

University of Tikrit
College of Veterinary Medicine
Dept. of Vet. Public Health
Meat Hygiene Course



Slaughter of livestock

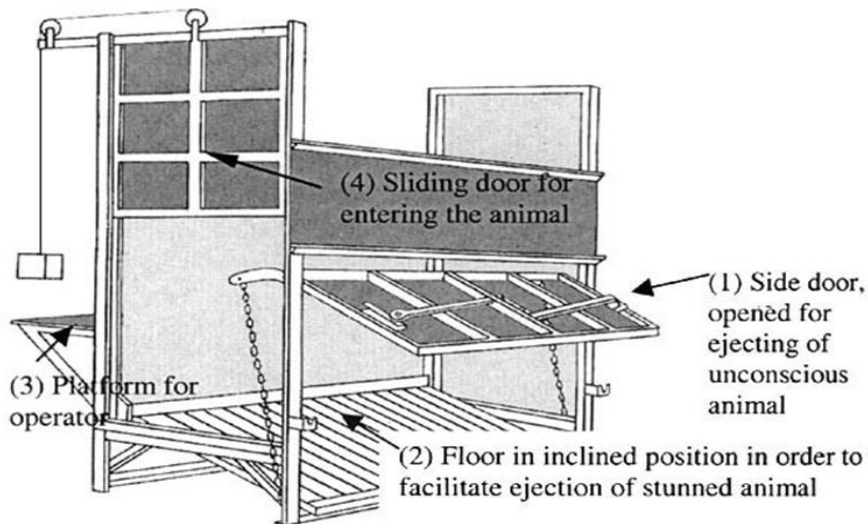
- At the time of slaughter, animals should be healthy and physiologically normal.
- Slaughter animals should be adequately rested.
- They should be rested, preferably overnight, particularly if they have travelled for some times over long distances.
- poultry are usually slaughtered on arrival as time and distances travelled are relatively short and holding in pens is stressful for them.

Restraint devices

- It is very important that slaughter animals should be properly restrained before stunning or bleeding.
- This is to ensure stability of the animal so that the stunning operation can be carried out accurately and properly.
- Different types of restraints are appropriate for different species:

Cattle

- A stunning box is the most common method of restraining cattle.
- The size of the box should be just wide enough to prevent the animal from turning around, and so be difficult to stun.
- The floor of the box should be non-slip.
- It is recommended that the operator should be positioned behind protective steel.

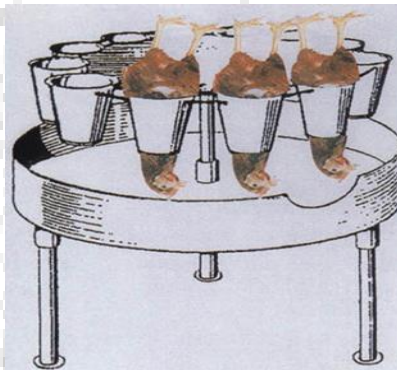


BLEEDING

The main method of bleeding in cattle is bilateral severance of the carotid arteries and jugular veins by an incision across the throat region caudal to the larynx.

Poultry

- Chickens are shackled by their legs onto a conveyor line.
- This must be done gently to avoid injury and stress.



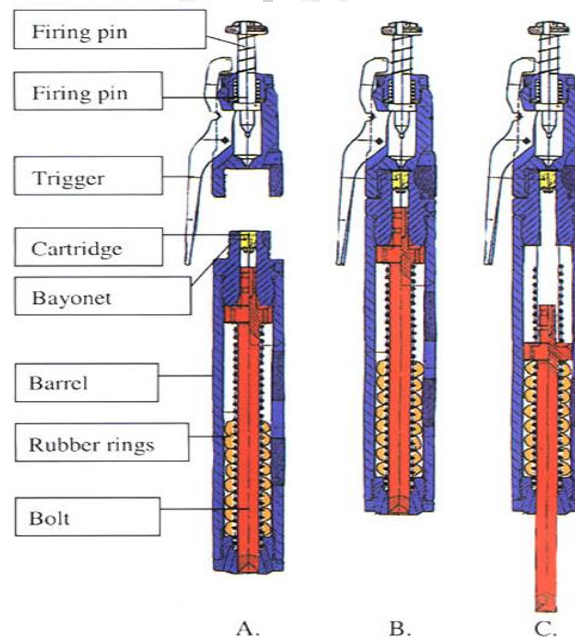
In a small slaughterhouse, birds can be placed headfirst in cones.

Stunning methods

- It is desirable to render an animal unconscious before it is slaughtered in order to eliminate pain, discomfort and stress from the procedure.
 - the animal should be rendered unconscious for long enough so that bleeding results in enough loss of blood to cause death from lack of oxygen to the brain (cerebral anoxia).
1. Percussion stunning (This method produces a physical shock to the brain).

➤ Captive bolt

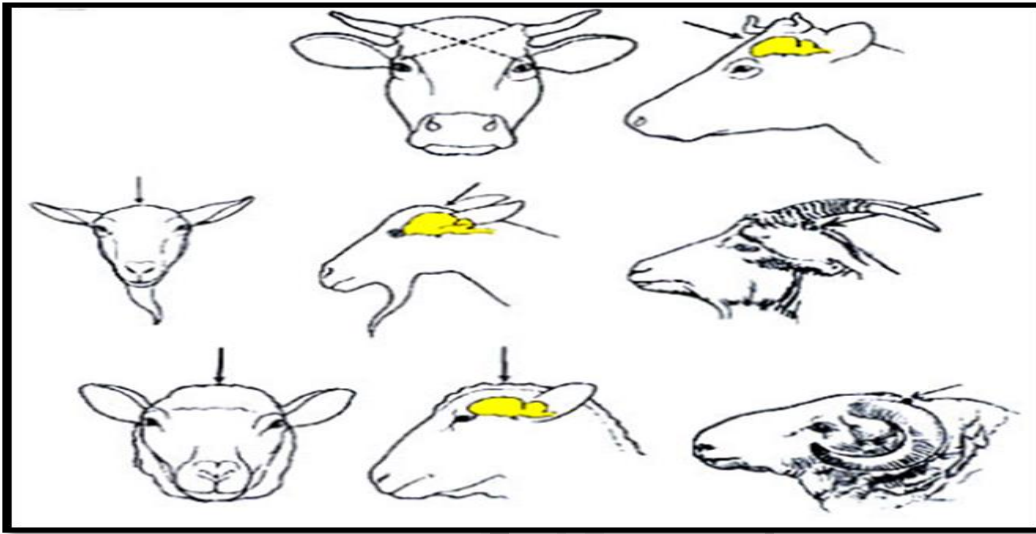
- This method works on the principle of a gun and fires a blank cartridge and it propels a short bolt (metal rod) from the barrel.
- The bolt penetrates the skull bone and produces concussion by damaging the brain or increasing intracranial pressure, causing bruising of the brain



Head sites for percussive stunning

With both types of percussive stunners, care must be taken to hold the instrument reasonably firmly against the animal's head at the proper point and direction. In *adult cattle*, the correct point is in the middle of the forehead where two lines taken from the medial canthus of each eye to the base of the opposite horn or horn prominence cross. The stunner is placed at right angles to the forehead. In *calves*, the pistol should be placed slightly lower on the head than for adult cattle. In *hornless sheep and goats*, the stunner is placed on the top of the head and aimed towards the gullet, while for *horned sheep and goats*, the muzzle is placed behind the ridge which runs between the horns, the direction of aim being the same.

Correct positioning of stunning gun for different species (cattle, goat, and sheep).



Carbon dioxide and other gas mixtures

Carbon dioxide was first used to induce pre-slaughter anaesthesia in animals in 1904 but was not used successfully on a commercial scale until 1950. Since then the method has been modified in several different ways and is now widely used throughout the world, although not as extensively as it could be, probably because of the high cost of installation and operation. The technique was banned for a period during the 1980s in the Netherlands because it was thought to lead to unconsciousness under very stressful conditions for the animal. The European Food Safety Authority report recommended the following gaseous atmospheres for the stunning:

- A mixture of 30% CO₂ and 60% argon or nitrogen in air, or
- with 90% argon or nitrogen (or other inert gas) in air.

Inhalation of carbon dioxide induces respiratory and metabolic acidosis and, hence, reduces the pH of the cerebrospinal fluid (CSF) and neurons thereby exerting its neuronal inhibitory and anaesthetic effects.



CO2 anaesthesia.

-Electrical stunning

- This method of stunning is well suited for sheep or goats, poultry and ostriches. Electrical stunning induces epileptic state in the brain. The epileptiform activity in the brain is induced by a release of neurotransmitters, glutamate and aspartate, into the extracellular space. This is a reversible process with the animal starting to regain consciousness after the stun.
- This state should last for long enough for bleeding to be carried out. A low voltage alternating electric current is applied by means of two electrodes, which are placed on either side of the brain using tongs.
- Since the brain of animals is small, the electrodes should be accurately and firmly placed high up on the sides of the head in sheep, goats, and ostriches. The electrodes should be correctly positioned so that the current will pass through the thalamus and cortex, the chief sensory centres in the forebrain. This relates to the space between the eyes and the base of the ears on most species. The electrical resistance of contact with the hair and skin may be lowered by ensuring that the electrodes are kept moist by immersion in brine and the skin of the head is kept clean but dry. The presence of wool on the sheep's head can increase electrical resistance significantly.
- There is little doubt that the failure of operators to observe these criteria has been the cause of much of the criticism of electrical stunning methods, firstly on the grounds that the method was not always humane and secondly because haemorrhages were often observed in the muscular tissue of animals stunned by electrical means. It is necessary for an adequate amount of electrical current to pass through the brain in a sufficiently short period of time. This depends on the voltage applied and the resistance, or more correctly impedance, present. If too high a voltage is employed, carcass quality may be compromised by the production of muscle haemorrhages and broken bones; if too low a voltage is used, the animal may be paralysed but still conscious of pain.
- The passage of electric current through the brain results in a rapid rise of blood pressure due to vasoconstriction and increased heart rate, hence the need for immediate bleeding in order to avoid blood splashing.



Water bath for automatic electrical stunning of poultry

- Poultry can be stunned electrically using a manually operated device or using an automatic water bath.
- Here birds are dragged through a trough of water that is charged with a low voltage current.



Recommended current and time characteristics for electrical stunning

Species	M/Amps	Amps	Volts	Time (sec.)	
Pig (bacon/porker)	min. 125	min. 1.25	max. 125	max. 10 (until EPS*)	
Sheep/goat	100-125	1.0-1.25	75-125	max. 10 (until EPS*)	
Poultry ³	1.5-2 kg broiler	200	2.0	50-70	5
	turkey	200	2.0	90	10
Ostrich	150-200	1.5-2.0	90	10-15	

* EPS is electroplectic shock.

