Meat and meat products processing -Level-II

Based on May 2019, Version 2 Occupational standards

Module Title: Operating stunning activities

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LG# 29	LO1- Restrain animal

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Restraining animals humanely and safely
- Restraining animals in correct position

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Restrain animals humanely and safely

Restrain animals in correct position

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
6. If you earned a satisfactory evaluation proceed to “Operation sheets
7. Perform “the Learning activity performance test” which is placed following “Operation sheets” ,
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Information sheet 1 Restraining animals humanely and safely

1.1. Definition:

Restraint is the use of manual, mechanical, or chemical means to limit some or all of an animal's normal movement for such purposes as examination, collection of samples, and drug administration, slaughter in process

Or Restraint is the restriction of movement of any animal and may vary from simply confining the animal in an enclosure, small space, box, or crate, to completely restricting its muscular activity (immobilization).

Basic Guidelines for Performing Animal Restraint

To work safely with an animal a person should:

- understand basic animal behavior in relation to their interactions with people during handling
- appreciate the "flight zones" typical of a species
- understand how to communicate with the animal
- use appropriate restraint techniques
- use restraint equipment properly
- identify any animals that may be unpredictable
- wear appropriate protective clothing and equipment

Figure 1.restraint cattle

General Guidelines for Care of Restrained Animals

- Restraint procedures should only be invoked after all other less stressful procedures have been rejected as alternatives.
- Supervision of animals in restraining devices should only be assigned to fully qualified and experienced personnel.
- The principal veterinary staff has the responsibility to ensure that all members of the veterinary staff, particularly those responsible for day-to-day animal care, are fully aware of the rationale for the restraint procedures and for the complications for the animal which may occur as a result of the restraint.
- Consultation should be sought with those experienced in the restraint procedures to be invoked, prior to its initial use, to ensure that minimal restraint is used to accomplish the procedure goals.

The principles of low stress restraint are:

a. Solid sides or barriers around the cattle to prevent them from seeing people deep inside their flight zone. This is especially important for wild or excitable cattle.

b. To prevent lunging at the head gate, the bovine's view of an escape pathway must be blocked until it is fully restrained.
c. Provide non-slip flooring for all species of animals.
d. Use the concept of optimal pressure. Sufficient pressure must be applied to provide the feeling of restraint, but excessive pressure that causes pain or discomfort must be avoided. This principle applies to all species.
e. The entrance of the restraint device must be well lighted. All species must be able to see a place to go.
f. Livestock will remain calmer if they can see other animals close to them.
g. Engineer equipment to minimize noise. High pitched noise is more disturbing to livestock than a low pitched rumble from a conveyor.
h. Restraint devices must be designed to avoid uncomfortable pressure points on the animal's body.
i. Restrain animal in an upright position.

Figure 2. Cattle

In general, restraint is required for:

- many production and management practices, such as :
  - ✓ Health care: physical examination, sampling and therapeutic procedures
  - ✓ Identification: ear tagging, tattooing, branding
  - ✓ Weighing

- ✓ Breeding
- ✓ Transportation
- ✓ Pregnancy diagnosis
- ✓ Stunning

- Safety
  - ✓ Animal
  - ✓ Persons
  - ✓ Equipment's/facility
  - Animal escape
  - Success of a procedure
  - Wise use of resources
  - Time management

Safe handling of cattle

For handling cattle include:

- Make sure the cattle know you are approaching.
- Take care – cows may charge to protect their calves or if they are startled.
- If mustering during mating (joining) season, use separate yards for bulls once yarded, if possible.
- Make sure there's enough room for the cattle to move.
- Try to work beyond the kicking range of the animal or close to its body.
- Use head rails, cradles and crushes to restrain animals when necessary.
- Dehorn your cattle.

Safe handling of pigs

For handling pigs include:

- Keep boars separate at all times.
- Use a drafting board when moving boars.
- Use nose ropes and crushes to restrain pigs when necessary.

- Lifting a pig should be avoided, but if you must lift a pig, sit it down facing away from you, draw it close to your body and pick it up by the back legs, making sure to lift with your thigh muscles.

Safe handling of sheep

For handling sheep include:

- Plan musters in advance.
- Assume that rams will act unpredictably.
- Use suitably trained sheep dogs to control the mob.
- Avoid isolating individual sheep.
- Lifting a sheep should be avoided,
- When shearing, use a harness to support your back.

Restraining animals

You must restrain an animal before you stun or kill it. Your equipment for restraining animals must: be in good working order allow you to stun or kill an animal effectively prevent injury or cuts to animals minimize struggling and vocalization minimize the time an animal's restrained

You must only put animals into restraining equipment, including head restraints, when you're ready to stun or kill the animal.

1.2. Restraining equipment

Types of boxes and restraint devices

Stunning boxes can be supplied direct through a manufacturer or designed and built by the slaughterhouse themselves and fall into four basic categories.

1. Simple box

The cattle are confined within a concrete or metal pen and there is an exit door to eject the animal once it has been stunned. The exit doors either slide vertically upwards or pivot round. Such boxes are acceptable but the operators need to be highly skilled to consistently and accurately stun animals, as the animal's head is free and fully mobile.

Figure 1. Stunning box

2. Passive restraint

Passive restraint is where the box has no moving parts but there is a fixed shelf or similar which prevents the animal putting its head down and encourages the animal to put its head in an accessible position for the operator. There are some boxes that have fixed wedges within the box to reduce body movement.

Figure 1. Passive shelve keeping head up 6 Source: Elders

3. Semi-passive restraint

Part passive restraint is where there is a combination of moving and non-moving parts to help position the head. For example stunning box is equipped with- moving side neck yoke that prevents animal to move its head to sides.

4. Active restraint of the head

Active restraints of the head work in two stages; a yoke that catches the neck and a chin lift that raises the head and jaw upwards. Because they hold the animal rigid they must be used in conjunction with other body restraint devices such as a side push or belly lift to prevent animals “hanging” once they are restrained.

5. Active restraints of the body

Both rump pushers and side pushers are mechanically operated and reduce the space in the box either in width or in length. A box fitted with a rump and side pusher can also be made longer and wider than would otherwise be possible, this extra space encourages cattle to enter more freely. These devices are essential when the slaughterhouse deals with cattle that differ significantly in size and type, and are useful with all types of boxes whether they are fitted with head restraint devices or not.

Figure Active restraints of the body

Self-check 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Choose the best answer (2 point)

1. What is the meaning of restraining of animals
   a. Immobilization
   b. Controlling
   c. Handling
   d. Except c all
   e. Except d all
2. What the responsibilities of person to work safely with an animal should:
   a. use appropriate restraint techniques
   b. use restraint equipment properly
   c. not identify any animals that may be unpredictable
   d. Except c all
3. Restraint procedures should only be invoked after all other less stressful procedures have been rejected as alternatives.

   a. True b. False
4. Supervision of animals in restraining devices should only be assigned to fully qualified and experienced personnel.

   a. true b. false
5. The principal veterinary staff has the responsibility to ensure that all members of the veterinary staff, particularly those responsible for day-to-day animal care,

   A. true b. false

You can ask you teacher for the copy of the correct answers.

Note: **Satisfactory rating - 10 points** **Unsatisfactory - below 10 points**

Information sheet 2 Restraining animals in correct position

Type of restraint

- Mechanical- ropes collars, halter, Lane chute, Squeeze chutes, flanking, casting
- Physical- fence, cage person
- Chemical- tranquilizers(drug used to reduce tension), aesthesia
  - ✓ Benozodiazepins
  - ✓ Neuroleptics
  - ✓ Ketamine, clonidine, dexmendetomine propofol
- Psychological- voice, mannerisms, distraction

Mechanical restraints

a. Rope Halters(Figure 1)

Figure1. Livestock Rope Halter

i. Hold slip lead and top of nose piece in left hand, and head stall in right hand.

ii. Approach animal, typically from the left side, being respectful of the animal's flight zone.

iii. Slip nose piece over nose with slip lead under chin, and place head stall over the top of the head and behind ears. Place head stall over poll and behind ears, then place nose piece around nose, with slip lead under chin (Figure 2).

iv. Pull the rope to adjust slip lead to proper size–for length of head and around nose (Figure 3).

v. Lead can be tied using a quick-release knot to a secure location, such as a ring or post, or to the stanchion if being used, with minimal slack.

Figure 1. Place Head Stall over Poll And behind ears

Figure 3. Adjust Slip Lead to proper quick release knot

Figure 4. Secure lead with

I. Cattle can be effectively and safely restrained in squeeze chutes, consisting of a head gate, tailgate, and sides that can be moved to change the width of the chute. The working chute leading up to the squeeze chute may include back-up or tailgate bars so that each animal can be enclosed as they pass through, so as to not move forward or backwards once secured (Figures 5 and 6).

II. Handler should inspect all working parts and ensure that there are no obstacles or sharp objects that might injure animals prior to using chute or stanchions.

III. As animal moves head through head gate, one handler closes head gate while a second handler places tailgate bar or rear gate depending upon style. Ensure that all latches, catches, or locks are secure. If squeeze chute, handler may be able to slowly squeeze animal to slow its progress to the head gate, to prevent injury from hitting head gate too fast.

IV. Once chute is secured, a rope halter can be used to restrain head as needed.

V. If animal should go down while restrained, prolonged pressure against the carotid can cause asphyxiation

Figure 5. Use of Working Chute with Squeeze Chute for Multiple Animals

Figure 6. Use of Squeeze Chute for Single Animal

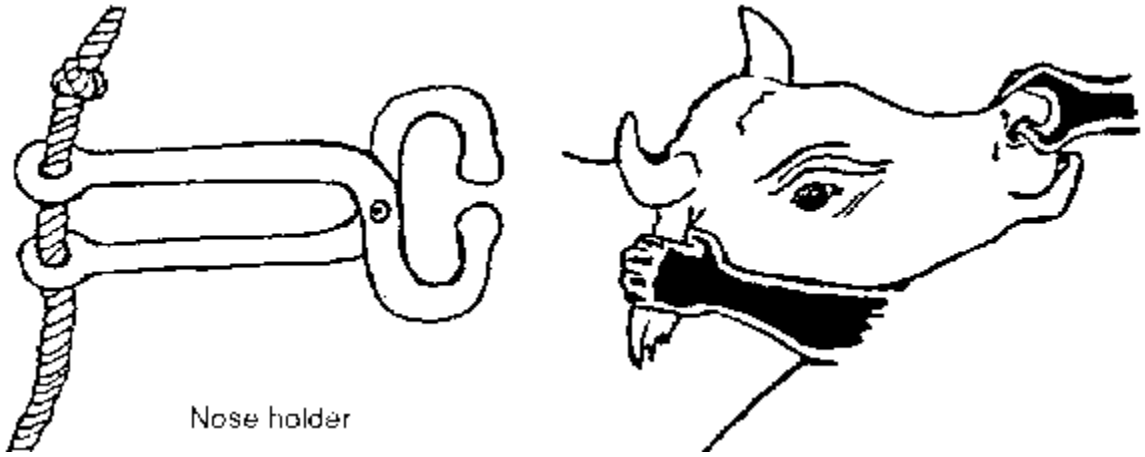
Figure 7. Squeeze chutes

Beef Cattle

- ✓ **Squeeze chutes**

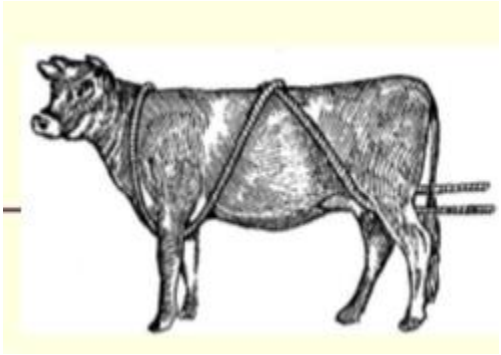
- Close head gate.
- Close tail gate.
- Close sides.
- Apply nose bar or nose tong to work head.
- Drop bottom side plank to work feet.
- Drop side bars to work neck, body and legs.
- Tilt calf chute (calf table) to work calves

- ✓ **Lane chute**



- Crowd multiple cattle.
- Chock single animal with pole in front and rear

Cast rope – Casting (Burley Method)



- Halter tie head.

- Pass rope over withers ends through forelegs, cross over back and through hind legs.
- Pull both ends of rope from rear to fall cow.

Flanking (Calves)

Hand restraining

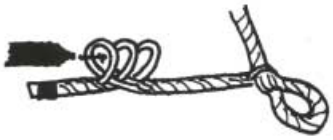
- Reach over calf.
- Reach down flank and grasp nearest hind leg with one hand.
- Reach between forelegs and grasp nearest foreleg with other hand.
- Lift and slide calf to ground.
- Kneel on neck and thigh.
- Lift bottom foreleg from ground.

Making the Halter

1. Measure out 12” from the end of the rope for the nose piece for a calf-sized halter. Twist the rope to open up the strands. Insert the short rope under one strand, leaving a loop twice the diameter of the rope.

2. To secure this loop, open up the strands of the nose piece near the loop. Push the long end of the rope under the two opened strands and pull it through until it is tight.

Finishing the Nose Piece (Alternative 1)



3. Grasp the nose piece near the end with one hand and 2-3 inches further down the rope with the other. Twist the rope between your hands to open the strands, then push your hands together. The strands should buckle and fold over, forming three loops. Line up the loops and put a stick the diameter of the rope through them to keep them in place.

4. Put the long end of the rope through the loops one at a time, starting with the loop furthest from the short end. Remove the stick as you go. After that is complete, run the long end of the rope through the eye loop to complete your halter.

Self-check 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Choose the best answer (2 point)

1. It Is not the physical type of restraint
   a. Lane chutes, b. squeeze chutes c. rope collars all

2. Mechanical types of restraints

   a. Voice b. ropes collars c. lane chute d. b &c

3. Hold slip lead and top of nose piece in left hand, and head stall in right hand
   the first step in
   a. rope halters b. physiological c. chemical d. all

4…….can be tied using a quick-release knot to a secure location,
   a. Lead b. slip nose c. flight zone d. none

5. Handler should inspect all working parts and ensure that there are no obstacles.
   a. True b. false

You can ask you teacher for the copy of the correct answers.

Note: **Satisfactory rating - 10 points** **Unsatisfactory - below 10 points**

LG# 30	LO2- Operate stunning equipment

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Operating stunning Equipment
- Maintaining stunning equipment and facilities

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Operate stunning Equipment
- Maintain stunning equipment and facilities

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Information sheet 1 Operating stunning Equipment

Captive bolt

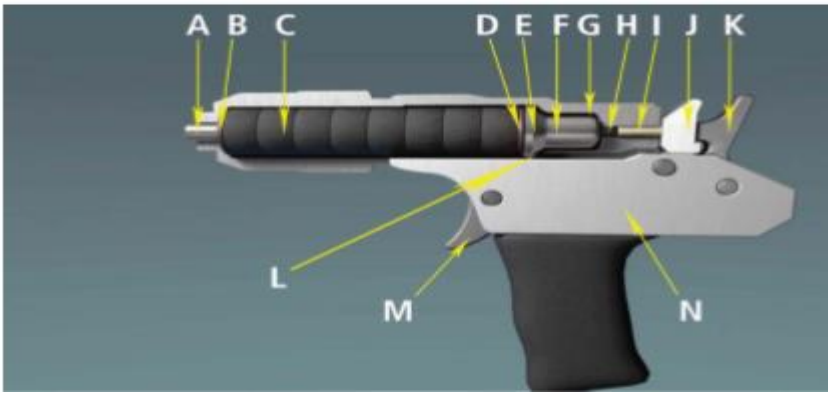
All captive bolts work along similar basic principles. There is a steel rod either with or without the mushroom type head with a flange and a piston which make up the bolt

The bolt is contained within a barrel, with the piston fitting tightly into a combustion chamber and the bolt being surrounded by compressible recuperating sleeves.

When fired, the power source propels the piston forward.

The bolt then emerges through the opening at the muzzle and either strikes or penetrates the skull. The bolt is retained by the flange (hence the name “captive-bolt”) and the energy is absorbed by the recuperating sleeves.

Stunners can be fired with a trigger mechanism or fired on contact with the animal’s skull.



A – Bolt B – Stop washer C – Recuperative Sleeves D – Flange Washer , E – Flange F – Piston G – Combustion Chamber H – Breech I – Cartridge J – Firing Block K – Hammer L – Undercut, M – Trigger N – Barrel

Stunners can be fired with a trigger mechanism or fired on contact with the animal’s skull. The trigger-fired, penetrating stunners are perhaps the most versatile; being suitable for a wide range of different types of animals and situations.

Stunning position

Figure Stunning position when using penetrative captive bolt

The stunning position for cattle using penetrating captive-bolt equipment is on the middle of the forehead at the crossing point of two imaginary lines between the base of the horns and the opposite eyes.

The stunning position for a non-penetrating captive-bolt is 2cm above the intersection of two imaginary lines drawn from the rear of the eyes to the opposite horn buds. The muzzle must be placed at right angles to the skull directing it to the center of the brain. Stunning position when using penetrative captive bolt.

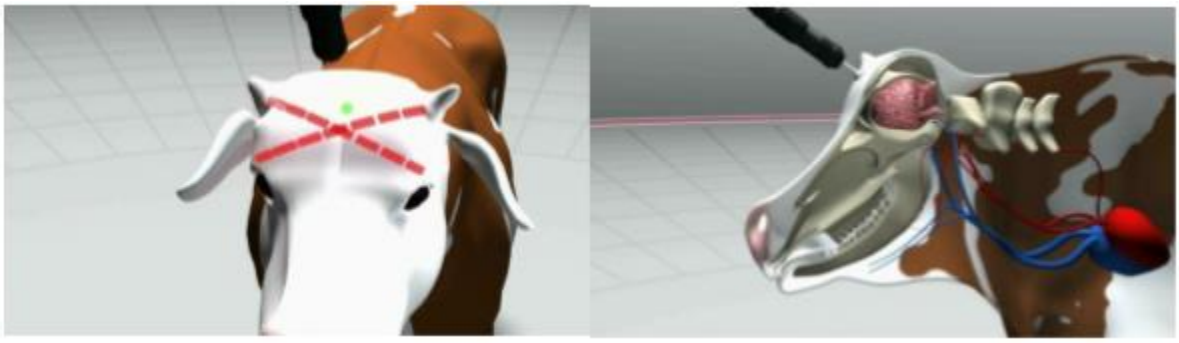


Figure Stunning position when using non-penetrative captive bolt

Signs of an effective stun

The outward signs in cattle that a stun has been effective are the same with both nonpenetrating and penetrating captive-bolts.

Monitoring Points are:

- Immediate collapse and no attempts to stand up
- Immediate and sustained absence of rhythmic breathing
- Absence of righting reflex
- Fore legs and hind legs flexed initially; fore legs will then straighten and become extended
- Eyes must not be rotated; a rotated eyeball indicates a deep stun is not present and there is a risk of return to consciousness
- No reflex response to a nose prick or ear pinch
- Absence of corneal reflex

If the animal does not show these signs then it must be re-stunned immediately

Failure to Stun

In the practical situation there may be occasions when the animal is not effectively stunned this could be the result of:

- Incorrect stunning position
- Not enough power e.g. wrong cartridge size or drop in air pressure
- Stunner malfunction
- Poor maintenance

A back-up stunner should always be close to hand should the main equipment fail. If the first stun fails the next attempt should always be in a different position because the swelling and damage caused by the first attempt reduces the effect of a second impact in the same place.

Methods to Improve Captive Bolt Stunning

1. Keep the captive bolt serviced and cleaned per the manufacturer's instructions. Cartridge fired captive bolts MUST be completely taken apart and cleaned after each day of use. Even if the gun is shot only one, it must be taken apart and cleaned at the end of the shift. For pneumatic stunners, follow the manufacturer's directions.
2. Replace broken parts and do not attempt to straighten a bent cocking device. You should replace it.
3. Keep cartridges dry; never store them in a damp location. Damp cartridges are a major cause of low powered, "soft" shots that are less effective. Soft sounding shots from cartridge fired captive bolts are less effective. On high speed lines, rotate cartridge fired captive bolts to prevent overheating. Overheated captive bolts lose hitting power.
4. Use a test stand to determine if the captive bolt has sufficient bolt velocity. The bolt velocity should be 55 m/s for steers and cows and 70 m/s for bulls. For accurate results, the test stand must be mounted on a strong, solid surface.
5. Pneumatic captive bolts must have a sufficient air supply to maintain the pressure specified by the manufacturer. The air supply should be equipped with

a filter and lubricator and the compressor should have sufficient capacity to maintain the required pressure during peak production time.

6. New cartridges directly from the manufacturer may vary in strength and performance. This may be due to variations in manufacturing.
7. Calm animals are easier to render insensible. Non-slip flooring is essential in stun boxes. Animals are more likely to leave agitated when they slip. Animals will be more willing to stand still on a non-slip surface. Steel rods can be welded into a grid to provide a non-slip floor.
8. Locate and eliminate distractions that make animals refuse to enter the stun box or restrainer. Below is a list of simple things that can be done to reduce balking and refusing to enter the stun box:

    - Add a light to illuminate a dark entrance.
    - Eliminate air hissing.
    - Block vision with solid panels so approaching animals do not look out onto the slaughter floor and see people and moving equipment.
    - Adjust ventilation to prevent air drafts from blowing toward approaching animals.
    - Provide plenty of back clearance on stun box entry doors. Animals may refuse to enter if the bottom of the gate is too low.

Table 1. Comparison of Different Types of Captive Bolts

Comparison of Different Types of Captive Bolts		
	Non-Penetrating	**Penetrating**
Second shot required	29%	12%
Immediate collapse	91%	99%
Righting behavior	7%	1%
Response to nostril stimulation	2%	0%
Eyeball rotation	5%	1%

Update on kicking after captive bolt stunning

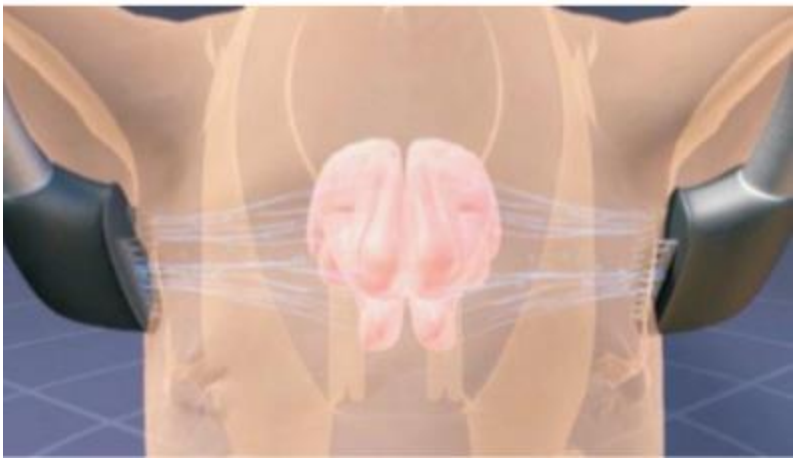
After animals are shot with a captive bolt they will often kick vigorously. This is due to reflexes. Cattle will continue to kick after the spine is severed. This occurs because the circuits that provide the rhythmic movements for walking are located in the middle of the spinal cord. In abattoir observations indicate that Holsteins kick more than the British/European beef breeds .Kicking should NEVER be used to determine if an animal is consciou

Safety Tips for Workers

1. Cartridge-fired stunners must ALWAYS be un-cocked before they are set down.
2. NEVER, NEVER throw a cartridge-fired stunner to another person.
3. Inspect latches on stunning boxes to make sure they latch securely. Before the next animal is admitted to the box, check the latch.
4. All guards must be kept in place over exposed pinch points which could be easily touched by employees during normal operation of the restrainer system equipment.
5. If a worker has to get inside a restrainer conveyor system to unjam it, lock it out first to prevent somebody else from turning it on.
6. Cartridge-fired stunners must always be kept unloaded when they are carried away from the stunning area.
7. Good maintenance is essential on pneumatic stunners to prevent excessive recoil which can strain and injure the operator's hands, arms or back.

How it works

Electrical stunning is a reversible method and consists of delivering electrical current to the animal's head. The conduction of electrical current provokes "grand mal" epilepsy, inhibiting brain activity and depolarizing neuronal cells immediately, leading to unconsciousness and preventing transduction of pain signaling, similar to an epileptic crisis in humans.



A pain stimulus can only be perceived within approximately 50 to 150 milliseconds, whereas electro narcosis in an ideal or laboratory conditions can cause insensibility within 15 milliseconds, ensuring that pigs do not feel pain when electrodes are correctly applied.

The effect of electro narcosis on pigs is temporary, thus the goal is to induce immediate unconsciousness and ensure it persists until the moment of death, which occurs with bleed out.

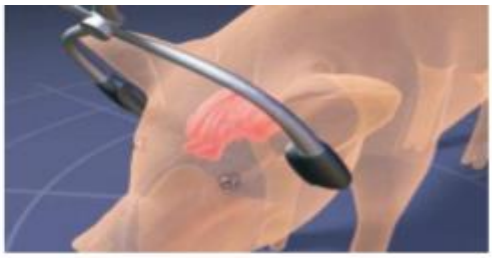
Usually the apparatus used for electrical stunning has to be equipped with:

- Electrodes
- Visual or audio devices indicating the time interval of electrode application;
- Visible safety device indicating electric current.

Figure Monitoring screen displaying stunning parameters visible to the operation

Electrode positioning

Position 1 (see images below) is ideal and the operator must prioritize it, but positions 2, 3, 4 and 5 are also acceptable.

1. Between the eyes and base of ear on both sides of the head	
2. Below the base of each ear on both sides of the head;	

3. Positioning the 1st electrode between the eye and the base of one ear and the 2nd electrode posterior to the other ear. The electrodes must be placed diagonally to the head	
4. Positioning electrodes on both sides of the head, posterior to ear insertions	
5. Positioning the 1st electrode on the superior region of the skull and the 2nd electrode in between the mandible roots	

Monitoring of stunning

Regular and frequent assessment of pigs as they are being stunned is very important, as well as monitoring of the stunning parameters. This practice will ensure that all animals go to the bleeding step unconscious.

When pigs are correctly stunned, they undergo two phases that are called the tonic and clonic phases.

The tonic phase lasts between 10 and 20 seconds and the pig shows:

- No rhythmic breathing in the flank and snout

- Pupils become dilated (mydriasis); No corneal reflex; No reflex to painful stimuli.

Clonic phase

The clonic phase starts after the tonic phase, lasting between 15 and 45 seconds and the pig shows:

- No rhythmic breathing;
- Involuntary ‘pedaling ‘or kicking;
- Gradual relaxation of musculature.

Figure in clonic phase

When using adequate electrical parameters and applying the electrodes in the correct place during 3 seconds, the average interval for return of reflexes in pigs is:

- **Rhythmic breathing:** About 37 - 41 seconds. Monitoring of rhythmic breathing can be performed at the snout or flank region, while the pig is at the bleeding table;
- **Corneal reflex:** About 47 seconds. In practice this reflex is difficult to verify and is often confounded with the palpebral reflex, which can be considered a false-positive. Thus, it must not be assessed in isolation;
- **Sensibility response**: About 57 seconds. This reflex can be assessed at the septum nasal region (compression test), skin or ear (pinching test);
- **Righting reflex and attempt to recover posture**: About 65 seconds, indicating full return of consciousness and sensibility

Self-check 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Choose the best answer (2 point)

1. A metal or plastic rest with a trestle arrangement onto which the bled animal is placed for skinning and evisceration, often used where a hoist system is unavailable;

a) Skinning Cradle
b) Hoise
c) Stun
d) All

2. A device for lifting up the stunned animal for bleeding; it can be operated manually, mechanically or electrically. An incision made close to the head

a. Hoise
b. Skinning
c. All

3. A small or narrow enclosure into which the animal is led from the Lairage to be rendered unconscious In the mid line of the neck

a. Stunning Pen
b. Skinning
c. Hoise
d. all

4. Good maintenance is essential on pneumatic stunners to prevent excessive recoil which can strain and injure the operators hands, arms or back.

a. True b. false

5. Pneumatic captive bolts must have a sufficient air supply to maintain the pressure specified by the manufacturer.

a. True b. false

Test I: Short Answer Questions

You can ask you teacher for the copy of the correct answers.

Note: **Satisfactory rating - 10 points** **Unsatisfactory - below 10 points**

Information sheet 2 Maintaining stunning equipment and facilities

Maintaining and using equipment

The animal welfare officer must check that equipment for restraining and stunning is properly used, in a way that ensures optimal conditions for the welfare of animals.

Manufacturers of restraining and stunning equipment are required to provide instructions for the use and the maintenance of such equipment, depending on the species, categories, quantities and/or weights of animals for which the equipment is designed.

Hence, the animal welfare officer must make sure that these instructions are known and properly implemented by the personnel concerned in the slaughterhouse. The animal welfare officer can also complete and/or adapt manufacturers 'instructions so that these types of equipment deliver good results in the context of their slaughter house.

Basic Equipment

The standard installation and equipment required in modern slaughter premises are those necessary to effect a rapid and hygienic conversion of livestock into meat in what might be called the dressing operations, and those required to prepare the offal for further use or disposal into waste, otherwise referred to loosely as cleaning and rendering operations.

2.2.1 Implementing methods of stunning

Maintain equipment

Electrical stunning

Electrical stunning is a method of simple stunning, so you'll need to follow it with another operation to kill the animal once it's unconscious.

When carry out electrical stunning must make sure that:

- there’s good electrical contact with the animal
- electrodes span the brain of the animal and can be adapted for the size of animal
- the current is strong enough to make an animal unconscious until death

In addition must:

- kill the animal before it recovers consciousness
- use at least the minimum currents for each species

Minimum currents for head-only electrical stunning

Table minimum current requirement for stunning

Species	**Minimum current**
Cattle 6 months or older	1.28 amps (A)
Cattle younger than 6 months	1.25A
Sheep and goats	1.0A
Pigs	1.3A

Head-to-body electrical stunning

If you’re using electrodes on an animal’s head and body, you must use the following currents:

- sheep and goats - 1A
- pigs - 1.3A

Do not use this method of simple stunning on cattle.

Monitor electrical stunning

For each animal stun, equipment must be fitted with a device that displays key parameters such as:

- voltage
- current
- length of exposure

The device must be clearly visible to staff carrying out stunning. Standard operating procedure should state what parameters need to record. If the electrodes do not deliver the right current or voltage for the right amount of time, the device must give a warning that can clearly see and hear.

1. Captive bolt stunning

Must follow manufacturer's instructions when using any device, including positioning and using the correct strength of cartridge.

Penetrative captive bolt

- ✓ Use penetrative captive bolt devices for simple stunning for all species.
- ✓ Must apply the device in the proper position.
- ✓ Must check the bolt has retracted to its full extent after each shot. If the bolt has not fully retracted, must not use the device until it's repaired
- ✓ Must not shoot cattle (or any bovine animal, including bison and buffalo) in the back of the head.

Non-penetrative captive bolt

- ✓ Can only use non-penetrative captive bolt devices for simple stunning on cattle, sheep, goats and deer (ruminants) less than 10 kg.
- ✓ Must apply the device in the proper position.

1. Firearm stunning

- Can use a firearm or shotgun to stun and kill an animal.
- Must use the correct power and caliber of cartridge for the type of animal.

2. Gas stunning

Gas stunning is a method of killing pigs.

- ✓ Must use a gas stunner to do this and follow the manufacturer's instructions.
- ✓ Must expose each pig to the gas for long enough to kill it and be able to:

  - visually monitor pigs in the gas stunner
  - access the pigs as quickly as possible

- flush the stunner with air so you can enter the chamber

✓ Gas stunners and their conveyors must:

- Minimize struggling or vocalization
- allow pigs to remain standing until they lose consciousness
- get pigs to the point of maximum gas concentration within 30 seconds
- have enough space for pigs to lie down without lying on each other, even when you're operating at maximum capacity
- have adequate lighting to allow pigs to see other pigs and their surroundings

Gas stunners and their conveyors must not injure or bruise pigs, or compress a pig's chest.

Gas monitoring devices

Gas stunners must have a monitoring device that continuously measures and displays the gas concentration. Must make sure the device is clearly visible to staff.

If the gas concentration falls below the correct level, the monitoring device must display a clear visible warning and sound an alarm.

Do not allow a pig to go into or remain in the stunner if:

- there's a problem with the gas stunner
- the alarm goes off
- the gas concentration falls below the correct level

Gas mixtures

Can use:

- carbon dioxide at high concentration
- carbon dioxide mixed with inert gases

- inert gases

Must not allow gases to enter into the chamber or the location where animals are to be stunned and killed in a way that it could create burns or excitement by freezing or lack of humidity.

Must only stun pigs by gas if each pig is exposed to the gas for long enough to make sure it's killed.

Carbon dioxide at high concentration

The minimum concentration is 80% carbon dioxide. Exposure of conscious pigs to the gas must lead to anoxia (loss of oxygen to the brain).

Must make sure that no pig enters the gas stunner if the carbon dioxide concentration by volume falls below 80%.

A pig must be conveyed to the maximum concentration of gas within 30 seconds of entering the stunner.

Carbon dioxide mixed with inert gases

Expose conscious pigs directly or progressively to a gas mixture containing up to 40% of carbon dioxide mixed with inert gases.

The maximum concentration is 40% carbon dioxide. Direct or progressive exposure of conscious pigs to the gas must lead to anoxia.

Inert gases

Expose conscious pigs directly or progressively to an inert gas mixture such as argon or nitrogen. This exposure must lead to the brain being deprived of oxygen (anoxia).

Facilities

Handling facilities should be designed to minimize stress and avoid causing injury during handling. Designs which encourage natural behavior will reduce the amount of effort required from the operator.

In designing facilities, the requirements of both the animals and the operators need to be considered. It should always be remembered that, however good the handling system, the skill and attitude of the operator is critical in maintaining high standards of welfare.

Personal Protective Equipment (PPE) and Hygiene

Ensure appropriate PPE is used to protect handler from accidental injury or exposure to blood and other body fluids, such as:

i. Scrubs or coveralls
ii. Steel-toed shoes or boots
iii. Leather or fabric gloves

Animal factors

To minimize stress to animals during handling procedures, handlers should ensure that:

- ✓ the animal's natural behavior is utilized
- ✓ the animals can walk at their own speed
- ✓ the surrounding environment is kept calm
- ✓ there are minimal distractions (including from noise and light)

Yard design, equipment and safety

General suggestions for improving yard safety include:

- Yards, crushes, cradles and sheds should be suitable in size and strength for the animals being handled.
- Avoid blind corners and sharp turns in the design of your yard.

- Keep the walkways and laneways dry and non-slip wherever possible.
- Make sure your gates (door), footholds and access ways are well positioned.
- Keep all equipment in good repair: gates moving and hung, latches working, hinges greased.

Self-check 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Choose the best answer (2 point)

1……. should be designed to minimize stress and avoid causing injury during handling of animals.

a. Animal handling facilities
b. Animals ppe
c. Stunning
d. all

2. Ensure appropriate PPE is used to protect handler from accidental injury or exposure to blood and other body fluids, is not include

a. Scrubs or coveralls
b. Steel-toed shoes or boots
c. Leather or fabric gloves
d. All
e. None

3. To minimize stress to animals during handling procedures, handlers should ensure that for the following requirement

a. the animal's natural behavior is utilized
b. the animals can walk at their own speed
c. the surrounding environment is kept calm
d. all

4. ……must have a monitoring device that continuously measures and displays the gas concentration.

a. Gas stunner
b. Captive bolt
c. Electrical stunner
d. All

5. ……. is a method of simple stunning, so you'll need to follow it with another operation to kill the animal once it's unconscious.

a. electrical stunning

b. captive bolt

c. gas stunner d. all

1.

You can ask you teacher for the copy of the correct answers.

Note: **Satisfactory rating - 10 points** **Unsatisfactory - below 10 points**

LG# 31	LO3 stun the animal

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- stunning animal in accordance with animal welfare
- occupational health and safety during stunning
- checking stunning based stunning part on work instruction

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- stun animal in accordance with animal welfare
- occupational health and safety during stunning
- check stunning based stunning part on work instruction

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
6. If you earned a satisfactory evaluation proceed to “Operation sheets
7. If your performance is satisfactory proceed to the next learning guide,

Information sheet 1 stunning animal in accordance with animal welfare

Stunning methods

General

The competence of the operators, and the appropriateness and effectiveness of the method used for stunning are the responsibility of the management of the slaughterhouse, and should be checked regularly by a competent authority.

Persons carrying out stunning should be properly trained and competent, and should ensure that:

- the animal is adequately restrained
- animals in restraints are stunned as soon as possible
- the equipment used for stunning is maintained and operated properly in accordance with the manufacturer's recommendations, in particular with regard to the species and size of the animal
- the instrument is applied correctly
- stunned animals are bled out (slaughtered) as soon as possible
- animals are not stunned when slaughter is likely to be delayed. In addition, when an animal is not properly stunned, aback-up procedure must be used immediately

Mechanical stunning

A mechanical device should be applied, usually to the front of the head and perpendicular to the bone surface.


Figures 1&2 illustrate the proper application of the device for certain species.

Signs of correct stunning using a mechanical instrument are as follows:

- the animal collapses immediately and does not attempt to stand up
- the body and muscles of the animal become tonic (rigid) immediately after the shot
- normal rhythmic breathing temporarily stops
- the eyelid is open with the eyeball facing straight ahead and is not rotated.

Electrical stunning

Direct contact

An electrical device should be applied to the animal in accordance with the following guidelines.

Electrical stunning equipment should not be applied on animals as a means of guidance, movement, restraint or immobilization, and should not deliver any shock to the animal before the actual stunning or killing.

Before being used on animals, electrical stunning apparatus should be tested using appropriate resistors or dummy loads to ensure the power output is adequate to stun animals.

The apparatus required for electrical stunning should be provided with adequate power to continuously achieve the minimum current level recommended for stunning.

In all cases, the correct current level shall be attained within 1 s of the initiation of stun and maintained for between 1 s and 3 s, in accordance with the manufacturer's instructions.

Electrical stunning of poultry using a water bath In the case of poultry suspended on a moving line, measures should be taken to ensure that the poultry are not wing flapping at the entrance of the stunner. The poultry should be secure in their shackles, but there should not be undue pressure on their shanks.

Minimum current level recommended for stunning

Species Minimum current levels	(amperes per animal)
Cattle	1.5
Calves	1.0
Pigs	1.25
Sheep and goats	0.5
poulrty	0.4

Gas stunning of poultry

The main objective of gas stunning is to avoid the pain and suffering of water bath stunning and killing systems, which involve shackling conscious poultry. Therefore, gas stunning should be limited to birds contained in crates or on conveyors only. The gas mixture should be non-aversive to poultry.

Gas stunning of poultry in their transport containers will eliminate the need for live bird handling at the processing plant and all the problems associated with electrical stunning. Similarly, gas stunning of poultry on a conveyor eliminates the problems associated with electrical water bath stunning.

a) Gas mixtures used for stunning poultry:

- a minimum of 2 min exposure to 40% CO2, 30% oxygen and 30% nitrogen, followed by a minimum of 1 min.

- a minimum of 2 min exposure to argon, nitrogen, other inert gases or any mixture of these gases in atmospheric air with a maximum of 2% residual oxygen by volume
- a minimum of 2 min exposure to a minimum of 55% CO2 in air.
- compressed gases should be vaporized before being administered into the chamber

b) Requirements for effective use gas stuning

- compressed gases should be vaporized before being administered into the chamber
- under no circumstances, should solid gases with freezing temperatures enter the chamber
- gas mixtures should be humidified according to the supplier's specifications

– the concentration of gas in the chamber should be continuously monitored and displayed to ensure that it is appropriate.

Under no circumstances should birds exposed to gas mixtures be allowed to regain consciousness. If necessary, the exposure time to the gas should be extended.

Stunning and slaughter

Anyone carrying out stunning and sticking must have the knowledge and skill necessary to perform the task humanely and efficiently and must be a licensed slaughter man or be a trainee slaughter man with a temporary CoC working under direct supervision of a licensed slaughter man or official veterinarian. WATOK Article 3 in Scotland refers to WASK schedule 12.

Always:

- ensure that an effective stun is achieved
- keep stunning equipment maintained and clean
- have available a reserve stunning instrument in good working order for the immediate use in case the first stunning instrument fails to operate effectively
- stun injured animals without delay
- handle animals in a manner which will allow stunning, hoisting and sticking to take place without delay
- complete all operations on one animal before the next is handled if working alone
- stun adult cattle in a stunning or restraining pen which is in good working order
- always bleed without delay after stunning

Never:

- leave animals waiting in stunning pens
- place animals in a stunning pen unless the person who is to carry out the stunning is ready to do so immediately
- stun an animal unless you are sure you can apply the stunning instrument correctly
- stun an animal unless it is possible for it to be stuck without delay
- use electrical stunning equipment for the purposes other than stunning animals
- tie the legs of the animal or suspend it by the legs before stunning

Self-check 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Choose the best answer (2 point)

1. Persons carrying out stunning should be properly trained and competent, and should ensure that:
   a. the animal is adequately restrained
   b. animals in restraints are stunned as soon as possible
   c. the instrument is applied correctly
   d. all
2. A mechanical device should be applied, usually to the front of the head and perpendicular to the bone surface.

   a. true b. false

3. In all cases, the correct current level shall be attained within 3 s of the initiation of stun in accordance with the manufacturer's instructions.

   a. true b. false

4. The main objective of gas stunning is to avoid the pain and suffering of water bath stunning and killing systems

   A. true b. false

3. The concentration of gas in the chamber should be continuously monitored and displayed to ensure that it is appropriate.
   a. true b. false

You can ask you teacher for the copy of the correct answers.

Note: **Satisfactory rating - 10 points** **Unsatisfactory - below 10 points**

Information sheet 2 occupational health and safety during stunning

STUNNING

The commercial slaughter of animals in the New Zealand meat industry must be carried out by approved methods and these include an approved method of stunning prior to slaughter.

Stunning of large mammals such as sheep, cattle and deer must be applied using one of the following:

- a captive bolt firearm; or
- an electrical stunner; or
- a suitable firearm.

Note that anyone using a firearm must have the relevant firearms licence.

The stunning can be designed to provide permanent insensibility or, as in the case of Halal slaughter, temporary insensibility.

Effective stunning is important for the welfare of the animal but is also important for the safety of the employees involved – in particular, the hazards involved in dealing with an inadequately stunned animal, especially in the case of larger animals such as cattle and deer.

In the case of stunning for temporary insensibility, additional precautions are necessary because the stun-to-stick interval is critical.

Repetitive ineffective stunning requiring repeat stunning must be investigated and remedied immediately.

Hazards in stunning process

Hazard1, Injury from inadequately stunned animals.

Control:

Access to a knocking box, or restraining crush and adjacent areas should be restricted to appropriately trained and protected employees.

- Operators must be competent and follow the correct stunning procedure for effective stunning (e.g. head correctly clamped for electrical stunning; correct positioning for captive bolt stunning).

- Operators must be competent in assessing the signs of acceptable and unacceptable stunning.
- When stunning for temporary insensitivity (i.e. for Halal slaughter), the person operating a knocking box must ensure there is clear space on the bleed table before stunning the next animal.
- Insensibility must be confirmed before releasing the stunned animal.
- In the case of smaller animals such as sheep, an automated system may be used whereby the stunning and release is controlled by the slaughterer.
- Where a restraining conveyor is used for sheep, goats, and calves in which individuals are separated, conveyors must be designed and operated to prevent animals from climbing on the backs of animals in front of them.
- Back-up stunning equipment (e.g. a captive bolt gun) for an inadequately stunned animal and a procedure for its use. Operators to be competent in this procedure.
- Barriers or bollards and escape routes to prevent improperly stunned cattle endangering employees.
- Safe escape routes for workers in sticking pens.
- An escape route and pen for an inadequately stunned cattle beast that is running around.

Hazard2, use of firearm.

Control:

- If a firearm is used for shooting an escaped animal, before you fire:
  -Clear other workers from the area. If this is not possible, they should stand behind the person shooting.
  -Consider the line of fire to ensure safety in case of a missed shot.
- The aim is to kill the animal with a single shot. Fire from as close a range as possible, to reduce the chance of the bullet ricocheting.
- Do not fire while the animal is moving its head.

Hazard3, Falling into a knocking box or restraining crush.

Control:

- Design of knocking box or restraining crush to minimize the risk of an employee falling in.

- Design of enclosures to minimize reaching and bending over.

Hazard4 Injury from small stock

Control:

(E.g. sheep; calves) jumping out at the entrance to the knocking box.

• Install barrier(s) to prevent escape or to enable ease of capture.

Hazard 5 Injury from handling animals in a crush pen

Control:

- Pens designed to minimize animal handling.
- The size of the crush pen should be just wide enough to prevent the animal from turning around.
- Animals need to be well restrained before stunning them.
- Position the operator behind protective steel bars.

Hazard 6, Injury from captive bolt stunning device.

Control:

- Operators need to be competent to use captive bolts. They should essentially be treated as the same as a firearm because they can inflict similar injury.
- Don’t leave a loaded captive bolt unattended.
- If the captive bolt falls or is dropped, don’t attempt to catch it. Keep clear as it may discharge on impact.
- Ensure the device is regularly cleaned and maintained in accordance with the manufacturer’s instructions to ensure that it functions effectively.
- Place the captive bolt device in secure storage when not in use.

Hazard 7, Electrical shock from a manual electrical stunning device

Control:

- There is a risk of fatal electrical shock if a person contacts the electrodes of a manual stunning device, so always follow the manufacturer’s safety instructions.
- Insulate the apron of a conveyor presenting animals for electrical stunning.
- Be aware that the animal may react and kick, accidently discharging the stun gun.

Managing health & safety

There are lots of good reasons for good management of health and safety in your workplace. A healthy and safe workplace is better to work in and more productive. Both employers and workers benefit.

Think about the losses that can be caused by workplace injuries or illnesses:

- Loss of productivity.
- Loss of workers.
- Loss of income for worker's family.
- Cost of extra overtime to make up lost time.
- Loss due to the employment of unfamiliar temporary staff.
- Fines and legal and investigation costs.
- Loss of goodwill.
- A downturn in staff morale.
- Pain and suffering

Responsibilities of employees

The HSE Act clearly states that employees also have responsibilities for health and safety at work.

Employer's key legal responsibilities:

Employers are required to: Take all practicable steps to ensure the safety of employees while at work including:

- The provision and maintenance of a safe work environment.
- The provision and maintenance of work facilities for employees' safety and health.

• Ensuring that plant used by employees is safe.

• Not exposing employees to hazards in or near the workplace.

• Development of emergency procedures.

• Identification of all hazards in the workplace then assessment and control significant hazards to ensure workers is not exposed to them.

• The provision of information, appropriate training and supervision.

• Involving employees in the development of health and safety procedures.

• Recording and investigating accidents and notifying the Ministry of Business, Innovation & Employment (MBIE) of any serious harm injuries.

Employee participation

Employee's responsibilities:

Employees need to: Take all practicable steps to ensure:

• You remain safe at work, for example by using the correct protective clothing and equipment, and by following the correct procedures.

• That any action or inaction (something you don't do) does not cause harm to any other person.

• Note that under the HSE Act you are able to refuse to do work that you believe is likely to cause you serious harm.

Self-check 2	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Choose the best answer (2 point)

1. Stunning of large mammals such as sheep, cattle and deer must be applied using one of the following:
    a. a captive bolt firearm; or
    b. an electrical stunner; or
    c. a suitable firearm.
    d. all
2. Effective stunning is important for the welfare of the animal but is also important safety of the employees involved – in particular
    a. True b. false
3. Repetitive ineffective stunning requiring repeat stunning must be investigated and remedied immediately.
    a. true b. false

4. "Do not fire while the animal is moving its head." Controlling mechanism for :
    a. use of firearm
    b. Injury from inadequately stunned animals
    c. Falling into a knocking box or restraining crush**.**
    d. all

5. "Jumping out at the entrance to the knocking box" controlling mechanism for:
    a. use of firearm
    b. Injury from inadequately stunned animals
    c .Falling into a knocking box or restraining crush.
    d.all

You can ask you teacher for the copy of the correct answers.

Note: **Satisfactory rating - 10 points** **Unsatisfactory - below 10 points**

Information sheet 3 checking stunning based stunning part on work instruction

Checking of stunning

The key stunning parameters

The animal welfare officer must be familiar with all relevant aspects of stunning parameters2 for the species and operations in the slaughterhouse for which he or she is responsible.

The legislation establishes requirements for stunning but some parameters have to be defined by the slaughterhouse operator (called „key parameters“). The role of the animal welfare officer is hence to define these key parameters and make sure that they are implemented

For the penetrative captive bolt, the following must be defi ned and monitored: the position and direction of the shot, the appropriate velocity, exit length and diameter of the bolt (according to animal size and species), and maximum stun to stick/kill interval(s).

For electrical stunning techniques key parameters must be set up.

For head-only electrical stunning, the following must be defined and monitored: the minimum current (A or mA) according to animal category, minimum voltage (V), maximum frequency (Hz), minimum time of exposure, maximum stun to-stick/kill interval(s), frequency of calibration of the equipment, optimization of the current flow, prevention of electrical shocks before stunning, and position and contact surface area of the electrodes

For head-to-body electrical stunning, the following must be defined and monitored: the minimum current (A or mA) according to species, minimum voltage (V), maximum frequency (Hz), minimum time of exposure, frequency of calibration of the equipment, optimization of the current flow, prevention of electrical shocks before stunning, and position and contact surface area of the electrodes, and maximum stun-to-stick interval(s), in case of simple stunning(s).

For electrical water bath stunning, the following must be defined and monitored: the minimum current (A or mA), minimum voltage (V), maximum frequency (Hz) according to species, minimum time of exposure, frequency of calibration of the equipment, prevention of electrical shocks before stunning, minimizing pain at shackling, optimization of current flow, maximum shackle duration before the water bath, minimum time of exposure for each animal, immersion of the birds up to the base of the wings, maximum stun-to stick/kill interval(s) for frequency over 50 Hz(s).

For gas methods key parameters must be set up.

For carbon dioxide at high concentration, the following must be defi ned and monitored: the level of carbon dioxide concentration, duration of exposure, maximum stun-to-stick interval(s) in case of simple stunning, quality of the gas, and temperature of the gas.

For carbon dioxide in two phases, the following must be defined and monitored: the carbon dioxide concentration, duration of exposure, quality of the gas, and temperature of the gas.

For carbon dioxide associated with inert gases, the following must be defined and monitored: the carbon dioxide concentration, duration of exposure, maximum stun-to-stick/ kill interval(s) in case of simple stunning, quality of the gas, temperature of the gas, and oxygen concentration.

For inert gases, the following must be defined and monitored: the oxygen concentration, duration of exposure, quality of the gas, maximum stun-to-stick/kill interval(s) in case of simple stunning, and temperature of the gas.

Mechanical stunning

- position and direction of shot
- appropriate velocity
- maximum stun to stick/kill interval(s)
- Plus + penetrative captive bolt
- exit length and diameter of the bolt

Electrical stunning

- minimum current (A or mA)
- minimum voltage (V)
- maximum frequency (Hz)
- minimum time of exposure
- maximum stun-to-stick/kill interval(s)
- frequency of calibration of the equipment

Gas stunning

- gas concentration
- duration of exposure
- temperature of the gas
- Plus + carbon dioxide at high

Self-check 3	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Choose the best answer (2 point)

1. When pigs are correctly stunned, they undergo two phases that are called

the tonic and clonic phases.

a. Tonic b. clonic c. all

2. The clonic phase starts after the tonic phase, lasting between 15 and 45 sec and the pig shows:

a. True b. false

3. Good maintenance is essential on pneumatic stunners to prevent excessive recoil which can strain and injure the operator's hands, arms or back.

a. True b. false

4. Inspect latches on stunning boxes to make sure they latch securely. Before the next animal is admitted to the box, check the latch.

a. True b. false

5. The conduction of electrical current provokes "grand mal" epilepsy, inhibiting brain activity and depolarizing neuronal cells immediately,

a. True b. false

You can ask you teacher for the copy of the correct answers.

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