Fundamentals and Future Directions in Poultry Stunning

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PAY ATTENTION TO DETAIL
Principles of humane stunning

• Important factors to consider:
  - How quickly does loss of consciousness occur?
  - Does the procedure cause pain or distress?
  - Are all animals stunned?
  - Is the duration of insensibility sufficient – reversible or irreversible?
Review

• Unique anatomy:
  • no diaphragm
  • hanging up-side-down (shackling) will exert pressure on heart
  • poultry are the only species that could be shackled prior to stunning and slaughter
• Scaly skin enriched with nociceptors
• Lack neocortex
• Nine air sacs (4 paired)
• Unidirectional air flow in lungs
• No lymph nodes
Electrical Waterbaths

• Stun poultry by passing birds through an electrically charged waterbath.

• Electric knife – current must pass through the brain.

• The electrical current passes through the brain, then the body and up to the shackle.

• Creates a petit-mal seizure.
Effective Electric Stunning

Depends on several factors:

- Amperage - commonly defined in terms of the voltage used but is actually the **amount** of electric current (measured in **amps** or milliamps) passing through the brain that is **important**

- Current measured in AMPs (A=V÷R).

- Time in the waterbath:
  - Min 4 seconds in low frequency
  - Min 10 seconds in higher frequency

- Height of the waterbath.

- Time to bleeding/effective bleeding.
Electrical Waterbath

- Reduce electrical resistance of the bird - wet shackles, food grade salt.

Minimum recommended RMS currents (mA) for water bath stunning

<table>
<thead>
<tr>
<th>Frequency (Hz)</th>
<th>Chickens</th>
<th>Turkeys</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 200 Hz</td>
<td>100</td>
<td>250</td>
</tr>
<tr>
<td>200 to 400 Hz</td>
<td>150</td>
<td>400</td>
</tr>
<tr>
<td>400 to 1500 Hz</td>
<td>200</td>
<td>400</td>
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</tbody>
</table>

European Food Safety Authority- AHAW/04-027
Electric Waterbaths

Pre-stun Electric Shocks:
- Painful
Waterbath

• Bleeding as soon as possible – 15 seconds.
• Waterbath must an adequate depth for the size of bird – to the base of the wings.
Determining Insensibility

- In a properly stunned bird:
  - neck arched with head held vertically.
  - no rhythmic breathing.
  - rigidly extended legs.
  - constant, rapid body tremors.
  - absence of a third eyelid (nictitating membrane) reflex.
  - wings held tightly against body.
Unloading/Shackling

- Blue or low-intensity lighting should be used – will calm birds.
- Recommend use of a breast comforter.
- Recommend regular breaks for staff.
- Escaped birds must be caught ASAP.
Bleeding

- A ventral neck cut is made across main blood vessels:
  - Carotid arteries
  - Jugular veins

- Birds are bled in order to:
  - Ensure animal is dead
  - Drain as much blood as possible
  - Improve quality of meat
Shackling

- Lift birds using both hands – one leg per hand
- No squeezing or tugging into shackles
- Place firmly but gently
Pre-Stun Shocks
CO\textsubscript{2} Stunning – the welfare debate

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages??</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduced handling</td>
<td>Relatively slow</td>
</tr>
<tr>
<td>Reduced isolation stress</td>
<td>Pain?</td>
</tr>
<tr>
<td>Reduced chance of error?</td>
<td>• CO\textsubscript{2} converted to acid</td>
</tr>
<tr>
<td>Other non-welfare benefits</td>
<td>Dyspnea?</td>
</tr>
<tr>
<td></td>
<td>• Unpleasant sensation of breathlessness</td>
</tr>
<tr>
<td></td>
<td>• Respiratory stimulant</td>
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<tr>
<td></td>
<td>Convulsions?</td>
</tr>
</tbody>
</table>
Electric vs. CO2 stunning

**Electric stunning system**

1. Arrived at slaughter
2. Shackling
3. Hanging to stunner
4. Stunning
5. Throat cut
6. Bleeding time
7. Scalding

**CO₂ Gas stunning system**

1. Arrived at slaughter
2. Gas stunning
3. Shackling
4. Throat cut
5. Bleeding time
6. Scalding
Gas-stunning

two types of gas stunning used in slaughter facilities:

- Controlled Atmosphere Killing (CAK)
- Controlled Atmosphere Stunning (CAS) – where animals/birds are simply rendered *unconscious* prior to processing.

In each case, birds are taken directly from the transport vehicles in their crates or modules and the modules are then inserted into a chamber where the gas is applied.
The gas can be a mixture of nitrogen and argon or singularly, carbon dioxide.

Systems that use argon and nitrogen have a longer holding time and are intended to kill the bird prior to neck cutting.
CO2 Gas-stunning

The birds are then moved along the conveyor into a three stage, horizontal, CO2 gas stunner.

Picture courtesy of Anglia Autoflow, manufacturer of Maple Lodge Farms’ CO2 System.
CO2 stunning

CO2 stunning is often criticized because the earlier systems provided the birds with one single high concentration of CO2.

Birds show aversive reactions to high concentrations of CO2, violently flapping their wings and gasping. This was a poor welfare outcome.

Three phases of gradually more concentrated levels of CO2, therefore avoiding an aversive reaction.
Benefits of Gas Stunning

Improved working conditions for poultry workers:

- The overall poor conditions result in a high turnover rate among slaughterhouse workers which is costly from both a welfare and economic perspective.
Effective Stunning

In a properly stunned animal:
• Bird should be limp, floppy.
• No righting reflex.
Bird Welfare Audit Criteria

• Poor stunning:
  – Birds must be rendered insensible by the stunner, check amperage, both legs in shackles.

• Poor cutting:
  – Birds must be effectively cut, no live birds in the scalder.
Auditing Poultry Welfare

Acts of Abuse or Neglect

- Throwing birds
- Stomping on birds
- Putting live birds in the trash
"A smidge to the left."
MENU CHOICES FOR THE DAY

☐ Energetic
☐ Caring
☐ Vital
☐ Creative

☐ Angry
☐ Disinterested
☐ Cynical
☐ Bitter
Agriculture as a Profession

“Of course it’s because animal welfare depends on so much more than just the physical environment. It depends strongly on the quality of animal care that the animals receive. This in turn depends so much on the knowledge, skill and attentiveness of the producers and staff.”

Dr. David Fraser, University of British Columbia
Questions?