Handling, Stunning, and Determining Insensibility in Cattle and Sheep, 2nd Edition

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Humane Slaughter Act

All animals are rendered insensible to pain by a single blow or gunshot or an electrical chemical, or other means that are rapid and effective
All Methods of Stunning
Definitely Conscious

- Remains standing
- Head or body right reflex
- Voluntary vocalization
- Spontaneous blinking (do not confuse with nystagmus)
- Eye pursuit
- Response to threat test-No touching
  (Terlouw, et al., 2016)

If any one of these indicators is present, the animal is conscious.
All Methods of Stunning

- Definitely unconscious – Brain dead
- Absence of corneal reflex to touch
- Absence of eyelid reflex to touch
- Absence of rhythmic breathing (do not confuse with gasping)

(Terlouw et al., 2016; Verhoeven, et al., 2016)
There is a gray zone of transition between definitely conscious and definitely brain dead. There would be situations where an immediate second captive bolt prevents return to sensibility and would not violate the Humane Slaughter Act.
All Methods of Stunning

- Situations where a second shot application of the electric stunner prevents return to sensibility.
- Weak corneal reflex
- Eyelid reflex
- Rhythmic breathing
- All indicators of definite consciousness must be absent.
All Methods of Stunning

- Before invasive dressing procedures start after bleeding
- All indicators of definite consciousness and definitely unconscious or brain dead must be absent
Trouble Shooting Handling and Stunning Problems

1. Excessive electric prod use due to distractions
2. Stunner maintenance
3. Employee training issue
4. Ergonomics or design
5. Cattle can see people
6. Slipping on the floor causes agitation
Humane Slaughter Regulations
9 CFR.313.2

- Driving livestock “minimize excitement and discomfort”

- “Any use of such implements (referring to electric prods or other driving implements) which, in the opinion of the inspector is excessive, is prohibited”
Humane Slaughter Act

- Dragging sensible downed animals forbidden
- Animals must have water in holding pens
Animal Avoids Walking on the Reflection
Bright Green Hose May Cause Animals to Stop
Most Common Distractions

- Reflections on water or metal
- Air blowing towards approaching cattle
- Moving people or equipment
- Chute entrance too dark
- Visual cliff in conveyor restrainer
- Shadows high contrasts
Animals going into the slaughter plant are afraid of little things people do not notice.
Tell Me Four Simple Ways to Improve Handling
Easy Fixes to Reduce Balking

1. Hang a curtain in front of the restrainer
2. Move a ceiling light to eliminate a reflection on wet shiny surfaces
3. Change color of employee hats or coats to reduce contrast
4. Change where people stand
5. Experiment with lights – cattle approach light
6. Flooring in crowd pens and chutes should look the same
Handler Movement Pattern to Keep Cattle Moving into a Squeeze Chute or Restrainer

Cattle will move forward when the handler passes the point of balance at the shoulder of each animal. The handler walks in the opposite direction along side the single file race.
Training Employees

1. Flight zone principles
2. Point of balance
3. No yelling
4. Move cattle in small groups
5. Fill crowd pen half full
6. Get electric prods out of people’s hands
Causes of Increased Vocalization

1. Electric prod use
2. Missed stuns
3. Excessive pressure from restraint device
4. Sharp edges on restrainer devices
5. Isolated animal
6. Slipping
Metal rods welded to the floor prevent rapid small slips (jigging)
Well-designed stun box with an adjustable side
Well Designed Stun Box
Non-slip Flooring on Restrainer Entrance is Essential
Correct stun

Incorrect stun
Captive Bolt Positions Cattle

AVMA, 2016
Captive Bolt Positions Sheep

A

B

AVMA, 2016
Captive Bolt Positions Pigs

AVMA, 2016
Captive Bolt Positions Goats

AVMA, 2016
Cartridge Fired Stunner
Must Keep Cartridges Dry
Poor maintenance of captive bolt stunners is a MAJOR cause of captive bolt failure.
Stunning with a pneumatic powered captive bolt

Note curtain to block the vision of the next animal
Cardboard to prevent cattle from seeing through cracks
Case Study
Beef Plant

- Blocked sunbeams with tarps
- Blocked view of people near the crowd pen with cardboard
- Blocked view of people walking in front of the restrainer with a curtain
- Illuminated the restrainer entrance with a portable light
- Stopped overloading of the crowd pen
Head holding devices are essential if non-penetrating captive bolt is used.
Non-penetrating captive bolt used with head holder
Head Holder For Use With Non-Penetrating Captive Bolt
Indentation in the skull from non-penetrating captive bolt
Non-Penetrating Captive Bolt

- Require more precise positioning than penetrating

- Effective stunning and brain damage are opposing goals

- Less effective on cattle with thick hair. Will not work on large bulls

- Effective on cattle with short hair
Electric Stunning of Cattle in a Head Holder
New Zealand System

![Image of a cattle being stunned in a head holder system](image-url)
Electric stunning with too much resistance is not effective.
Effective Electric Stunning
Continuous Wetting

Be careful not to create a new circuit over the surface of the animal with water
Requirements for Effective Electric Stunning

- Low resistance
- Maintain firm contact
- Head restraint
- Systems that ground out through the floor often work poorly
- Works poorly on dehydrated animals
Head Holder for the Center Track Restrainer
Steer in head holder on the center track restrainer
Differences in Reactions of Insensible Animals

- Nystagmus (vibrating) eye must not be confused with natural spontaneous blinking. Nystagmus is permissible after electric or CO$_2$ stunning. It must be absent after captive bolt.

- Gasping like a fish out of water must not be confused with true rhythmic breathing. Gasping is permissible after electric or CO$_2$ stunning. It must be absent after captive bolt.
After captive bolt, the eye should have a wide, blank stare and not be rotated.

Corneal reflex must be absent before bleeding, after captive bolt.

Corneal reflex may be present in unconscious animals prior to bleeding.
Correctly Stunned Animal With Penetrating Captive Bolt Completely insensible
Correctly stunned animal with non-penetrating captive bolt bleed within 60 seconds
Sensible bovine with righting reflex

(Photo not from U.S.)
It is normal to have kicking in a correctly stunned animal

The tail relaxes or spinal reflexes subside
- Paddling kicking motions can occur in unconscious animals.
- Reaction to bleeding knife can occur in unconscious animals

Terlouw et al., 2015
Head *Must* be Dead!

Ignore the Body
Immobilizer covers up signs of insensibility. Turn off to determine insensibility
The animal should be held in an upright position for religious slaughter.
Small Animal Restrainer for Kosher or Halal Slaughter

www.Spiritofhumane.com
www.sheepandgoat.com
Welfare Tips for Religious Slaughter Without Stunning

- Calm animals lose sensibility faster
- Fast knife strokes are more effective
- Perform throat cut immediately after restraint
- Vocalization score of 5% or less
- Knife is twice the width of the neck
- Release pusher gate and head restraint after the cut
Time to Eye Rollback and Collapse at a Kosher Plant

<table>
<thead>
<tr>
<th></th>
<th>Good Technique</th>
<th>Poor Technique</th>
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<tbody>
<tr>
<td>Avg. time to collapse</td>
<td>17 seconds</td>
<td>33 seconds</td>
</tr>
<tr>
<td>Longest time</td>
<td>38 seconds</td>
<td>120 seconds</td>
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<tr>
<td>Percentage collapsed in 30 seconds</td>
<td>94%</td>
<td>68%</td>
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Cattle Should be Cut Close to the Jaw in C1 Position

- Facilitates bleed out and helps prevent arteries from sealing off
- Cuts sensory nerves that transmit “potentially unpleasant sensory signals associated with blood contaminating the upper and lower respiratory tract.”

N.C. Gregory, 2011; Gibson et al., 2015
- Stunning before slaughter is permitted by many Muslim religious authorities (Nakyinsige et al., 2013; Farouk, 2013)

- The heart continues to beat after captive bolt stunning (Vimini et al., 1983; Jeristrom, 2014)
Halal slaughter with head only electric stunning
Head Only Stun

- Must be bled within 20 seconds; 10 seconds recommended
- Tonic and clovic seizure spasm indicates and effective stun
There is a Zero Tolerance for Hoisting an Animal that is Showing Obvious Signs of Sensibility

There is Zero Tolerance for Skinning, Scalding, Dehairing or Removal of Any Body Part on an Animal that Shows any Sign of Partial Return to Sensibility
<table>
<thead>
<tr>
<th>Behavior</th>
<th>Score</th>
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<tbody>
<tr>
<td>Stunned with one shot</td>
<td>95%</td>
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<tr>
<td>Insensible</td>
<td>100%</td>
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<tr>
<td>Electric prod</td>
<td>25%</td>
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<tr>
<td>Falling down</td>
<td>1%</td>
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<tr>
<td>Vocalizing</td>
<td>3%</td>
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<tr>
<td>Vocalizing with head holder</td>
<td>5%</td>
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Humane Slaughter Act

- “All animals rendered insensible to pain by a single blow or gunshot”

- Problem for the industry – Absolute perfection is impossible – High standards are possible

- In 2014, 2015 scored three high speed plants. The stunning scores were 100%, 99%, and 100%.
USDA/FSIS Robust Systematic Approach for Humane Slaughter Requirements

- Written Procedures – SOPs for staying in compliance, includes corrective action for a noncompliance
- Written Records of evaluations, internal NAMI audits, stunner maintenance log and employee training
- FSIS – Review of records and written procedure
- Is similar to a HACCP Plan
USDA/FSIS Definition of Egregious Inhumane Treatment

“An egregious inhumane treatment is any act or condition that results in severe harm to animals.”

FSIS Directive 6900.2, Revision 2
Useful FSIS Sources on the Internet

- Humane Interactive Knowledge Exchange (HIKE) Scenarios
- Humane Handling Enforcement Actions – List All Regulatory Actions
- Type titles into Google