

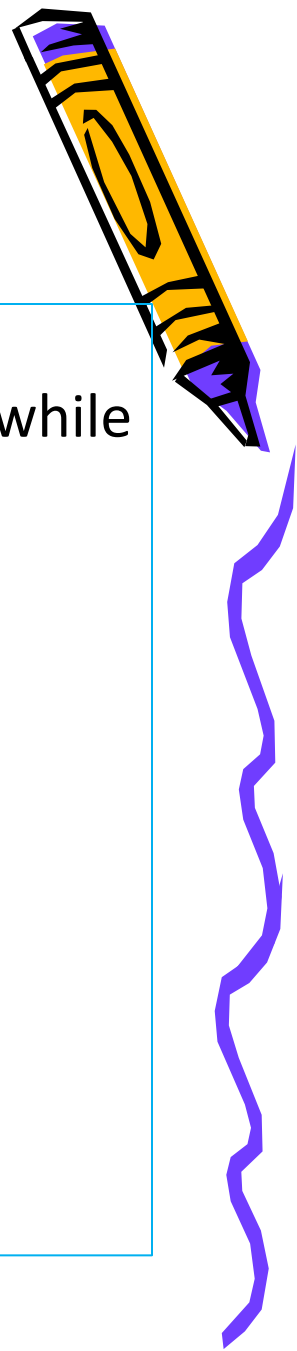


# Humane Slaughter



According to the law, animals should be **stunned** for unconsciousness prior to their slaughter to ensure a quick, relatively painless death





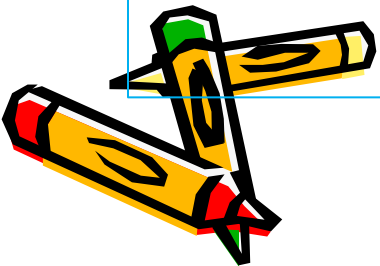
## **Stunning –**

Act of making animal insensible or unconscious to pain while killing slaughtering or sticking

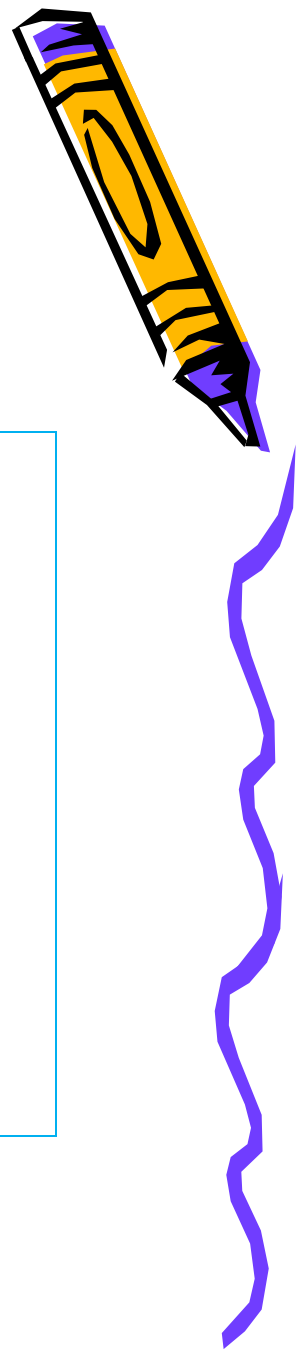
✓ Promotes animal welfare & meat quality

- **Stunning has two purpose:**

1. To induce an immediate state of insensibility
2. To produce sufficient immobility to facilitate the sticking process to initiate bleeding



# Humane Slaughter

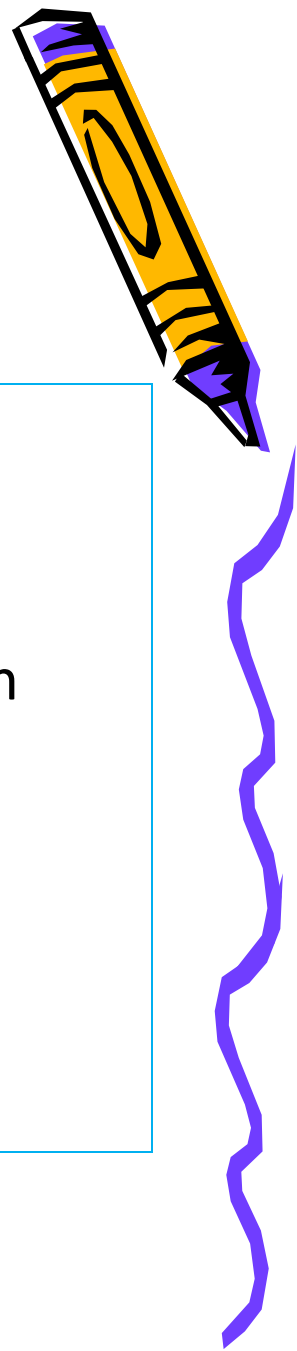


Modern abattoir

1. **Stunning** – Mechanical  
Electrical  
Chemical
2. **Bleeding / Sticking**

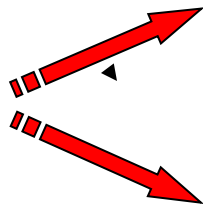


# Common methods of stunning



## 1. Mechanical methods

Percussion



Penetrative

Non penetrative/concussion

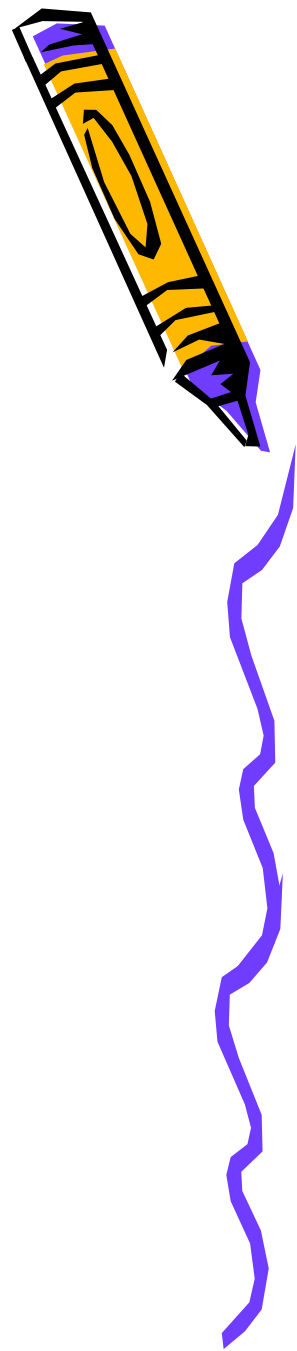
## 2. Chemical/gaseous method

## 3. Electrical method



# Choice of methods of stunning

- Class of animals
- Intended line speed
- Humane aspects
- Capital and maintenance
- Ease of operation
- Safety of personnel
- Effects on carcass and brain
- Religious and legal requirements



# Percussive stunning

## ✶ 2 types

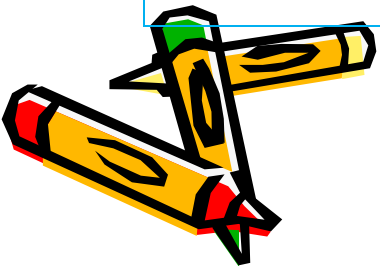
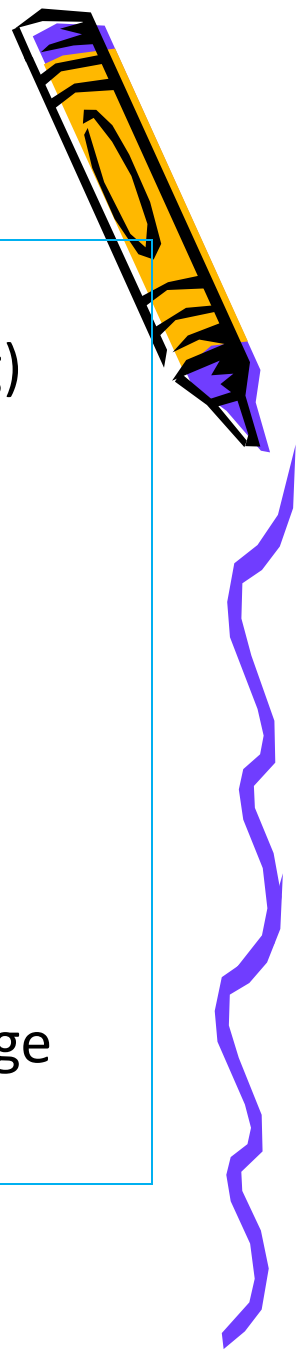
- Penetrative ( CBP, pneumatic & water jet stunning)
- Non penetrative ( mushroom head stunner)

## • ✶ Captive bolt pistol → 2 types

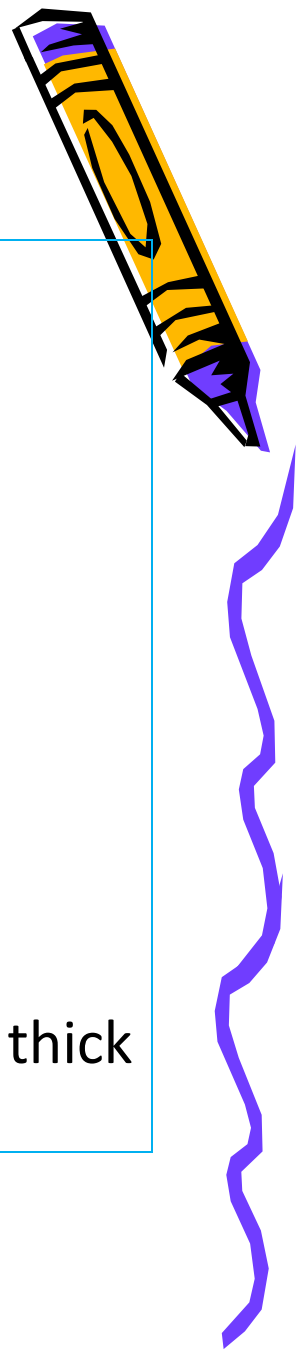
- Help of trigger
- Contact type

## Principle

- Propels bolt forward by discharge of blank cartridge
- Automatically recoils back into the barrel



# Strength of cartridge



- Correct strength for different species
- Measured in grains (1 grain = 0.065 g )
- Large cattle & mature bulls → 3-4 grains  
lambs-→ 1 grain
- Mostly 0.22 or 0.25 grain cartridge is used

→ Used for stunning in

Cattle

Sheep & calves

→ Less effective in bulls and pigs → massive skull & thick frontal bone



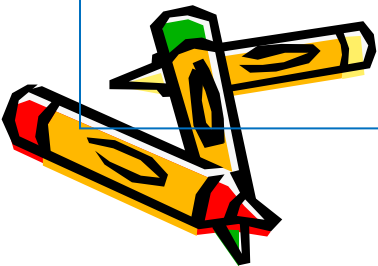
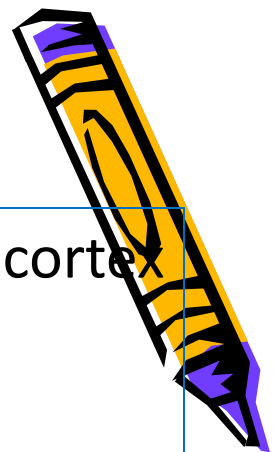
# Mechanism of action

- Immediate & permanent insensibility by destruction of cortex & deeper parts of brain
- Rapid rise and fall in intracranial pressure
- Sudden jerk due to energy bolt imparts to head



acceleration concussion

- Results in depolarization of neurons in brain including that of cortex
- Imp force in producing unconsciousness
  - velocity of bolt
  - speed with which it strikes brain

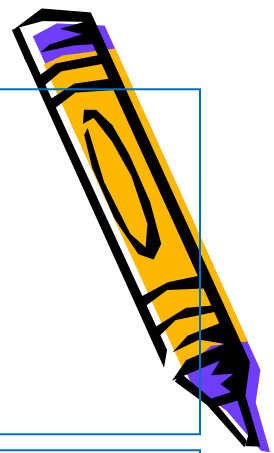






## Velocity in different species

Steers , heifers & cow → 55 m/s  
young bulls → 65-70 m/s



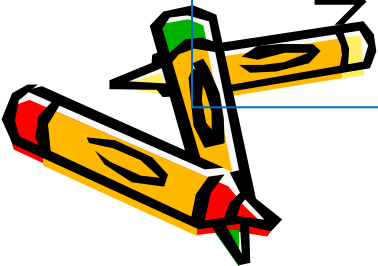
## Disadvantages of CBP

- noise produced during operation
- regular maintenance required
- cannot be used when higher line speed is required (240-250/hr)
- destruction of brain & hence not edible
- Brain tissue embolism in pulmonary artery



## Pneumatic stunner

→ bolt activated under pressure of 80-120 psi



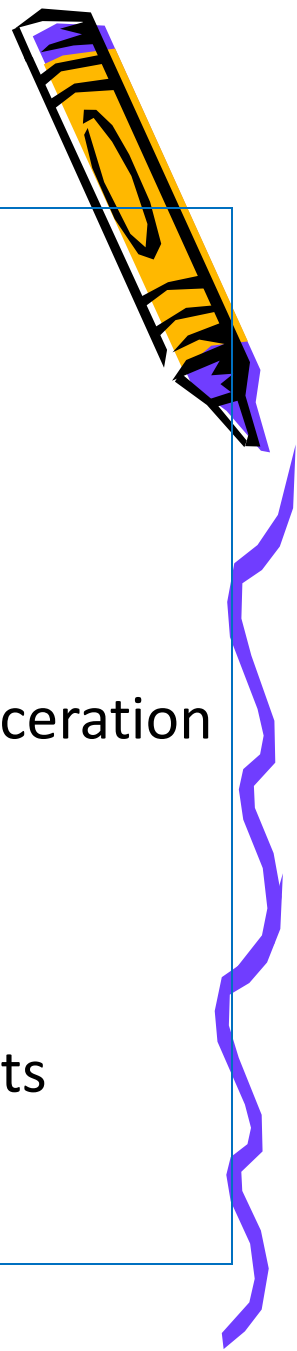
# Water jet stunning

- Fine jet of water to penetrate skull
- 0.5mm jet at pressure of 3500 to 4000 bars
- Drills through skin & skull in 0.2 -0.4 s

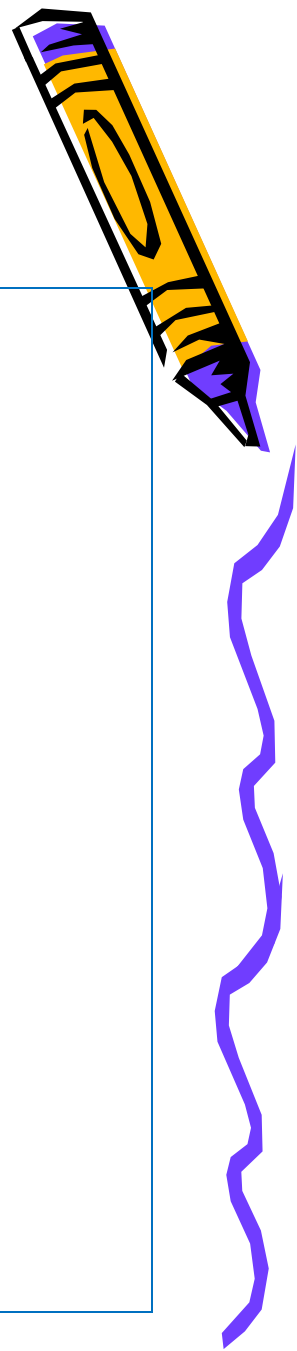
## Mode of action

- Mechanically destroys brain by induction of laceration ,crushing & shock waves
- Results in immediate unconsciousness
- Causes convulsion due to destruction of brain
- Prevented by immobilizing current of 250mA & 40 volts

Meat of superior quality than CO<sub>2</sub>/electrical  
stunning



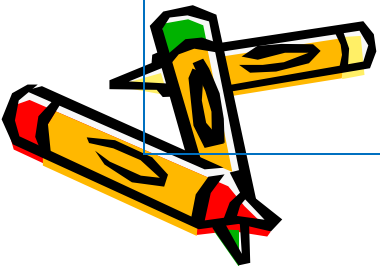
# Non penetrative percussion stunner



- Stunner with mushroom head
- Used in calves
- Brain is edible

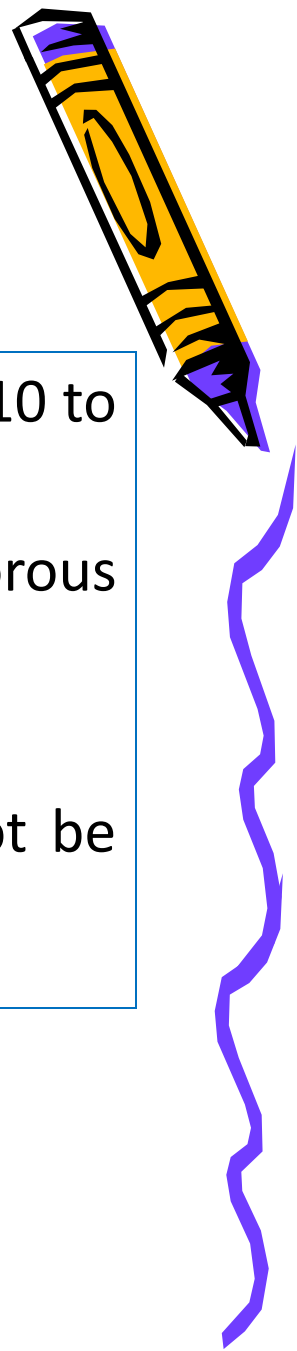
## Sticking to stunning interval

- Non penetrative stunner
  - <30s
- Penetrative stunner
  - cattle < 60s
  - sheep & goat < 15s
  - calves < 10s



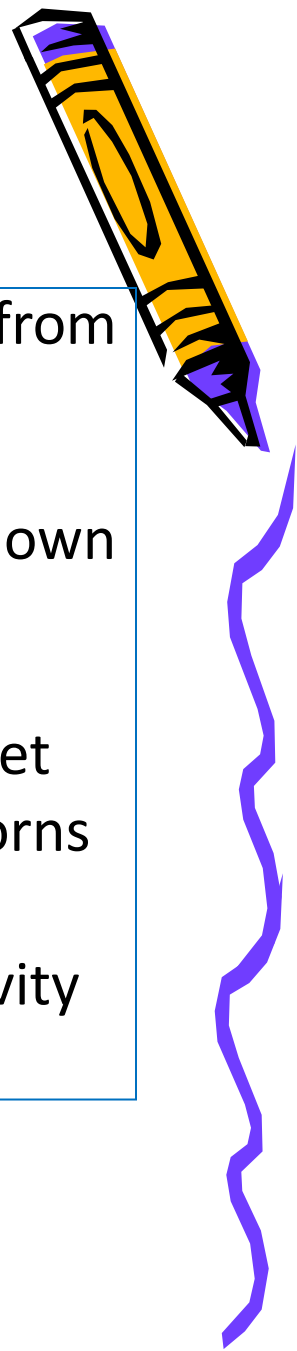
# Typical signs in percussive stunning

- Immediate collapse of animal by tonic spasm lasting 10 to 15s
- Slow clonic movement of hind leg & eventually vigorous hind leg movements
- Ceasing of rhythmic breathing
- Eyeball should face outward with a fixed gaze & not be rotated inwards

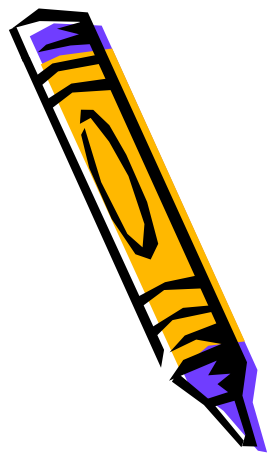
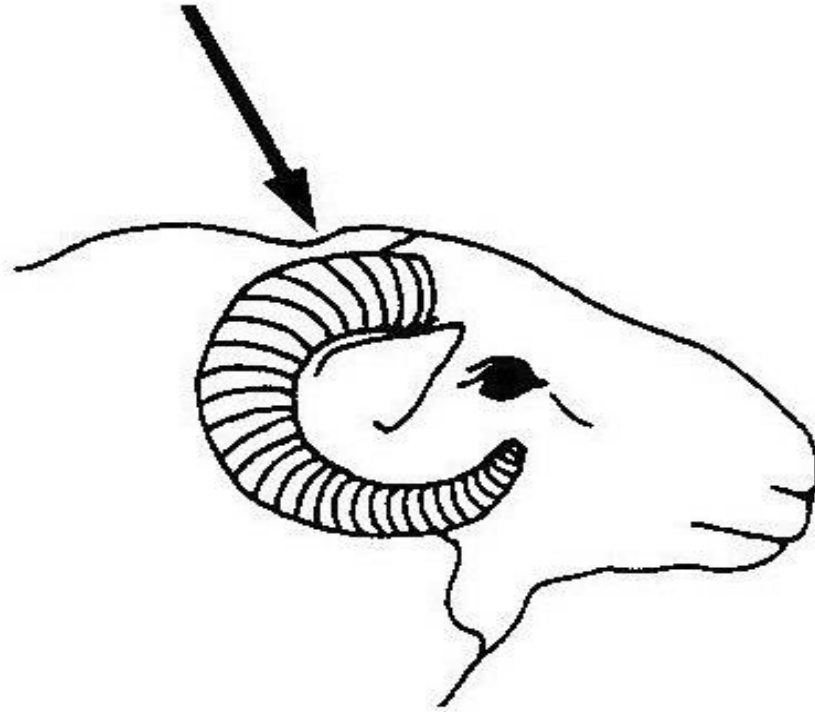


# Head site for percussive stunning

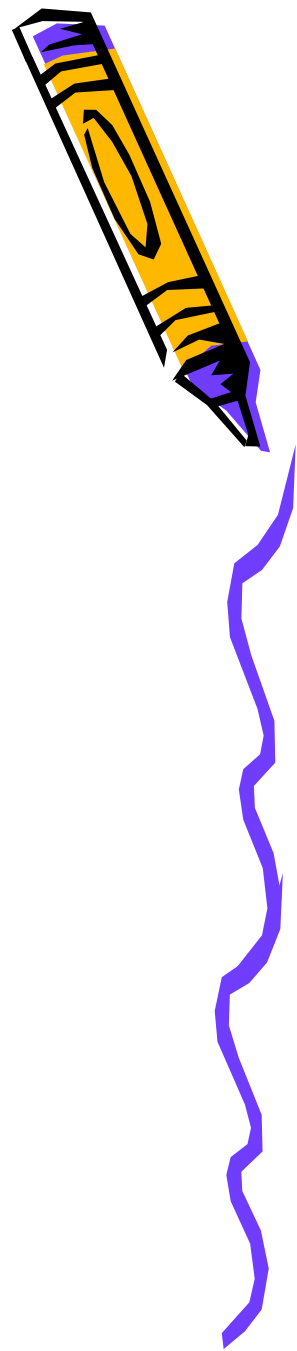
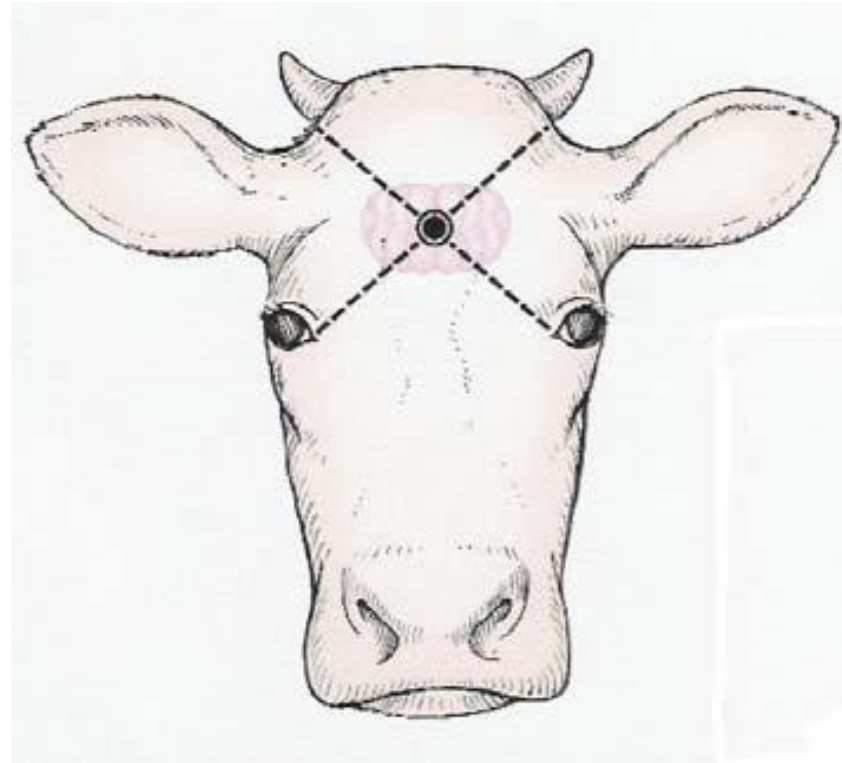
- **Adult cattle** –middle of forehead where 2 lines taken from median canthus of eye to base of opp. horn meet
- **Calves** –slightly down on head than for adult cattle
- **Bulls & old cows**- 1.5cm to side of ridge running down center of forehead
- **Hornless sheep & goat** - top of head aimed towards gullet
- **Horned sheep & goat** – behind ridge running between horns
- **Pigs** -2.5cm above level of eyes & fired upward cranial cavity



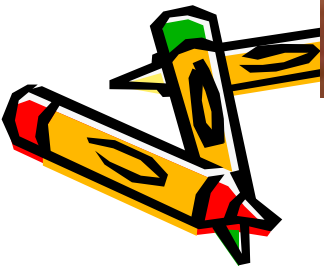
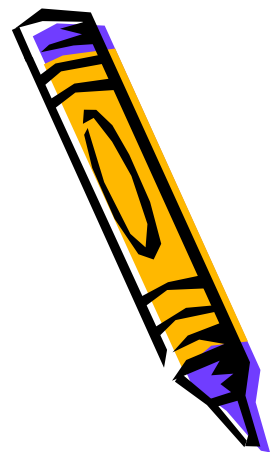
Horned sheep & goat - behind ridge running  
between horns



Adult cattle -middle of forehead where  
2 lines taken from median canthus of  
eye to base of opp horn meet

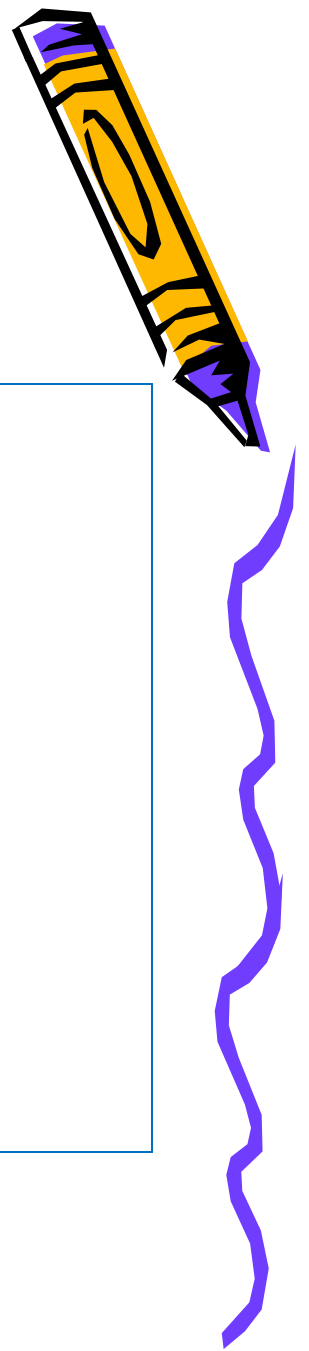


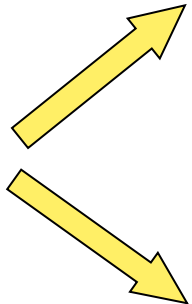
Pigs -2.5cm above level of eyes & fired  
upward cranial cavity



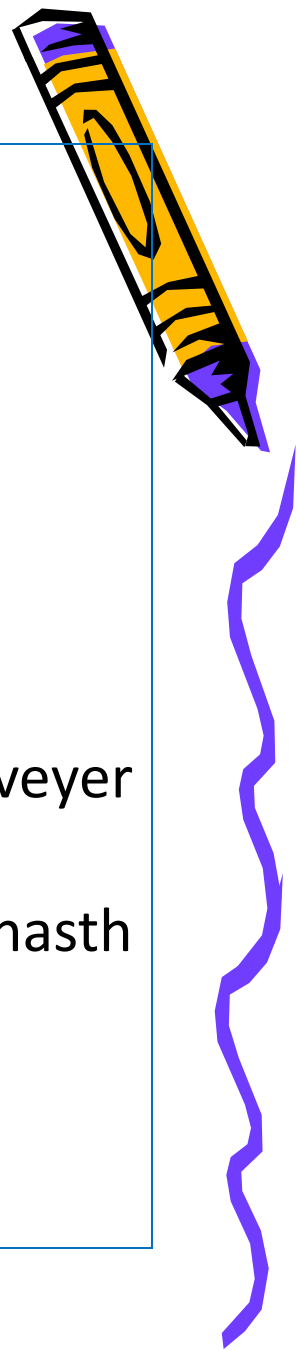


# Gaseous or chemical stunning



- CO<sub>2</sub> is most commonly used
- 80 % to 95 % concn. is most suitable
- Concn. 
  - High → stiff carcass
    - reflex muscular activity
    - poor bleeding
  - Low → improperly stunned
- Long exposure → superficial congestion of skin



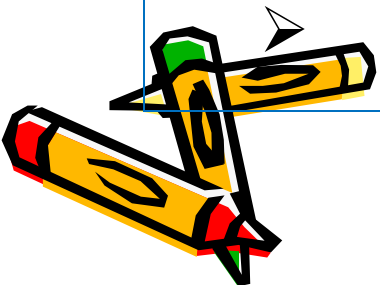


- Period of exposure -45s
- Recovery time – 90s
- Bleeding to be done within 30s

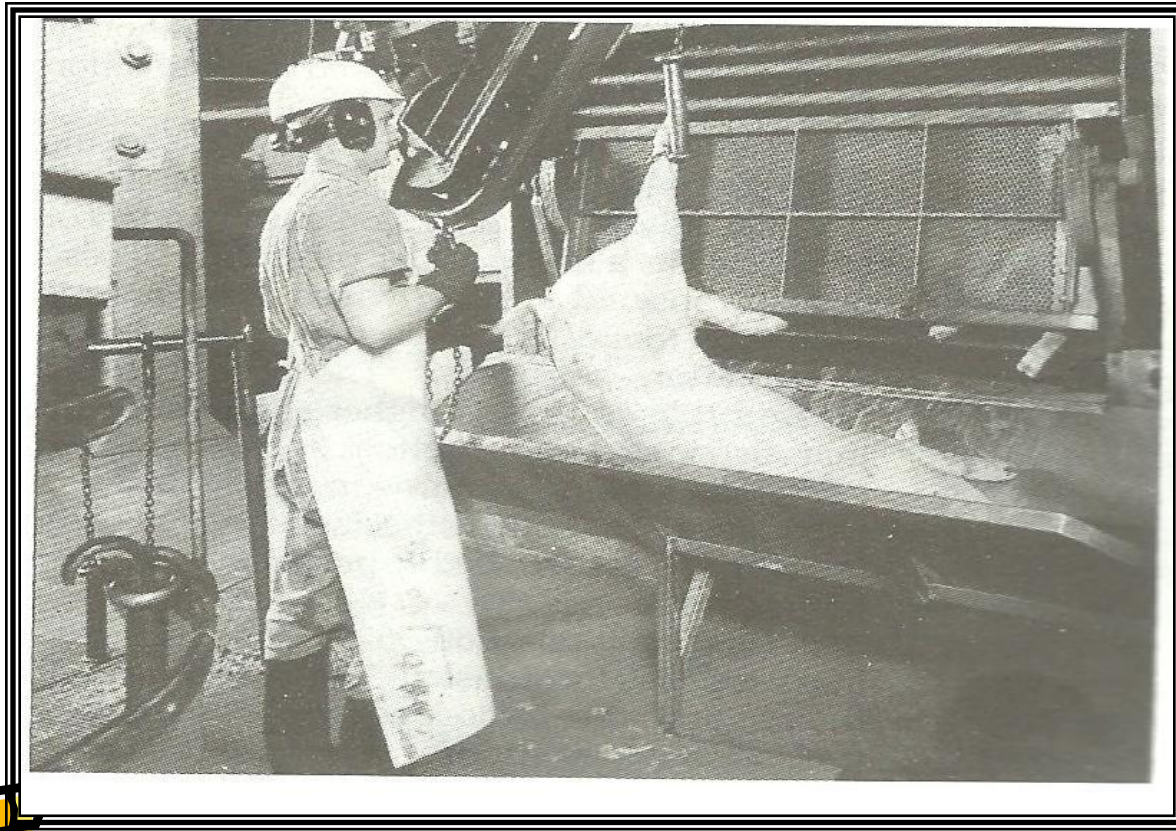
## Types of apparatus

### 1 Oval tunnel/combi

- Used when line speed is up to 600 pigs/hr
- Tunnel in the form of oval through which slot conveyer carries the pig
- Tunnel sloping down at an angle of 30 to anasth chamber
- Actual conveyer divided into 10 compartments
- pigs up to 113kg can be handled



# Oval tunnel/combi system

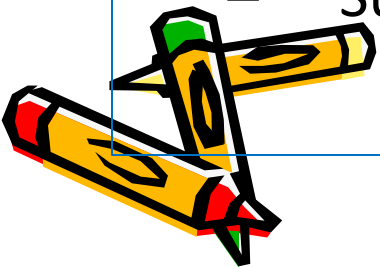
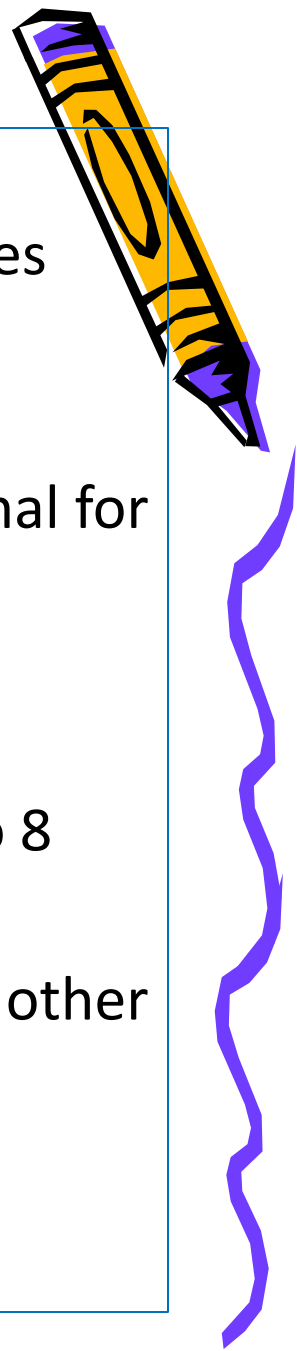


## 2. Dip lift

- Suitable to pig of any size as well as sheep & calves
- Cage(213cm length 68cm height & 53cm wide)
- Descent to CO2 pit & remain for preset time
- Return to ground level ejecting unconscious animal for shackling & bleeding
- suitable for small meat plants

## 3. Compact CO2immobiliser/ferri's wheel

- Horizontally revolving apparatus divided into 4 to 8 compartments
- When 1 section is uppermost for loading the other section are rotating to submerge in gas chamber
- Suitable when line speed up to 300 pigs/hr

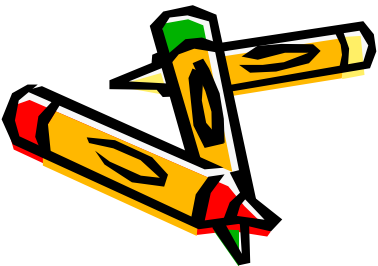
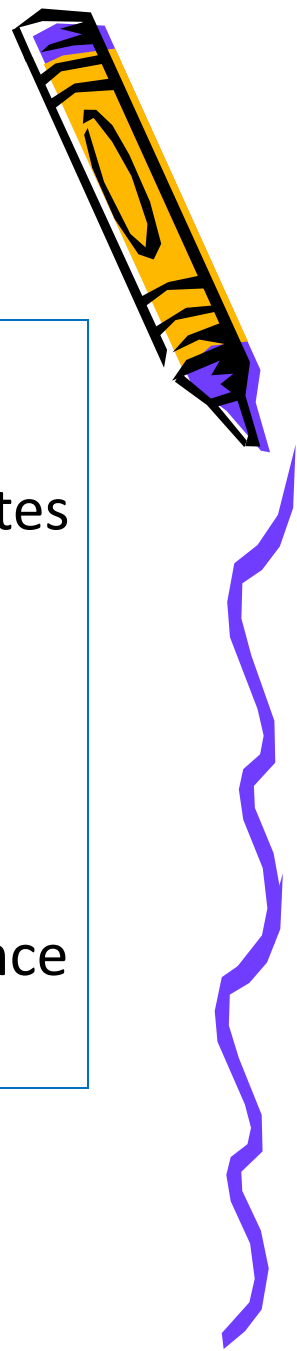


# Advantages of CO<sub>2</sub> stunning

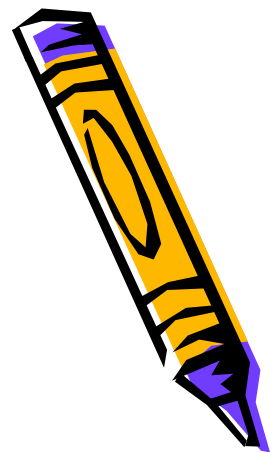
- Relaxed carcass allowing easy dehairing & dressing
- Less noise & reduced labor requirements
- Increased blood yield by 0.75% as CO<sub>2</sub> stimulates respiration thus favoring circulation & better bleeding
- Bone fractures and muscular hemorrhages reduced
- PSE condition is reduced greatly

## Disadvantages

- Needs more room ,High capital investment & hence unsuitable for small plants

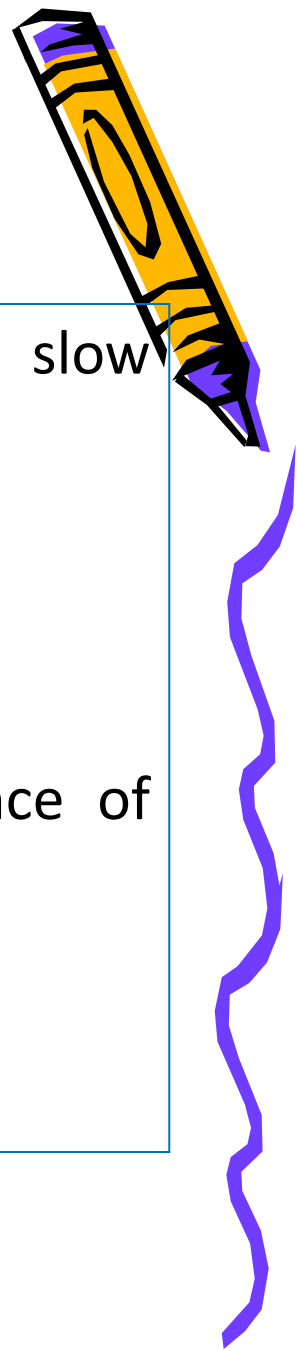


# Apparatus for CO<sub>2</sub> stunning



# Typical signs in CO<sub>2</sub> stunning

- Period of increased respiratory rate followed by slow resp movement & final dyspnoea
- Corneal & palpebral reflex are absent
- Extreme muscle flaccidity
- Limbs & jaws are consequently relaxed
- Most reliable sign of loss of sensibility is absence of respiratory activity
- Gagging respiratory movement is the sign of imminent brain death





**THANK YOU**

