Eligibility criteria and stunning interventions

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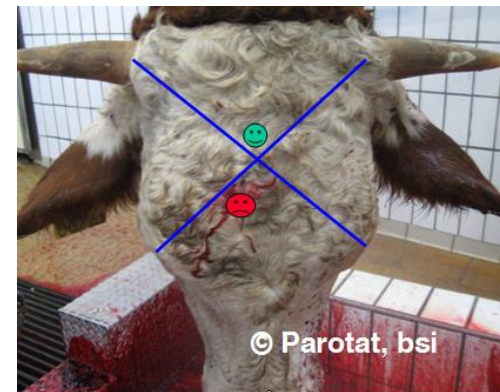European Food Safety Authority

Outline

- **Background**
  - Why is it so important to know about details of the stunning intervention?

- **Stunning interventions and parameters…**
  - Penetrative captive bolt
  - Electrical stunning
  - Modified atmosphere stunning (CO_2)

- **…some examples from practice**
  - Incomplete information about stunning intervention is misleading

- **Conclusions**

Example: Penetrative captive bolt stunning

- Quick penetration of the skull, transfer of energy to the animals head
- Bolt of adequate length, diameter and sharpness correctly placed and sufficiently accelerated
- Shock waves in the brain
- Instantaneous effect
- Quick effective bleeding

Schermer

KS or KR

buffer rings spring fixed

Cash Magnum .22 or .25

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parameters to report (as per guidance) example penetrative captive bolt stunning

- **Position and direction of the shot**
  - Restraining system
  - Position of captive bolt gun
  - Bolt penetration site

- **Velocity, bolt length and diameter of the bolt according to size and species**
  - Captive bolt gun characteristics
  - Cartridge or compressed air specifications
  - Bolt dimensions, mass and velocity
  - Type (e.g. beef or dairy cattle) and size of animal
  - Equipment maintenance, cleaning and storage conditions

- **Quality of bleeding**
  - Maximum stun to stick interval*
  - Sticking wound/ vessels cut

* mean/ median; range; std.dev/ interquartile range

Example: Electrical stunning

- Head only/ head to back (one/two cycle)
- Correct position, good electrical contact
- Current passing the brain
- Instantaneous effect, epileptic fit ≈grand mal epileptic seizure (tonic, clonic)
- Effect on the heart?
- Quick effective bleeding

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ECG

blood pressure

120

80

40 mm Hg

0

400 ms

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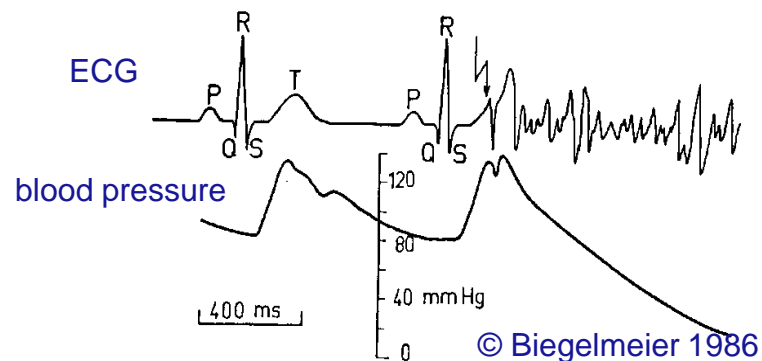
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parameters to report (as per guidance) example electric stunning

- Minimum current (current type, waveform, current level*, latency)

- Minimum voltage (exposed and delivered voltage*, if applicable)

- (Maximum ?) frequency

- Minimum exposure time*

- Maximum stun-to-stick intervals*

- Optimisation of current flow (electrode characteristics, appearance, animal restraining)

- Prevention of electrical shocks

- Position and contact surface area of electrodes (position and type of electrodes, animal skin conditions)

- Quality of bleeding

- Calibration

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* mean/ median; range; std.dev/ interquartile range

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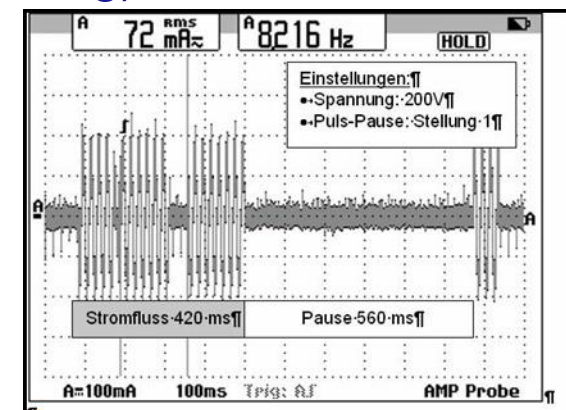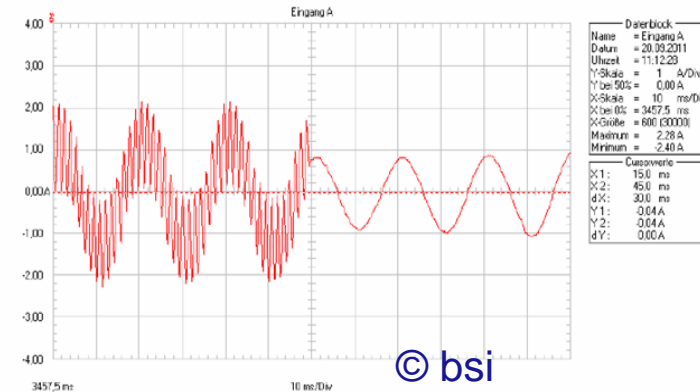
Example: Modified atmosphere stunning (CO2)

- <u>Pigs</u>: quickly enter high concentrations (>80% / > 90%)

- <u>Poultry</u>: slow induction using CO_2-concentrations below 40%, until the animal is unconscious

- Watch out for induction conditions

- Possible variation of gas concentration, position of stops in the dip, posittion of measuring points

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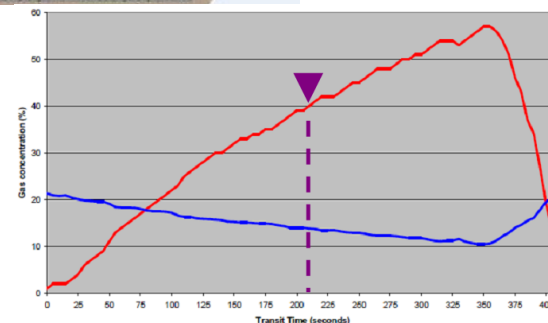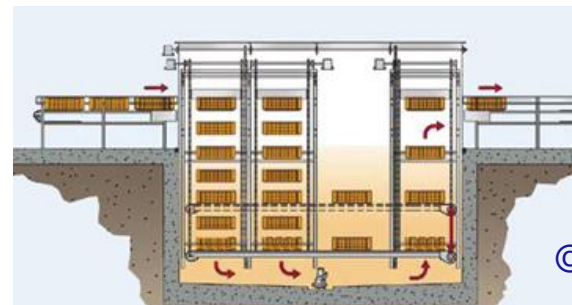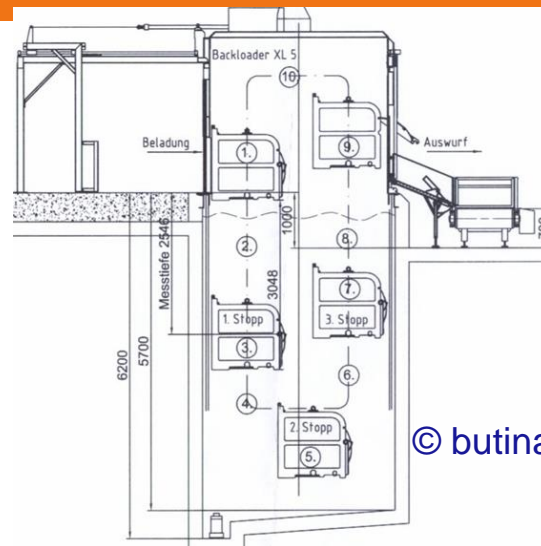
parameters to report (as per guidance)
example modified atmosphere stunning (CO2)

- CO2-concentration
  - Initial concentration*, gradient, targeted and final concentration*
  - Animal stocking density, species, breed, age
  - Monitoring, calibration of equipment

- Duration of intervention
  - Time to reach targeted concentration*
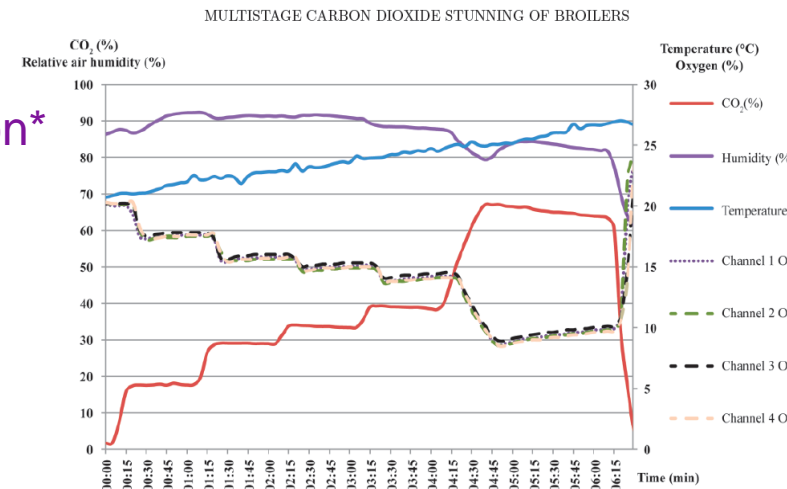 - Duration of targeted concentration*

- Quality of bleeding
  - Maximum stun to stick interval*
  - Sticking wound/ vessels cut

- Quality of the gas
  - CO2 source
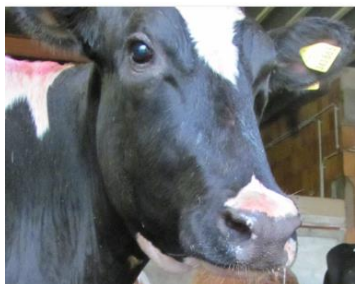 - Gas composition of the atmosphere

- Temperature of the gas

MULTISTAGE CARBON DIOXIDE STUNNING OF BROILERS

Figure 4. Course of CO_2 concentration, O_2, air RH, and temperature during a single run lasting 6 min, as observed in experiment 3.

GERRITZEN ET AL. 2013 Poultry Science 92:41–50
http://dx.doi.org/10.3382/ps.2012-02551

* mean/ median; range; std.dev/ interquartile range

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Conclusions

- **Every detail may be important**
- Confounding effects already by different characteristics of the stunning intervention
- Animal effect
- Effect of slaughter speed
- Level of uncertainty surrounding the evidence presented?
- Can results be generalised?
- Potential limitations of conclusions?

Any Questions?