

Technical Note No 3

Head Restraint Equipment

Summary

It is a statutory requirement to have a head restraint fitted into every cattle stun box in the UK. When this regulation came into force, the Humane Slaughter Association (HSA) reviewed the effects of head restraint systems on the accuracy of stunning and the associated effects on animal welfare. The report concluded that active head restraints markedly increased the accuracy of the shot, although the improvement did not compensate for the increased stress levels experienced by the majority of the animals subjected to this type of restraint. Passive restraints, however, produced a significant increase in the accuracy of each shot, with no increase in stress levels or the length of time animals were spending in the box prior to stunning.

For these reasons, passive systems are the recommended form of restraint for captive-bolt stunning of cattle.

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Legislation

The Welfare of Animals at the Time of Killing (England) Regulations 2015, state that a stunning pen used to restrain adult bovine animals for the purpose of stunning is constructed so as to:

'...restricts the movement of the head of an animal confined in it so as to permit accurate stunning and allow the head of the animal to be released immediately after the animal has been stunned'

Types of restraint available

The types of restraint available range from active devices, which physically hold the head in place, to passive devices which simply encourage the animal to hold its head in the correct position. Active restraints, (the head-yoke and chin-lift, and cantilever neck-yoke system) physically restrain the animal to decrease the amount of head movement. The head-yoke and chin-lift restraint works in two stages; the yoke closes around the animal's neck, the chin-lift then rises to push the animal's head upwards, resulting in complete immobilisation of the head. The cantilever neck-yoke has arms which lie flat against the side of the wall; when activated, the arms move up and out to close around the neck, stopping the animals moving backwards and restricting head movement to up and down. Part-passive devices restrain the animals like the cantilever neck-yoke, but have one static arm and one moving part which causes less stress to the animal. The passive devices available (fixed shelf) do not physically restrain the head, but encourage the animal to place its head in the correct position and restricts downward movement. The passive restraint has no moving parts, although the effectiveness can be improved by the use of a rump-push device behind the cattle.

1) Active restraint - design specification

- The arms should fit closely to the wall - no distraction to the animal entering
- The area in front of and above the head restraint should be brighter than the rest of the box - encouraging the animal to place its head in the correct position
- The slaughterman should have enough room to stun correctly and safely once the head is held
- The restraint should have an immediate, quiet action when activated, ensuring the animal is restrained at the first attempt without inducing undue stress
- The power source operating the restraint must work quietly with no sudden noises
- A hydraulic power source will be quieter than a pneumatic source
- If operated manually, a trip mechanism should be fitted to allow immediate release of the head
- The restraint should be regularly maintained so that the device operates effectively at all times

Cantilever head restraints, as shown below, are not suitable for heavy or strong animals which may pull the restraint system off the wall.

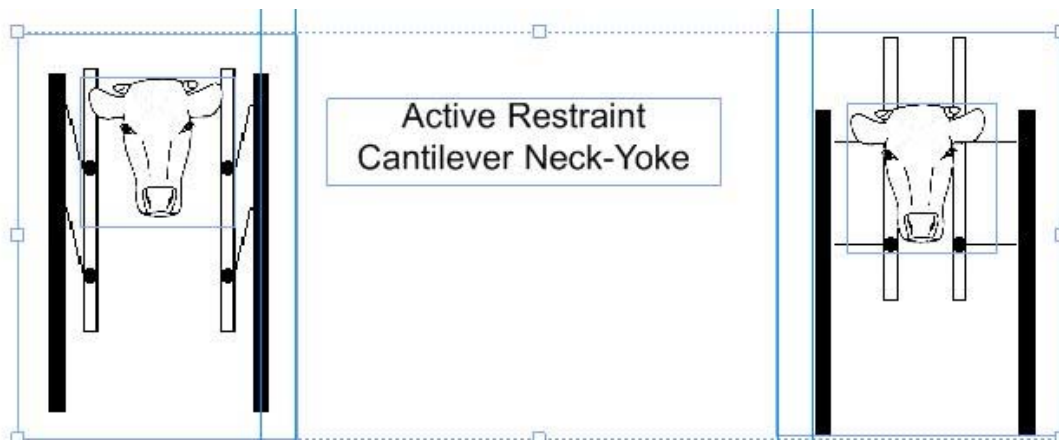


Figure 1a Resting Position

Figure 1b Restraining position

2) Part-passive restraint - specific requirements

The part-passive system has the same requirements as the active restraints. To avoid distraction the stationary side should not contrast with the inside of the box.

- The power source should be fitted out of the sight of the animal
- The fittings on the static arm should be on the side closest to the front of the box, in order to prevent distraction

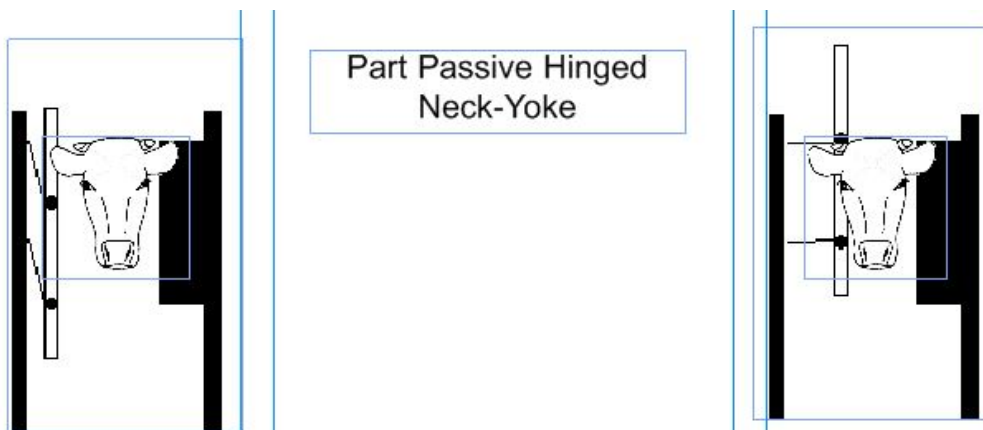


Figure 2a Resting Position

Figure 2b Restraining position

Please note diagrams not to scale, the dimensions required are dependent on each individual abattoir

3) Passive restraints - specific requirements

- Use internal fittings to hang the shelf - minimising distraction to the animal
- The shelf can be either a solid box (Figure 3), a piece of sheet metal curved to form a surface (Figure 4) or a metal shelf held by a counter balance (Figure 5)
- The fixed shelf (Figures 3 and 4) should be fitted in such a way that swing-doors are not impaired and the removal of the stunned animal is not affected
- The movable shelf (Figure 5) can be fitted in boxes with fully rotating doors as the shelf will drop as the gate goes over it
- Make the area above the shelf lighter than the rest of the box
- Close any gaps which allow light in at the base or sides of the box – to avoid distraction
- Place a bar across the top of the box (lying above the withers) – to prevent animals stepping onto the shelf
- Avoid creating shadows or contrasting colours in the box which may distract the animal from entering
- Install a rump-push so the box can deal with all sizes of animals

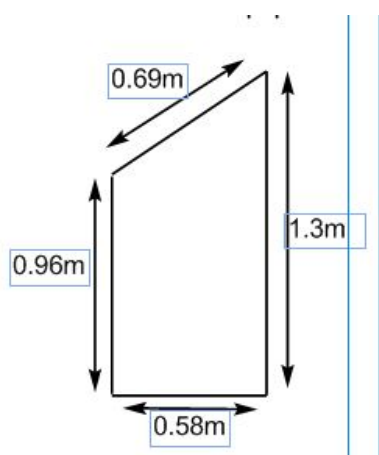


Figure 3 Box Style

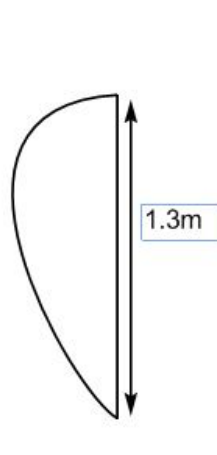


Figure 4 Curved metal shelf

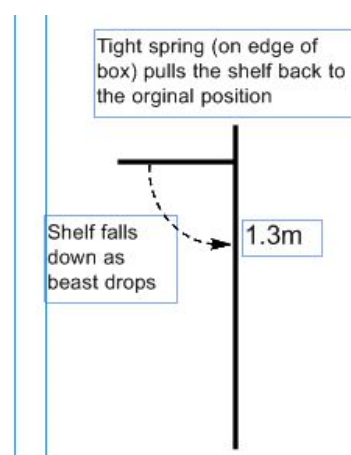


Figure 5 Pivoting shelf

NB Side views of various head shelves - not to scale

Rump-push

When a plant slaughters animals of a similar size, the shelf is an ideal system. However, when the size of the animals varies, the shelf becomes less effective as smaller animals can shy back away from the slaughterman. By fitting a rump-push the animals are encouraged forwards and prevented from backing away. Rump-pushes can be operated manually, hydraulically or pneumatically depending on the power source available. Overall the hydraulic system would be best as this can apply the correct pressure to individual animals and also has a quiet action. The push should be ideally be positioned around 90cm high.

When fitting a rump push it is important that it should:

- not impair removal of the animal after stunning
- be capable of applying suitable pressure, therefore positioning without causing pain or bruising to the animal
- be at a height suitable to control all animals

Comparison of restraints

As mentioned above, the type of restraint depends entirely on the individual abattoir's circumstances. The following table summarises all the options discussed so far, showing both advantages and disadvantages of each system.

	Active		Part-passive	Passive
	Head-yoke and chin-lift	Cantilever neckyoke	Hinged neckyoke	Head shelf
Effect of restraint on animal	Head securely in a fixed position	Backwards movement restricted	Backwards movement restricted	Downwards movement restricted
Advantages	<ul style="list-style-type: none"> • animal held stable • allows accurate shot • good for training staff • can hold heavy animals • animal cannot move back 	<ul style="list-style-type: none"> • animal held stable • allows accurate shot • good for training staff • animal cannot move back 	<ul style="list-style-type: none"> • animal held stable • allows accurate shot • head held in a good position • animal cannot move back 	<ul style="list-style-type: none"> • no distraction to animal • no power requirements • no extra stress to the animal • not physically restrained • no effect on throughput time
Possible disadvantages	<ul style="list-style-type: none"> • extra stress experienced • slower throughput time • increased time in stun-box prior to stunning • disruption of carcase removal 	<ul style="list-style-type: none"> • extra stress experienced • slower throughput time • increased time in stun-box prior to stunning • disruption of carcase removal • cannot hold heavy, strong animals 	<ul style="list-style-type: none"> • the passive arm may deter animal from entering the box • moving arm may stress the animal 	<ul style="list-style-type: none"> • does not restrict all movement • bar may be needed across the top of the box • rump-push may be needed to position (power would be required)

Construction materials

The device should be manufactured from materials which:

- are non-toxic
- are corrosion resistant and robust
- are familiar to the animal and non-contrasting with surroundings
- require minimum routine maintenance
- are able to withstand a high degree of physical challenges from both animals and operators

Design

The following considerations are a good basis for finding the right system for your abattoir.

Conformity

Does it conform to current welfare legislation?

Flexibility

Will it adapt to future:

- | | |
|----------------------|--------------------------|
| operational changes? | <input type="checkbox"/> |
| cattle breeds/sizes? | <input type="checkbox"/> |
| plant capacities? | <input type="checkbox"/> |

Usability/reliability

Can it be easily:

- | | |
|-------------|--------------------------|
| installed? | <input type="checkbox"/> |
| operated? | <input type="checkbox"/> |
| inspected? | <input type="checkbox"/> |
| maintained? | <input type="checkbox"/> |
| cleaned? | <input type="checkbox"/> |

Environmental factors

Have you considered:

- | | |
|----------------------------------|--------------------------|
| lighting? | <input type="checkbox"/> |
| noise? (for operator and animal) | <input type="checkbox"/> |

Human factors

- | | |
|---|--------------------------|
| Is it safe for humans? | <input type="checkbox"/> |
| It is easy to operate? | <input type="checkbox"/> |
| Is handling made easier? | <input type="checkbox"/> |
| Can all parts be reached? | <input type="checkbox"/> |
| Have staff approved it? | <input type="checkbox"/> |
| Does it cater for worst-case operators? | <input type="checkbox"/> |

Animal Factors

- Is it suitable for all cattle?
- Is there no risk of injury at all?
- Does it prevent goading?

Cost

Is it affordable in terms of:

- installation?
 - running?
 - maintenance?
- Will the accuracy of stunning be significantly improved?

Future implications

Have all future implications been considered?

Adapted from Link: Improved Handling Systems for Pigs at Slaughter

Final design

An ideal head restraint design would consistently position the animals' heads in such a way that accurate stunning would occur all the time, without compromising animal welfare. To enable this, the design should:

- ✓ have a minimal adverse impact on animal welfare
- ✓ not increase time spent in stun box prior to stun
- ✓ be constructed so that the animal enters freely, with little hesitation
- ✓ be suitable for the existing stunning equipment and procedures
- ✓ position, rather than physically restrain, the head
- ✓ provide an instant constraint so throughput is not disrupted
- ✓ not impair the removal of animals from the stun box
- ✓ allow unhindered access for both stunning and re-stunning of dropped animals
- ✓ release the head immediately after stunning

IMPORTANT:

The best restraint does not have to be over-complicated in either design or operation.

HSA recommendations

Based on its survey results and trials on restraint systems, the HSA recommends that:

Passive head restraint systems are currently the best type of restraint available for conventional slaughter.

- The effectiveness of the head shelf can be improved by installing a rump-push especially if your plant kills varying sizes of animals
- A good head restraint design will not cause extra 'excitement' to be experienced by the animal whilst in the box, ie not increase the time spent in the box prior to stunning, not require extra handling or force to get the animal into the box, but will allow improved shooting accuracy
- If already in place, an active restraint should only be used when absolutely necessary, ie when animals voluntarily place their heads in the device, or are too fractious to manage, and when trainees are undergoing practical instruction
- Due to the increased stress caused by a head-yoke and chin-lift, this system can only be justified when religious slaughter is being performed
- Staff and equipment should be regularly monitored to maintain high animal welfare standards

IMPORTANT:

Animal welfare will be compromised if captive-bolt equipment is not carefully maintained, the wrong cartridges are used, or the shot is inaccurate, even with a good restraint system.

This technical note is intended for abattoirs in which animals are killed by conventional slaughter methods. It is important to stress that the legislation for religious slaughter states the animals should be slaughtered;

'...in a restraining pen which has been approved in writing by the competent authority and which the competent authority is satisfied has been installed in such a manner as to ensure that it will operate efficiently'

and will, therefore, have different restraining requirements to the stun boxes mentioned in this technical note.

DISCLAIMER OF LIABILITY

In no circumstances can the HSA accept liability for the way in which the equipment in this leaflet is used: or for any loss, damage, death or injury caused thereby, since this depends on circumstance wholly outside the HSA's control

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Further reading

The Welfare of Animals at the Time of Killing (England) Regulations 2015
Defra 2015

Head Restraint at Slaughter
HSA 1995

Captive-Bolt Stunning of Livestock (5th Edition)
HSA 2014

Handling Cattle at Abattoirs and Markets
HSA & MLC 2001

Full details of all legislation can be found on the following website:
www.legislation.gov.uk