

PERUGIA ETRUSCA 2025 MEETING

Haluk ANIL

Animal welfare and preparing livestock for transport and slaughter

Italy, June 2025

LEGISLATION

Legislation list

***COUNCIL REGULATION (EC) No 1/2005
on the protection of animals during transport
and related
operations and amending Directives 64/432/EEC
and 93/119/EC and Regulation (EC) No 1255/97***

***COUNCIL REGULATION (EC) No 1099/2009 on
the protection of animals at the time of killing***

***EFSA Opinion of the Scientific Panel on Animal
Health and Welfare on a request from the
Commission related to welfare aspects of the
main systems of stunning and killing the main
commercial species of animals***

OIE Terrestrial Animal Health Code (2016)

ON FARM KILLING

There are a variety of methods available for emergency killing of animals:

- ☐ *Lethal injection*
- ☐ *Free-bullet firearms*
- ☐ *Captive-bolt stunning followed by bleeding or pithing*
- ☐ *External trauma followed by bleeding*

On Farm killing for transport and human consumption

When animal can walk:

- ☐ ☐ *Ante-mortem inspection by a Veterinarian and at the abattoir*
- ☐ *Electrical stunning or captive bolt*
- ☐ *Captive-bolt stunning followed by bleeding or pithing*

On Farm killing for transport and human consumption

When animal can NOT walk:

☐ *Ante-mortem inspection by a Veterinarian and Certificate required*

Depopulation of poultry for slaughter

Removal from shed/cage

Loading into crates

Modular crates on lorries

Heat stress and DOAs

Transport and welfare

- **Cattle and sheep**
 - **Overcrowding**
 - **Long journeys**
 - **Injury before and after loading**
 - **Meat Quality**
- **Poultry**
 - **Heat stroke**
 - **DOAs**



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Wool pull damage in sheep



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Animal Welfare at Slaughter



pH decline determines meat quality. If 5.5 to 5.7 is reached within 48 minutes it is regarded as PSE.

Glycogen depletion results in less lactic acid production. In this case the meat will be very dry and dark in colour. This condition is known as Dark Firm Dry (DFD) meat.



Animal Welfare at Slaughter

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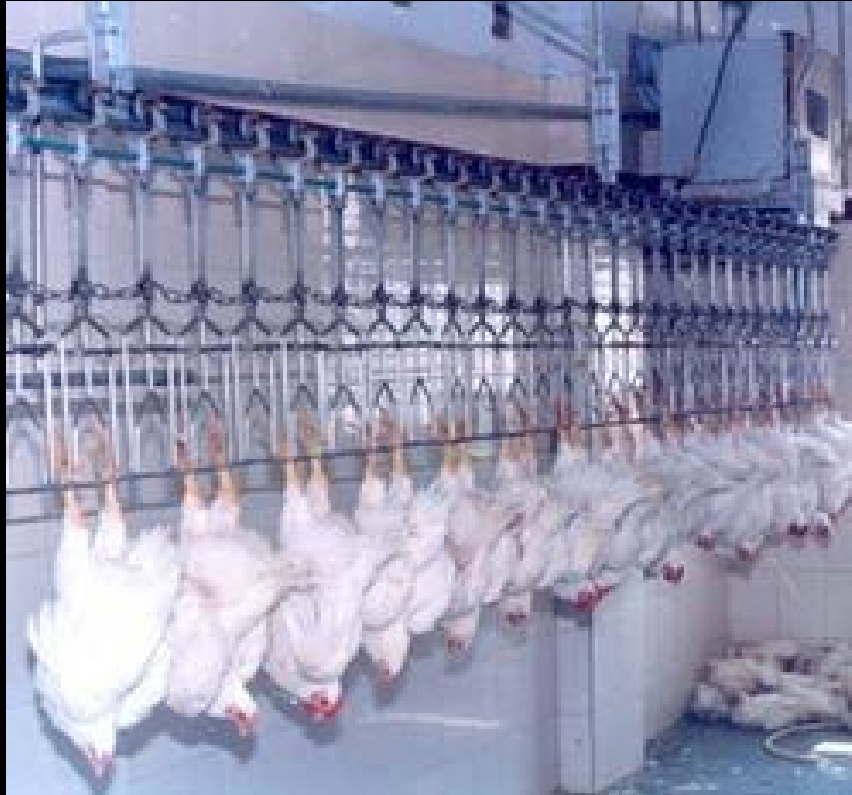


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Preslaughter handling cattle

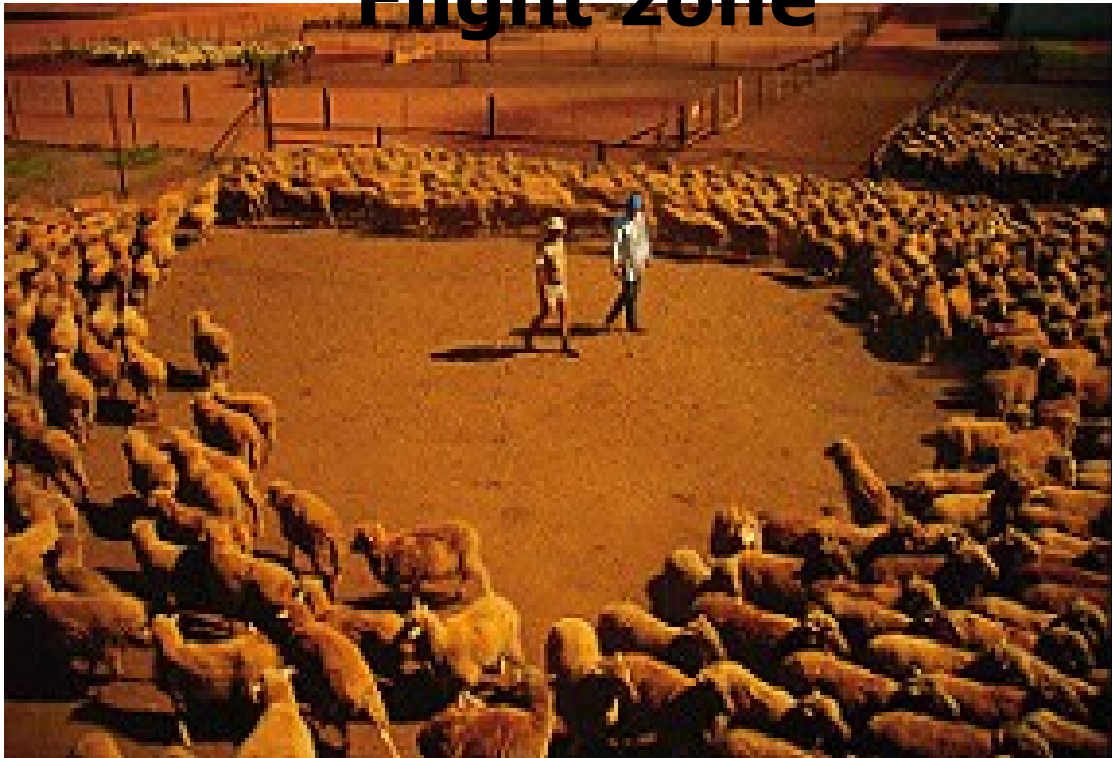
Minimise stress by:

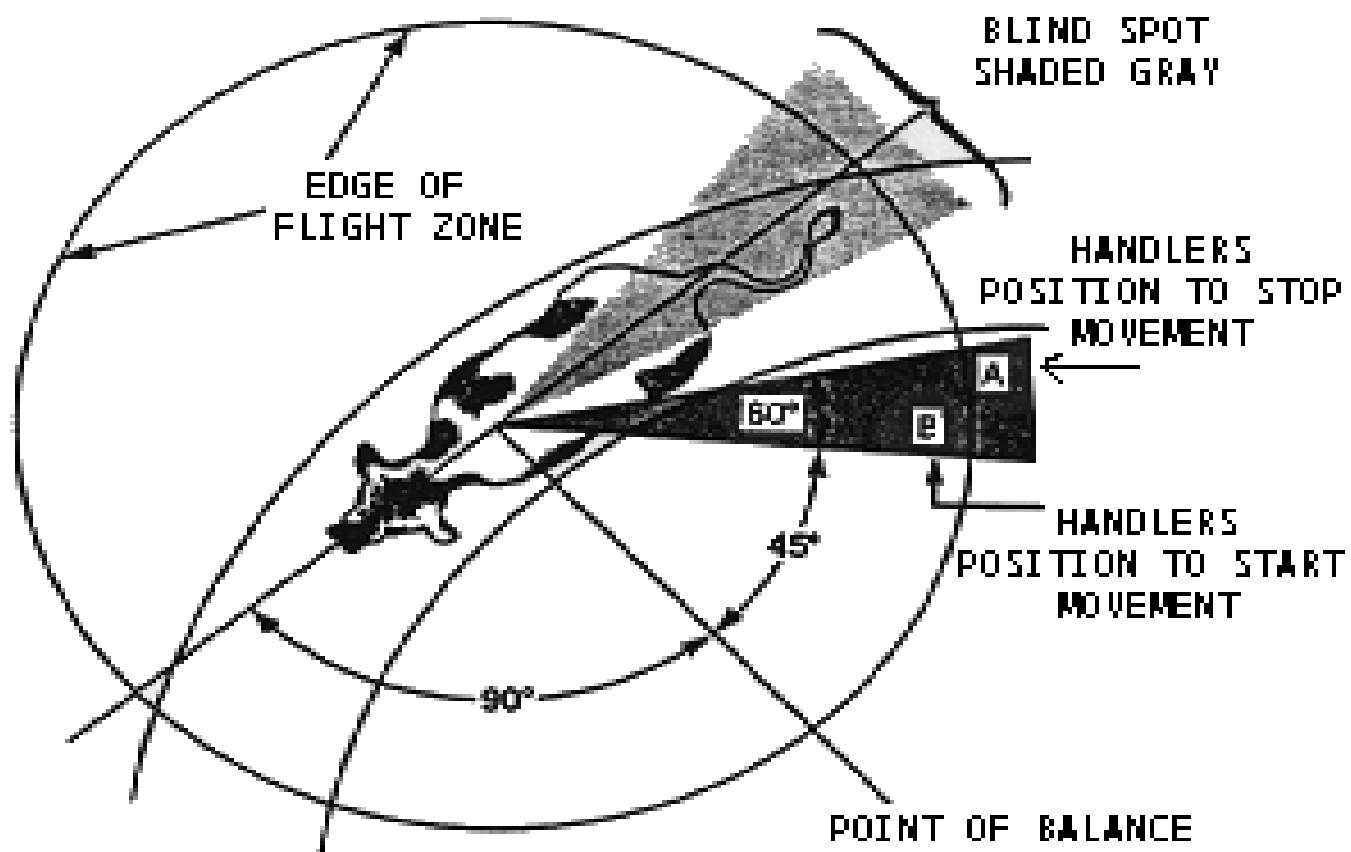
- **Good handling**
- **Rest animals**
- **Avoid distractions**
- **Prevent potential injury**
- **Guide animals through curved races**
- **Good lighting**

AND Improve:

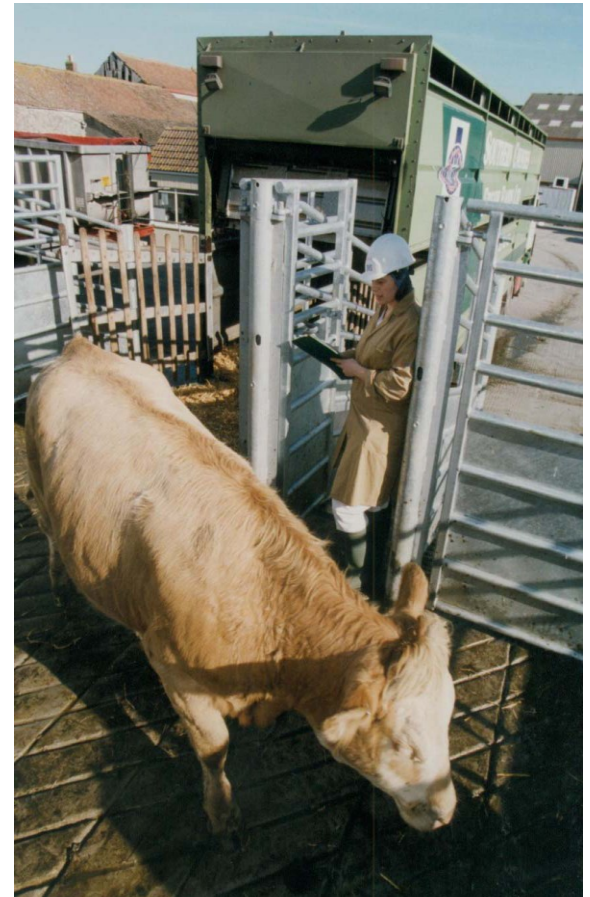
- **Animal welfare**
- **Meat quality**

Same principles apply: Flight zone





Unloading



Pen design and layout



Race design



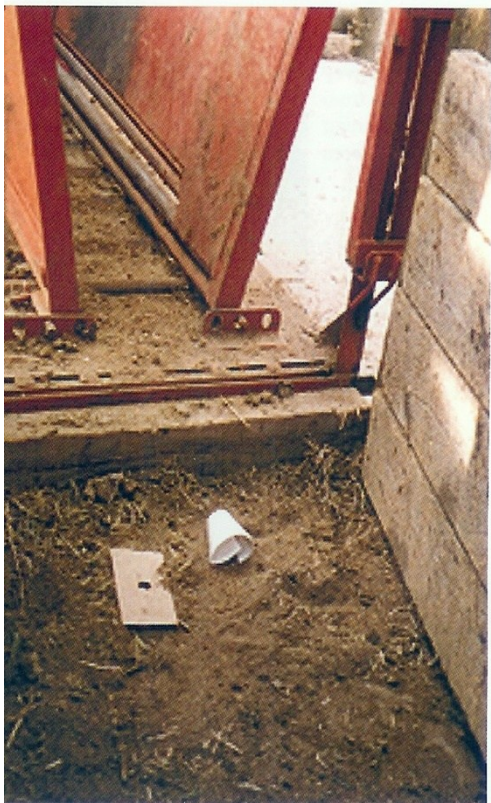
Cattle race design



Cattle race design



Avoid obstacles



Preslaughter handling, no pen



Cattle slaughtered by muslim method

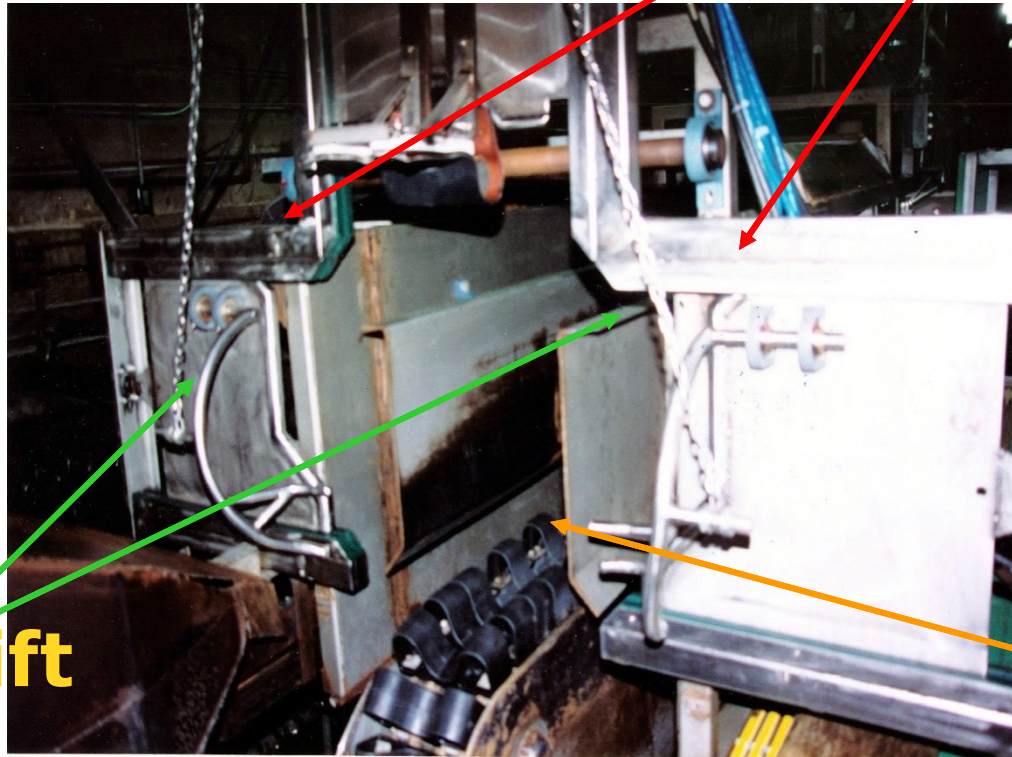


**Animal hoisted onto bleed rail.
Note next animal being led into slaughterhall.**

Stunning restraining conveyor for cattle

View
from
front

Neck
restra
int

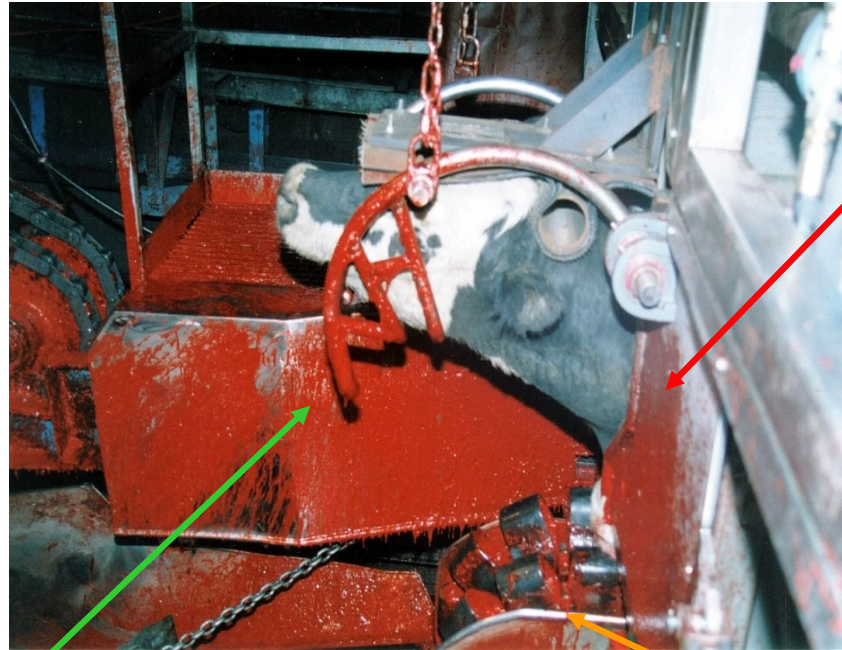


Chin lift

Monorail

Stunning restraining conveyor for cattle

View
from
front



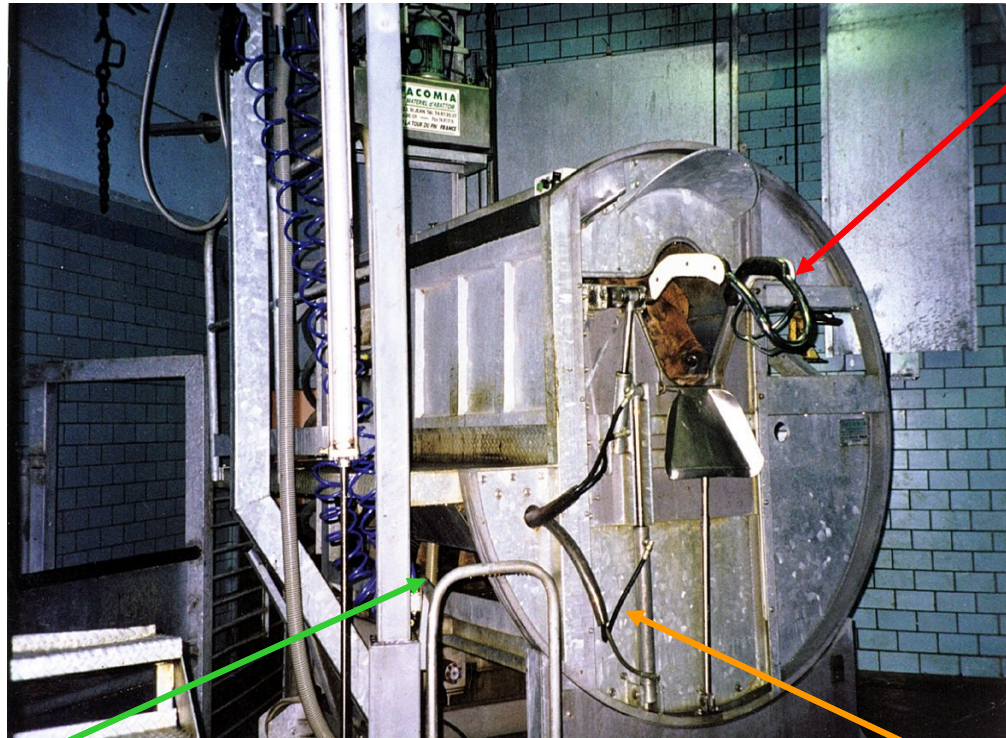
Neck
restra
int

Chin lift

Monorail

Facomia restraining pen for cattle

View
from
front



Chin
lift

Belly lift

Rotating pen

Restraining methods: Example cattle

v. Holleben, Volzendo, Anil
2010

see www.grandin.com

- upright restraint,

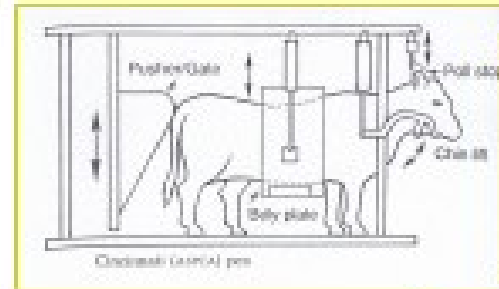
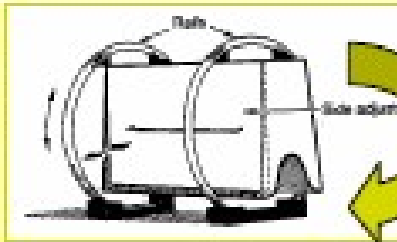


photo NAV
NL

- inverted 180° (on the back)



- inverted 45°/90° (on the side)

* dialrel

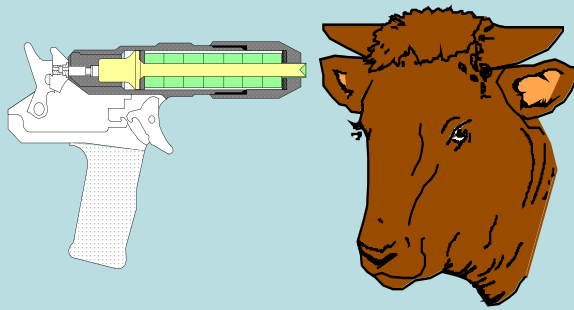
Photo only to be taken as
an example for self
constructed equipment;
Rotary pens can be also
used for turning to 45°/90°



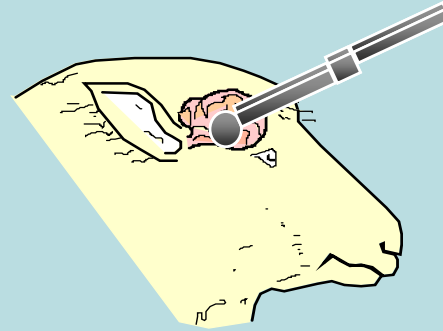
Dialrel Final WS 15th and 16th March 2010, Taksim, Istanbul

STUNNING METHODS

Mechanical Stunning



Electrical Stunning



Gas Stunning

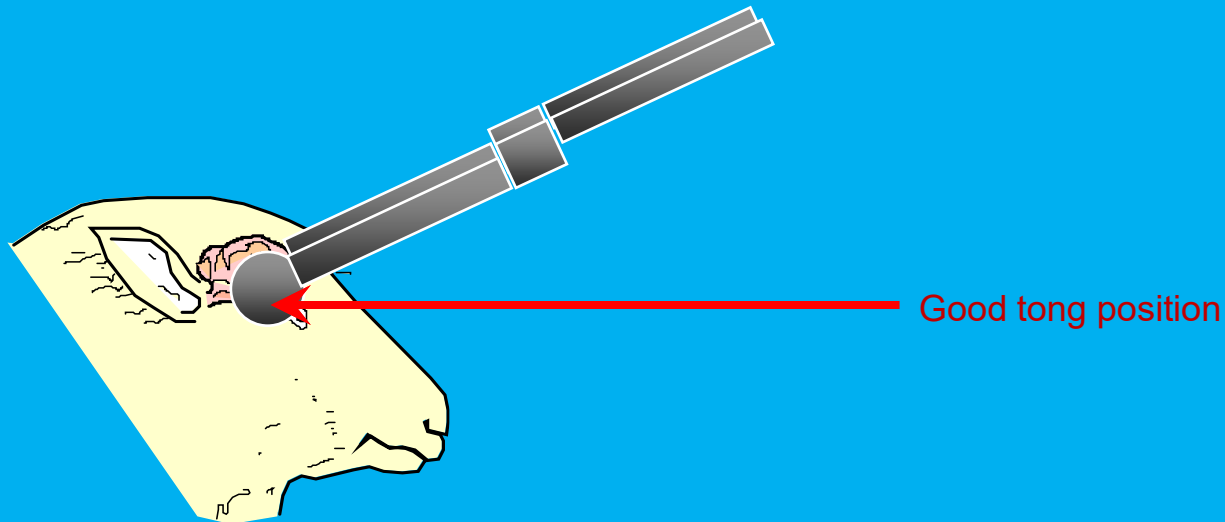


Other novel methods



PRIMARY AIM OF ELECTRICAL STUNNING

Electrical stunning is aimed at producing..... EPILEPSY

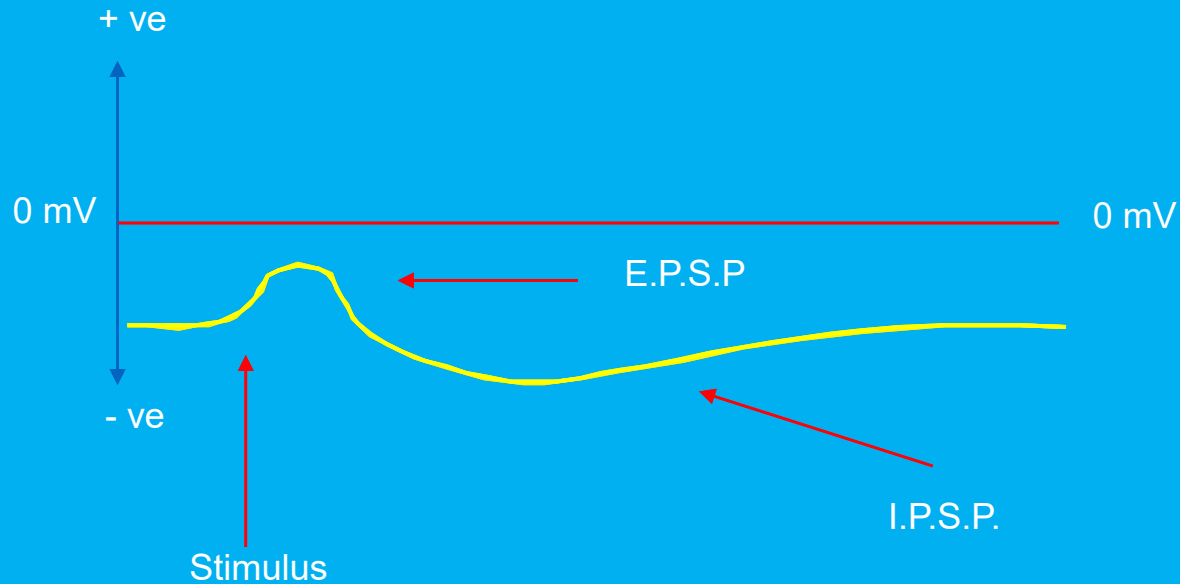


IDEAL ELECTRODE POSITION IN SHEEP



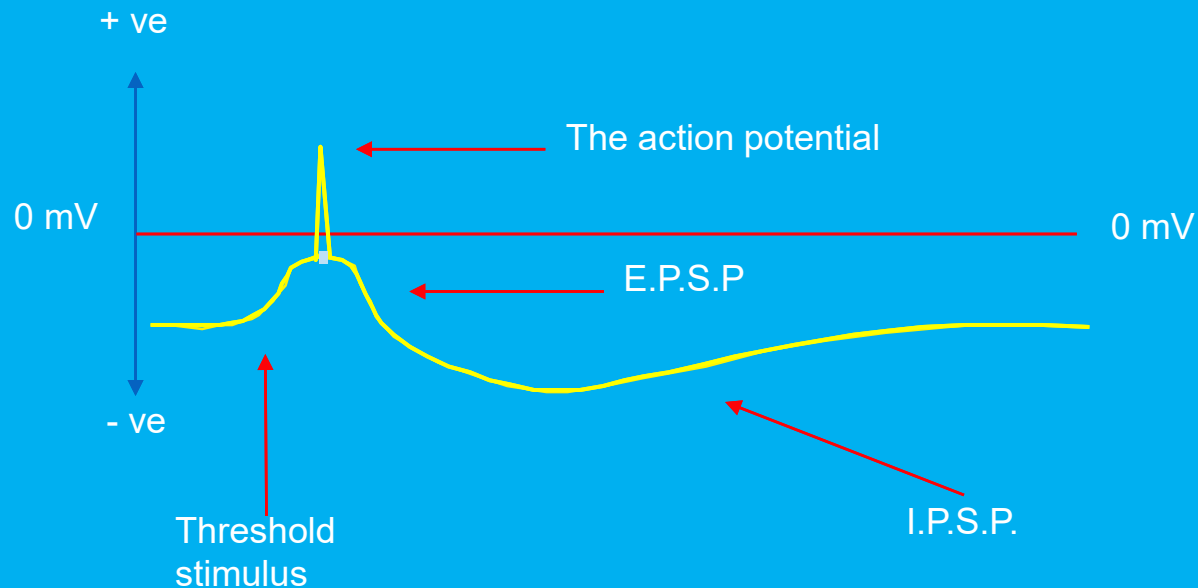
THE PHYSIOLOGY OF EPILEPSY

The electrical activity of a neuron



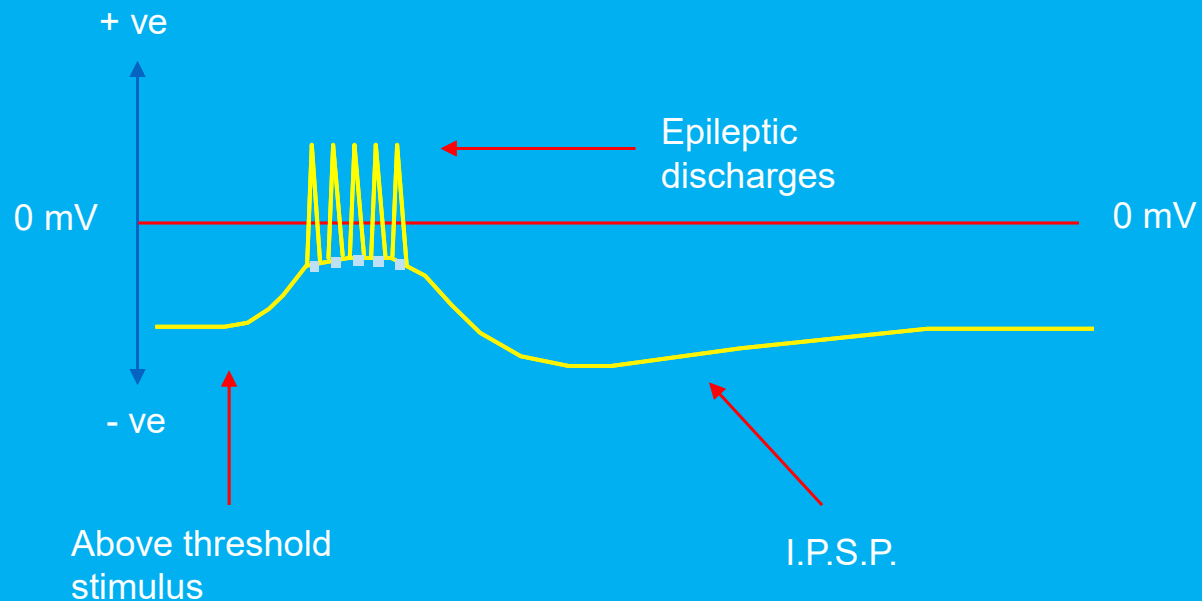
THE PHYSIOLOGY OF EPILEPSY

The electrical activity of a neuron



THE PHYSIOLOGY OF EPILEPSY

The electrical activity of a neuron





$$I = I_0 \sin 2\pi ft$$

where I_0 = maximum (peak) value of the current

t = time

f = frequency, 60 cycles per sec (cps)

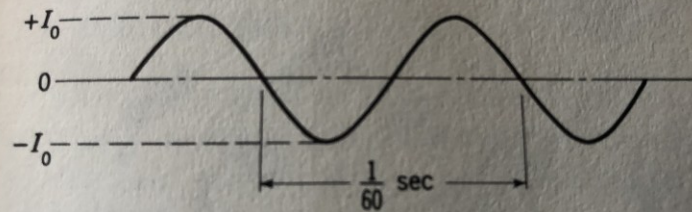
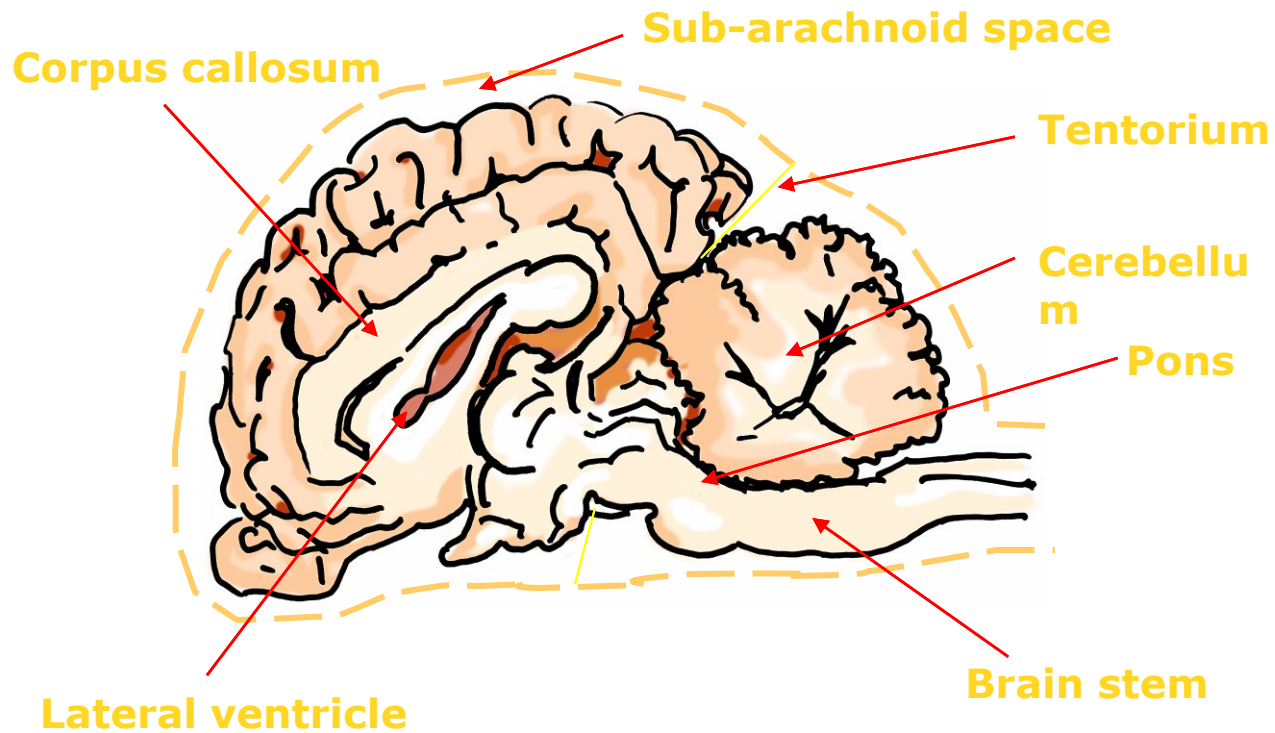


FIG. 2-3 A 60-cps sinusoidal alternating current.

Mid-sagittal section of bovine brain



Animal Welfare at Slaughter

“The purpose of any method of stunning is to render the animal immediately unconscious until it is dead”

- *The Welfare of Animals (Slaughter or Killing) Regulations 1995* UK

New WATOK Reg

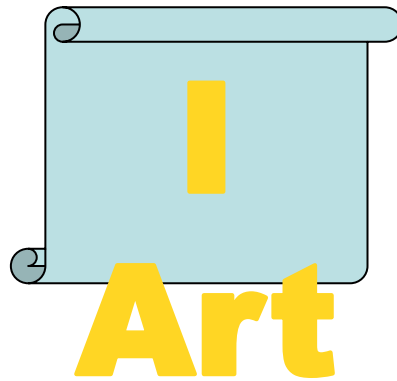
European Community, 2009. COUNCIL REGULATION (EC) No 1099/2009 (In Force January 2013)

OIE Standards

PLUS Halal Standards eg SMIC, GSO, MS

1099/2009 REGULATION AND RELIGIOUS SLAUGHTER

For animals subject to slaughter prescribed by religious rites, the requirements of paragraph 1 shall not apply provided that the slaughter takes place in a slaughterhouse



Head only electrodes (Valhalla)



The two 'leaf electrodes' hang down positioned to contact the pig between the eyes and the ears for a 'head only' stun. The whole electrode montage moves forward with the pig in the moving V restraint. The electrode positioning is crucial as is the condition of the electrodes.

EFSA Risk Assessment- WRAPSTUN

Table 8.3. Commonly used systems and factors that affect animal welfare during stunning for slaughter or killing of selected species.

	Pen	Passageway	Race into stunning area	Restraint	Stunning box
Bulls	Familiar groups Mixing reduces welfare	Single file race	Curved/straight race	Head restraint/yoke or free standing	For captive bolt or electrical stunning

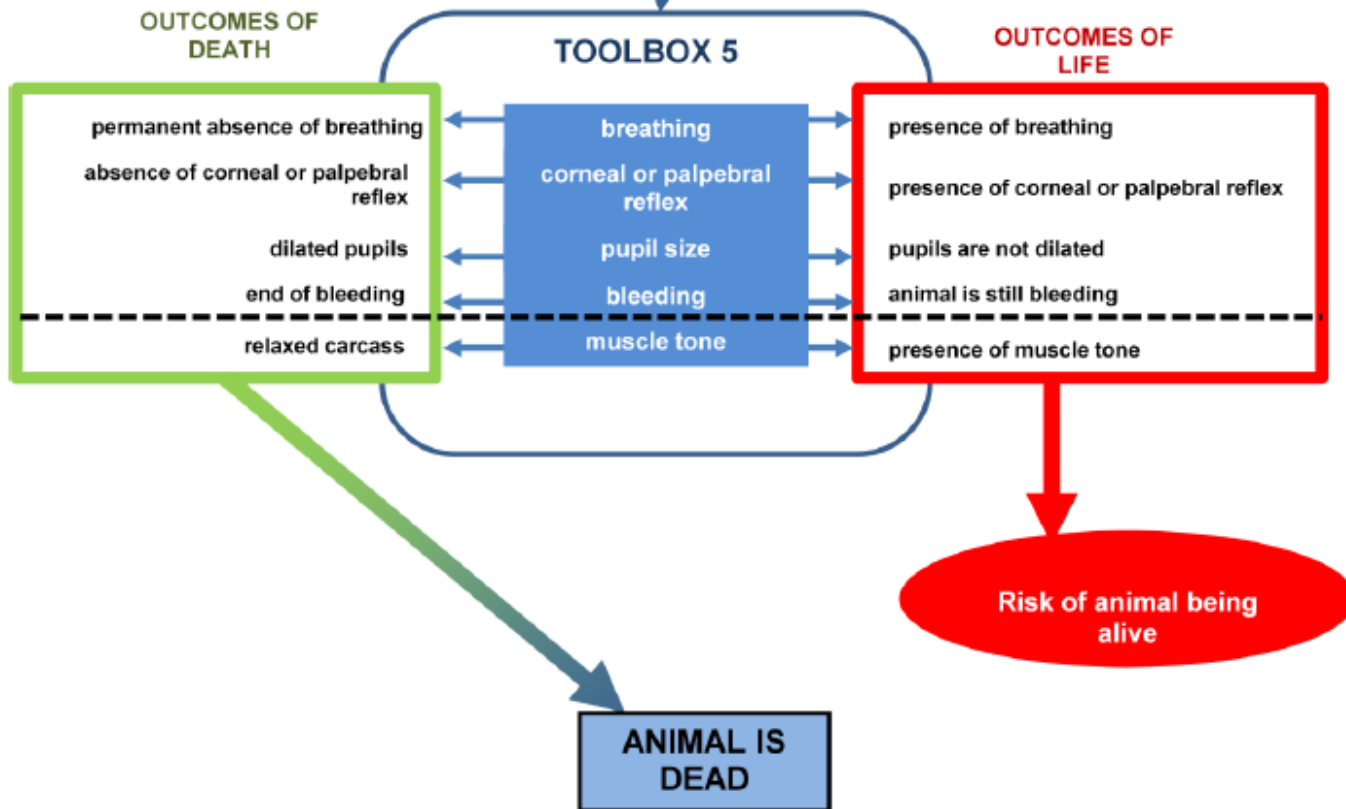
EFSA Risk Assessment-WRAPSTUN

Table 9.3. Good stunning/killing practices (GSKP) and critical control points (CCP) in slaughter cattle; holding pen.

Hazards from RA	Factor	Dos	Don'ts	GSKP	CCP
Height and dimensions	Appropriate for animal size		Do not not overcrowd		CCP
Structure of pen	Solid sides, partially open sides, short side, sharp objects,	Check obstacles, avoid overcrowding	Do not not overcrowd	GSKP	
Floor surface and condition	Slipperiness, gaps, potholes, steps, too rough,	Provide rough surface	Do not allow slippery material to build up	GSKP	
Bedding	Available, unavailable, wet, dirty, faecal contamination	provide bedding	Do not allow dirty/faecal material to build up	GSKP	
Gates	Design (vertical or horizontal opening, opening size), gate handle type	Reduce noise, fit buffers	Reduce clanking noise	GSKP	
Sensory input	Smell, glaring objects, light intensity, sudden change of light, overall noise	Provide adequate lighting, avoid dark areas	Avoid dark areas,	GSKP	
Air quality	Noxious gasses, weather conditions, ventilation, temperature (high or low), humidity	Improve ventilation		GSKP	
Handlers	Hitting, shouting	Instruct to stop practice, provide training(long-term)	Do not allow hitting, employ trained personnel'		CCP
	Untrained handlers, lack of motivation	Instruct to stop practice, provide training(long-term)	Do not employ untrained personnel		
Use of driving tools	Use of prods, electric goads, sticks,	Instruct to stop practice, provide training(long-term)	No Electric goads employ trained personnel'	GSKP	
	Rattles, soft brushes, automatic gates and transfer			GSKP	
Stocking density	Overcrowding (Standard 500 to 600 kg/m2)		Do not Overcrowd/ employ untrained personnel	GSKP	CCP
Mixing	Aggression, fighting, mounting behaviour	Keep groups together employ trained personnel'	No mixing	GSKP	CCP
Drinker availability	No drinkers available	Provide Drinkers			
Food availability	No food available	Provide Food			

SLAUGHTER WITHOUT PRIOR STUNNING

Key Stage 1 (prior scalding): check for outcomes of death



$$I = I_0 \sin 2\pi ft$$

where I_0 = maximum (peak) value of the current

t = time

f = frequency, 60 cycles per sec (cps)

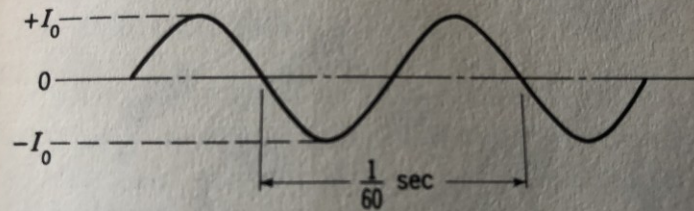


FIG. 2-3 A 60-cps sinusoidal alternating current.

CAPTIVE BOLT STUNNING OF CATTLE



Dr Haluk Anil

CAPTIVE BOLT STUNNING

Aim : Disruption of brain activity by concussion

Types of guns

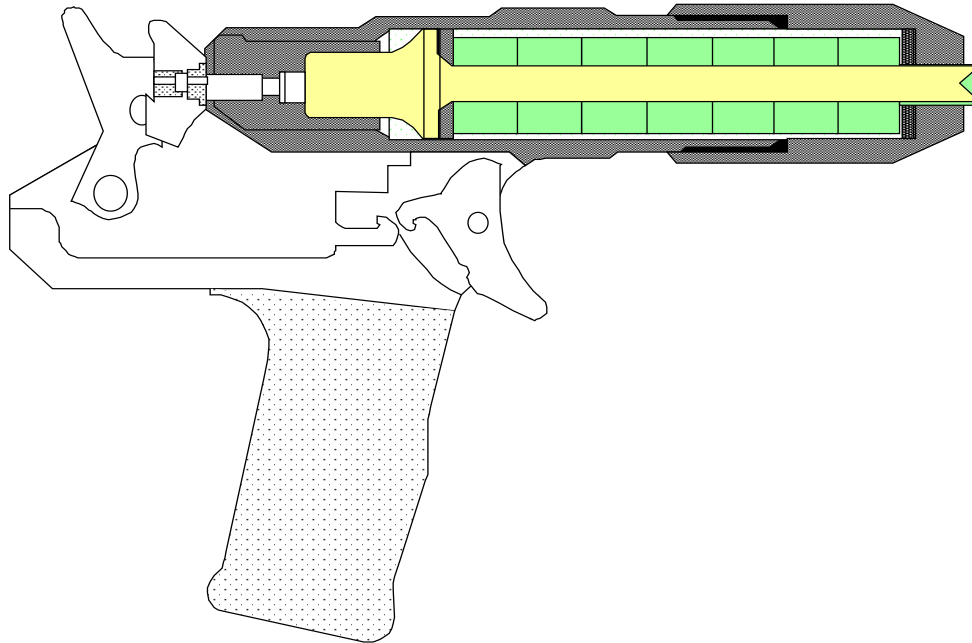
Penetrating :

- **Blank cartridge, air injected bolt, air operated bolt with air injection**
- **free bullet (horses)**

Non - penetrating (blow to head) :

- **Mushroom head gun, cash knocker (religious slaughter)**

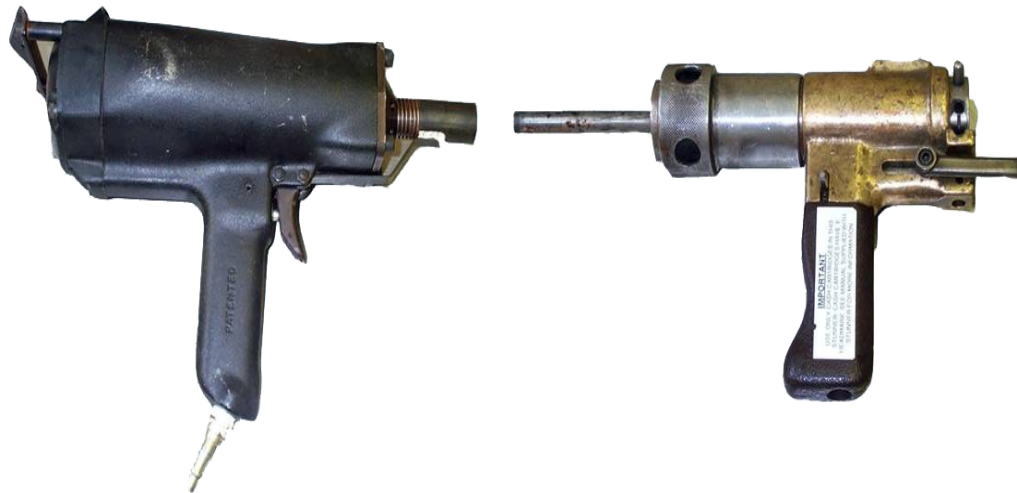
Cross section:



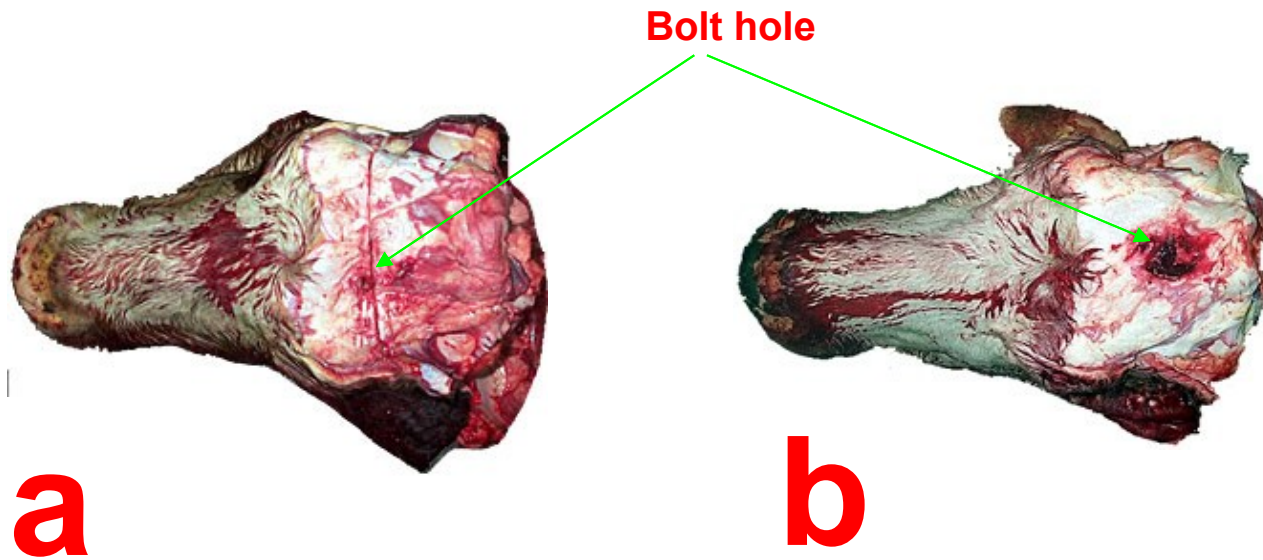
EXAMPLES OF NON- PENETRATING AND PENETRATING CAPTIVE BOLT GUNS

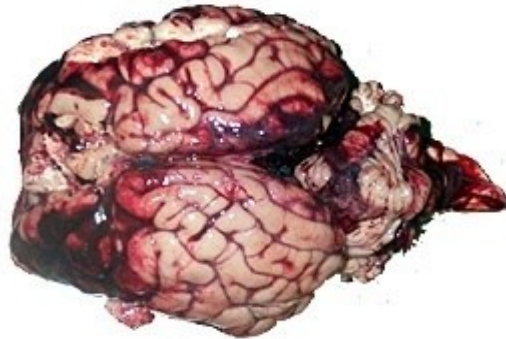


EXAMPLES OF NON- PENETRATING AND PENETRATING CAPTIVE BOLT GUNS

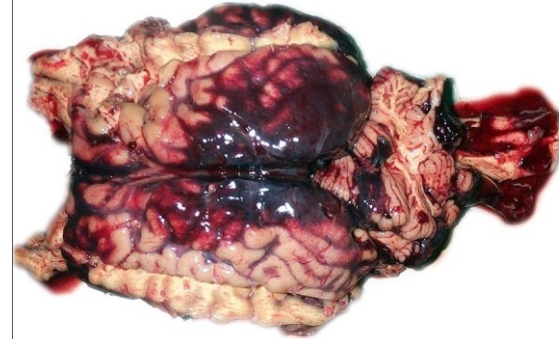


- a) Penetrating captive bolt stunning;**
b) Non-penetrating captive bolt stunning;

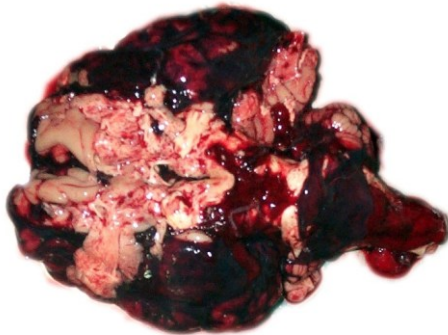




Penetrating CBG



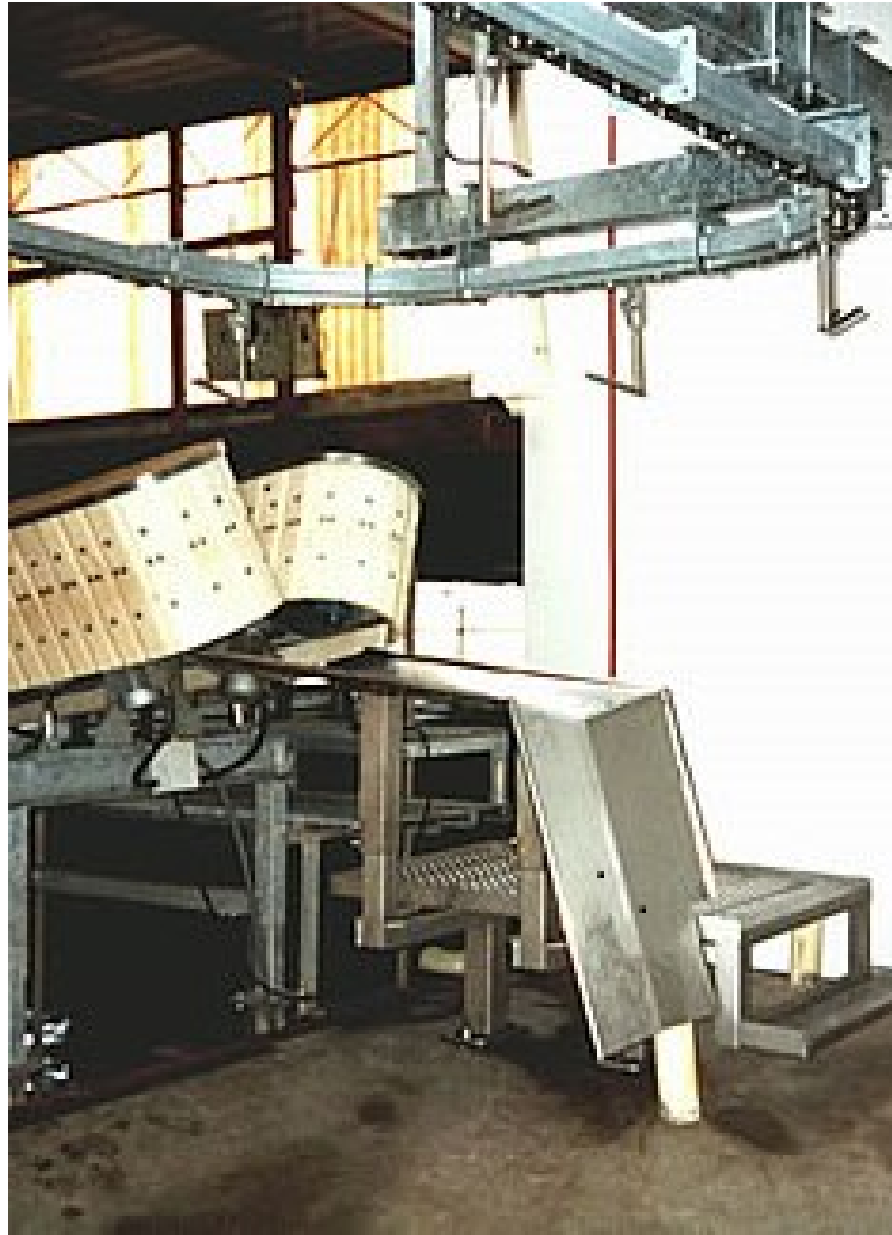
Non-penetrating CBG



MARK IV restrainer

*2 hydraulic cylinders (70 % of costs)
Slaughter with and without stunning*





SHEEP RESTRAINT – small slaughterhouses

