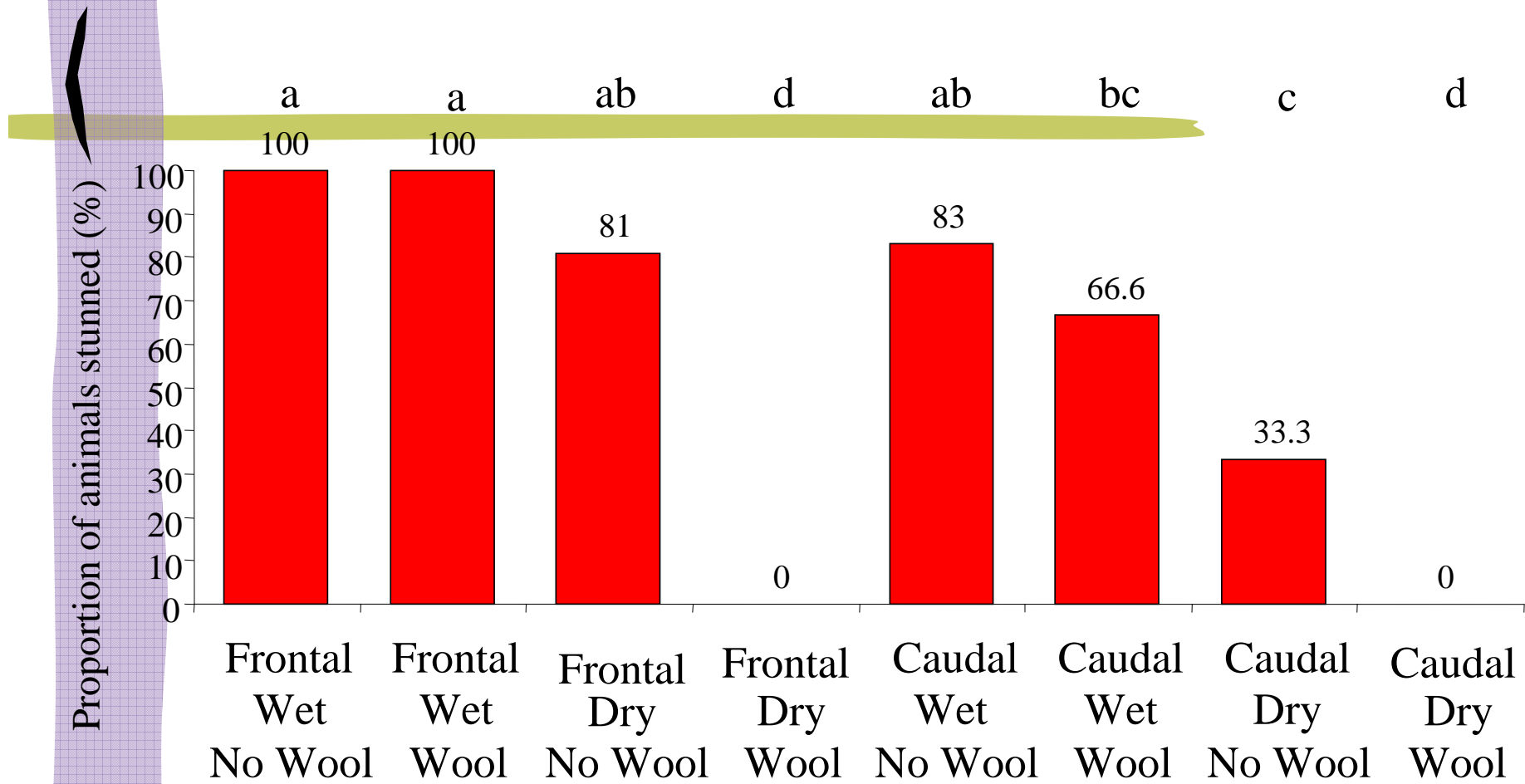


## Electrical stunning

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# Effectiveness



## Animal Welfare

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Electrical Stunning:

Current intensity

Electrode placement

Application time

Recovery

Carbon dioxide Stunning:

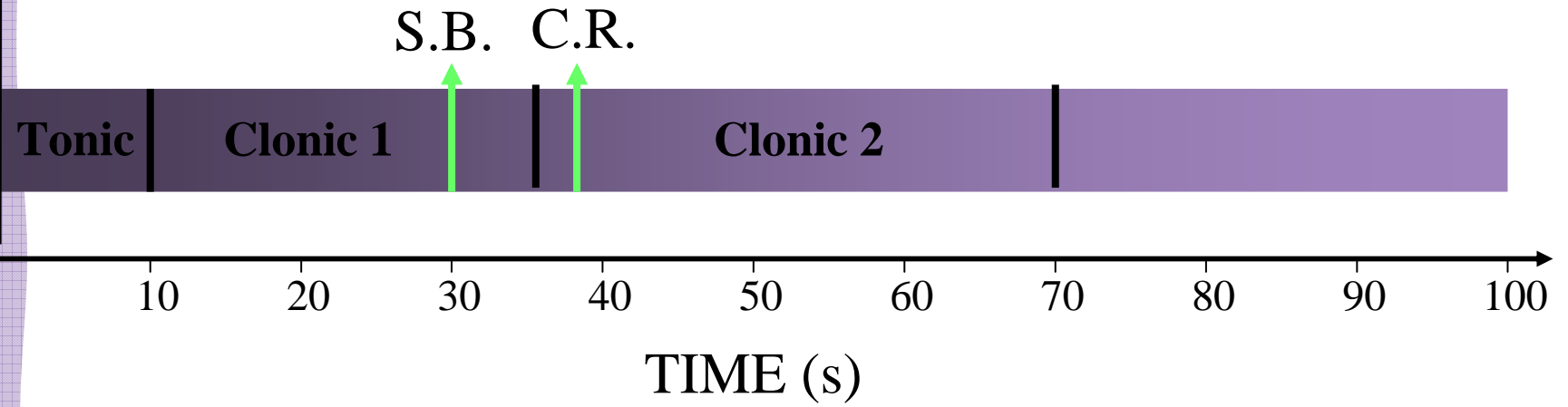
[CO<sub>2</sub>]

Exposure time

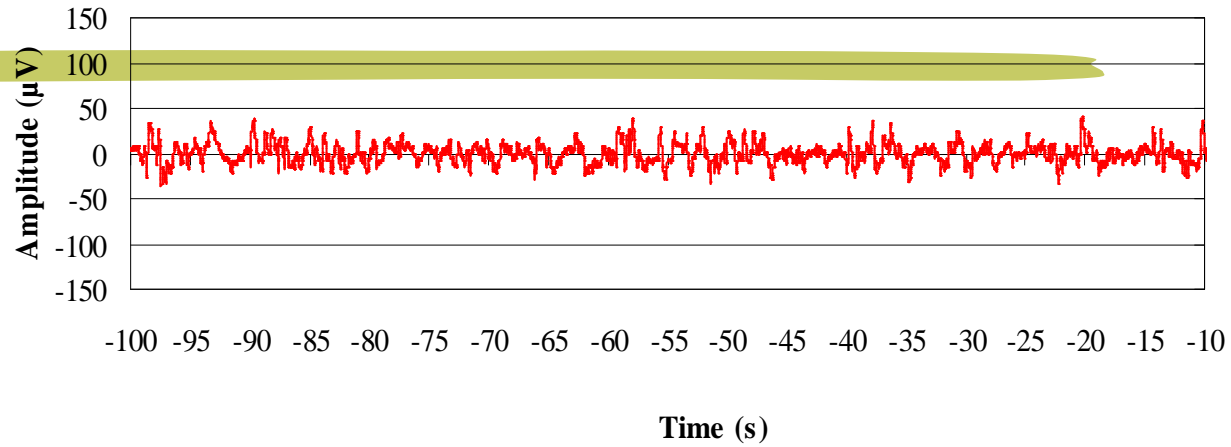
Recovery

# Animal Reflexes

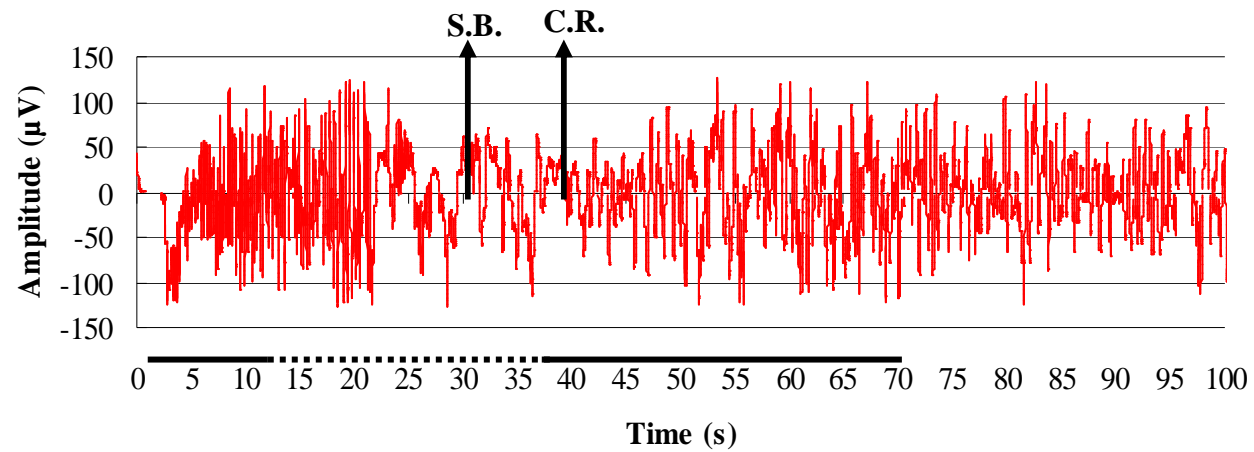
STUNNING



a) EEG before electrical stunning



b) EEG after electrical stunning





## Conclusions

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- AW can be measured objectively.
- Several measures has to be used, mainly animal-based ones.
- The "human factor" is of major importance in transport and slaughter
- Recommendations have to be tailored to each type of animal





# Acknowledgements

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- Dr. Antonio Velarde (IRTA)
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