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On-Farm Humane Killing of Neonate Pigs, Goats and Sheep

This technical guidance, published by the Humane Slaughter Association (HSA), is a result of research funded by DEFRA and carried out by the University of Bristol in collaboration with the HSA.

Occasionally, young piglets, goat kids or lambs must be killed on-farm due to ill health, poor performance or for management purposes. This technical note describes the use of mechanical, non-penetrating captive-bolt devices for the humane killing of neonate (new-born/infant) pigs¹, goats² and sheep³ within certain specified parameters.*

These devices can only be used as a killing method for:

- ***piglets of less than 10kg of liveweight;***
- ***kids of less than 4kg of liveweight; or***
- ***lambs of less than 6kg of liveweight.***

To be allowed for use as a killing method, the devices must deliver a minimum kinetic energy of:

- ***27.7 Joules for piglets;***
- ***27.8 Joules for kids; and***
- ***107 Joules for lambs.***

The use of non-penetrative captive-bolt devices remains a permitted method for the simple stunning of sheep and goats (ruminants) under 10kg liveweight. Simple stunning must be immediately followed by a killing method, such as bleeding-out (exsanguination).

* *The Protection of Animals at the Time of Killing (Amendment) (England) Regulations 2022*

Introduction

Historically, the usual practice for on-farm emergency killing, or culling, of neonate pigs, goats and sheep was by manual blunt-force trauma. This is carried out by administering a heavy blow to the head in one of two ways:

- Hold the animal by the back legs and deliver a firm blow to the back of the head with a blunt instrument, eg an iron bar or hammer.
- Hold the animal by the back legs and swing it through an arc to hit the back of its head with considerable force against a solid object, eg a brick wall or metal stanchion.

Whilst this technique, properly carried out by a trained and competent operator, is an effective, humane method of killing neonates, it is dependent on several variables being met: the strength and skill of the operator; and the timing and accuracy of the blow. Current slaughter legislation prohibits the use of manual blunt-force trauma as a stunning or killing method, but it may still have to be used in dire emergencies: for example, when movement of the animals, any delay in killing (such as immediately irreparable breakdown of equipment), or a combination of the two, will cause avoidable suffering.

This method of killing is aesthetically unpleasant for the operator, any bystanders and/or onlookers, and is open to much misinterpretation.

Mechanical blunt-force trauma is an alternative method that delivers a more controlled percussive blow to the head and does not require the procedure to be followed by a killing method. There are a number of tools on the market that can humanely stun-kill neonate piglets and kids. It has been shown that lambs are more resistant to mechanical blunt-force trauma, therefore a device that delivers a heavier blow is required for lambs.

Legislation

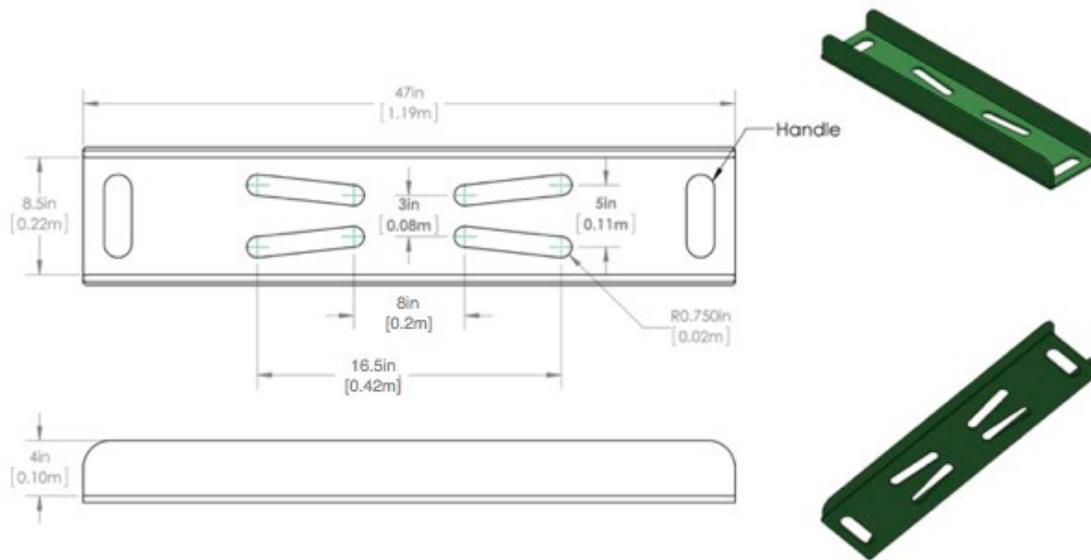
Killing

Council Regulation (EC) No. 1099/2009 on the protection of animals at the time of killing defines 'killing' as "*any intentionally induced process, which causes the death of an animal*". Annex I of this regulation describes the permitted methods, including non-penetrating captive-bolt devices.

Restraint

It is essential to restrain the animal prior to the application of a non-penetrating captive-bolt device, particularly if undertaking this procedure alone. The restraining device shown in Figure 1 was designed by Bock Industries*, in collaboration with the University of Bristol, to enable a single operative to carry out this procedure humanely. A similar restraining device can be fabricated on-farm using a section of plastic guttering, or drainage pipe halved lengthwise, with slots cut out to accommodate the legs. For piglets, placing the restrainer crossways on a pen corner will position the head close to the horizontal steel support of the pen. Ideally the restraint should firmly support the subject so that bolt energy is not flexing the pen support. A rigid restraint system will ensure maximum impact energy is transferred to the subject.

Figure 1: Neonate restraining device.



Piglets

When using this method to kill piglets, research has demonstrated that it is important to support the head of the piglet on a hard surface for maximum energy transfer to the skull to ensure an effective kill. The energy requirement for an effective stun-kill on piglets up to ten kilograms is greater than, or equal to, 27.7 Joules. The energy developed by individual devices can be determined from the manufacturer's website.

Shooting position

The shooting position for piglets is on the midline between the eyes and the ears on the frontal/parietal bone, as shown in Figure 2.

* Bock Industries <http://www.bock-industries.com/zephyr-exl-swine-restraint-new.html>

Figure 2: Shooting position for piglets.



Post-shot movement is an expected result of an effective stun-kill. The important organ when assessing the death of an animal is the brain. Following an effective percussive blow, the brain is no longer functioning. However, death is a process that starts with the higher centres of the brain followed by other parts of the central nervous system, for example the spinal cord, which will die more slowly. Once the brain is dead, spinal reflexes are released from the control exerted by the upper-brain and post-shot movements will result. These will gradually subside.

Some piglets will bleed from the nose due to the force of the blow – this is not a welfare concern, as the brain of the animal is no longer functioning.

Watch – On-Farm Killing of New-Born Piglets

Assessment of the effectiveness of the shot

Following the shot, the piglet should be assessed as follows:

- the piglet should not be breathing rhythmically
- there should be no corneal reflex (a blink in response to touching the eye), and
- there should be no response to a painful stimulus (a nose prick with needle).

The absence of these responses indicates an effective stun-kill.

Gasping respiration, or agonal breathing, may be present in a small number of piglets. In the dying animal this is the last respiratory pattern prior to loss of movement and is not a welfare concern.

Goat Kids

The application of a percussive blow with energy of greater than, or equal to, 27.8 Joules will produce an effective stun-kill on kids up to four kilograms. The energy developed by individual devices can be determined from the manufacturer's website.

Shooting position

Shot position is critical with kids. The stunner must be applied behind the poll, between the ears, with the neck bent and the chin touching chest, as shown in Figure 3.

Figure 3: Correct shooting position for kids.



Some kids may bleed from the nose due to the force of the blow and/or the skin on the head may split: this is not a welfare concern, as the brain of the animal is no longer functioning. Post-shot movement is an expected result of an effective stun-kill, as was reported with piglets above.

Watch – On-Farm Killing of New-Born Goat Kids

Assessment of the effectiveness of the shot: Following the shot, the kid should be assessed as follows:

- the kid should not be breathing rhythmically,
- there should be no corneal reflex (a blink in response to touching the eye), and
- there should be no response to a painful stimulus (a nose prick with needle).

The absence of these responses indicates an effective stun-kill.

Gasping respiration, or agonal breathing, may be present in a small number of kids. In the dying animal this is the last respiratory pattern prior to loss of movement, and is not a welfare concern.

Lambs

Lambs are more difficult to stun-kill than piglets and kids when using a non-penetrating captive-bolt device. The energy required to produce an effective stun-kill on lambs up to six kilograms was found to be greater than, or equal to, 107 Joules. This increased energy requirement can be produced by the Cash Small Animal Tool which has been reproofed to enable a pink, 1.25 grain cartridge to be used. This produces sufficient energy for the effective stun/killing of lambs.

Shooting position: Shot position is also critical with lambs. It must be applied behind the poll, between the ears, with the neck bent and the chin touching chest, as shown with kids in Figure 3.

Some lambs may bleed from the nose due to the force of the blow and/or the skin on the head may split – this is not a welfare concern, as the brain of the animal is no longer functioning. Post-shot movement is an expected result of an effective stun-kill, as was reported with piglets above.

Watch – On-Farm Killing of New-Born Lambs

Assessment of the effectiveness of the shot: Following the shot, the lamb should be assessed as follows:

- the lamb should not be breathing rhythmically,
- there should be no corneal reflex (a blink in response to touching the eye), and
- there should be no response to a painful stimulus (a nose prick with needle).

The absence of these responses indicates an effective stun-kill.

Gasping respiration, or agonal breathing, may be present in a small number of lambs. In the dying animal this is the last respiratory pattern prior to loss of movement, and is not a welfare concern.

Captive-bolt equipment must be cleaned, following the manufacturer's instructions, after every day's use regardless of the number of discharges. It must also be stored safely and securely when not in use.

The HSA recommends using pink 1.25 grain cartridges in the Cash Small Animal Tool for all species. Being a low-powered stunning device, the tool's performance is likely to be compromised more seriously when using 1 grain cartridges if it is not maintained properly, or its internal components become excessively worn.

The HSA recommends using 125 psi with the Bock Zephyr EXL.

Summary

Species (impact energy)	Stun-kill	Simple stun
Piglets (≥ 27.7 Joules)	Up to 10 kg	N/A
Goat Kids (≥ 27.8 Joules)	Up to 4kg	4–10kg
Lambs (≥ 107 Joules)	Up to 6kg	6–10kg

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

References

¹Andrew Grist, Jeff A Lines, Toby G Knowles, Charles W Mason and Stephen B Wotton 2018. The Use of a Non-Penetrating Captive-bolt for the Euthanasia of Neonate Piglets. *Animals*. 8, 48; doi:10.3390/ani8040048

²Andrew Grist, Jeff A Lines, Toby G Knowles, Charles W Mason and Stephen B Wotton 2018. Use of a Non-Penetrating Captive-bolt for Euthanasia of Neonate Goats. *Animals*. 8, 58; doi:10.3390/ani8040058

³Andrew Grist, Jeff A Lines, Toby G Knowles, Charles W Mason and Stephen B Wotton 2018. The Use of a Mechanical Non-Penetrating Captive-bolt Device for the Euthanasia of Neonate Lambs. *Animals* **2018**, 8, 49; doi:10.3390/ani8040049

Grist, A, Murrell, J, McKinstry, J, Knowles, T & Wotton, S, (2017), 'Humane euthanasia of neonates I: validation of the effectiveness of the Zephyr EXL non-penetrating captive bolt euthanasia system on neonate piglets up to 10.9 kg live-weight'. *Animal Welfare*, vol 26., pp. 111-120

Grist, A., Knowles, T.G. and Wotton, S.B. (2018) Humane Euthanasia of Neonates II: Field study of the effectiveness of the Zephyr EXL Non-Penetrating Captive Bolt system for euthanasia of new-born piglets *Animal Welfare* vol 27., pp 319-327

Council Regulation (EC) No 1099/2009 on the protection of animals at the time of killing

The Protection of Animals at the Time of Killing (Amendment) (England) Regulations 2022

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