

Stunning for small plants

Meat Inspection Training Days

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Jennifer Woods, M.Sc. VPM - Animal Welfare

Most Common Causes of Failed Stuns with Firearms and Captive Bolt Gun

Not the appropriate firearm for the species

Inaccurate placement of shot

Wet or damp ammunition

Failure to maintain gun

Appropriate Training is Critical to Successful Stunning

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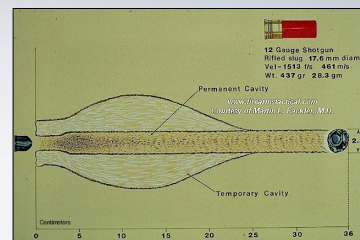
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Gunshot kills by mass destruction of the brain

1st - shockwaves compress the tissues ahead of the bullet

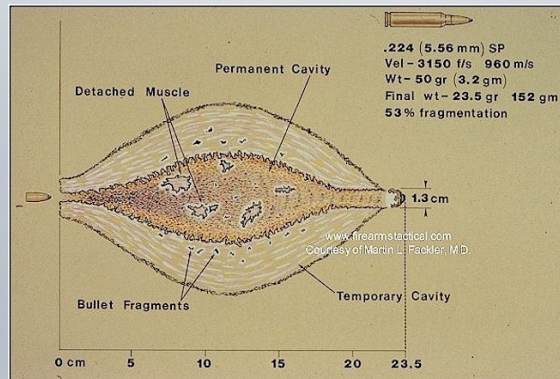
2nd - laceration and crushing along the path or track of the bullet as it travels through the brain

3rd - formation of permanent and temporary cavities in the brain caused by the track of the bullet.



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The degree of brain damage inflicted by the bullet is dependent upon the firearm, nature of the ammunition and accuracy of the shot.

Firearm Basics

The basic ballistics of a bullet are:

Weight or Mass - this is the weight of the grains in the bullet.

Muzzle velocity is the speed of the bullet the moment it leaves the muzzle.

Muzzle energy is the kinetic energy of a bullet as it is expelled from the muzzle. The energy of the bullet is determined by the formula of half of the mass multiplied by the square of the velocity. $KE = \frac{1}{2}mv^2$

Firearm Basics

You want the bullet to maintain enough energy to effectively penetrate the skull of the animal, but not so much it passes right through.

As the bullet passes through the air, it loses energy. The further it travels, the less energy it has as it hits the target. This why close range shots will not require the same amount of kinetic energy as a longer distanced shot.

Shape of ammunition can also influence energy loss. Pointed bullets have less resistance than rounded bullets, losing less energy as they travel.

Firearm Basics

The **calibre** of the gun is based on the interior bore or diameter of the barrel.

The larger the calibre (higher mass) = the more suitable it is for:

1. Larger animal
2. Animals with thick skulls or horn mass
3. Longer distance shots

Firearm Basics

The barrel of a gun will be either:

Smooth

Rifled (spiral grooves).

When a barrel is **rifled** it causes the bullet to spin. The more spin a bullet gets from rifling, the more stable it is in flight making for a more accurate shot, especially at a distance.

Selection of Firearm

The firearm needs to be powerful enough (kinetic energy) to produce irreversible insensibility, yet not so powerful that the bullet passes through the skull and into the neck of the animal.

$$E_k = \frac{1}{2}mv^2$$

Selection of Firearm

The three main considerations when choosing a firearm and ammunition are:

The size of the animal

The thickness of the skull

The distance between the shooter and the animal

When choosing between a shotgun and rifle considerations include:

Shotguns are best for close range shots (less than 20 feet)

Only slugs should be used in shotguns

Shotguns significantly reduce the chance of ricochet

Rifles are best for longer range shots (greater than 20 feet)

There is a greater chance of ricochet with a rifle

Ammunition from rifles have a greater chance of passing through the brain and into the neck of the animal. A shotgun slug with the equivalent energy will not.

Handling and restraint must be adequate to ensure the safety of the operator and the welfare of the animal.

Preparing to shoot:

Always be aware of your surroundings - location of people/other animals.

Load your weapon

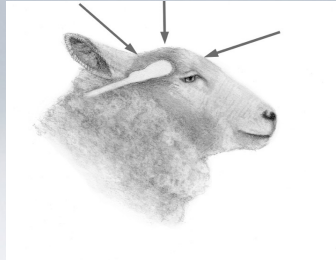
Wait for the animal to calm down/settle if necessary. **Be Patient!**
Ideally, you will wait for the animal to be looking straight on at you.

Find the target on their head

Shoot

LOCATION OF SHOT

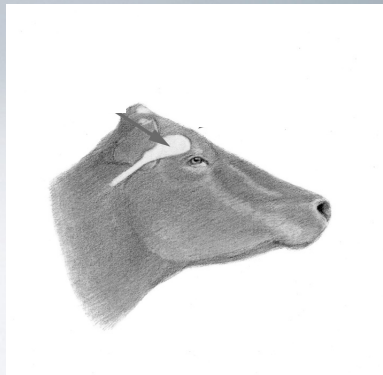
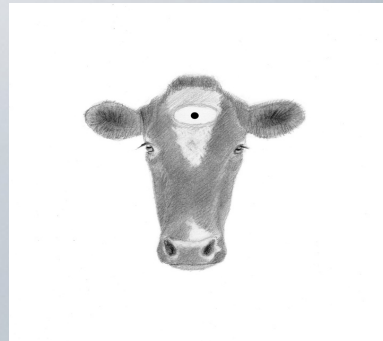
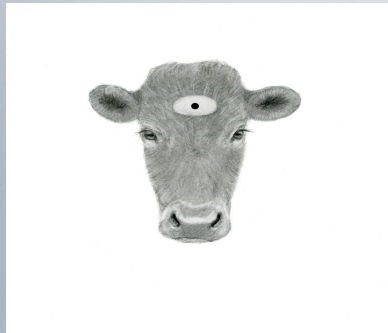
The best place to penetrate the head is where the bullet/slug will meet minimal resistance with the most direct path to the desired areas of the brain, insuring maximum damage and destruction to the brain.



Plan the trajectory so that the bolt or projectile travels through the brain.

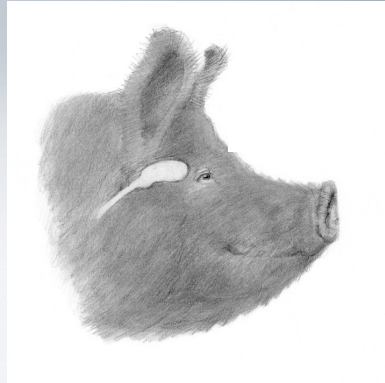
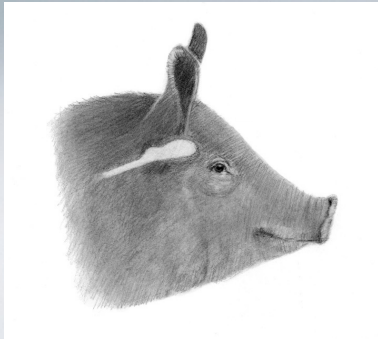
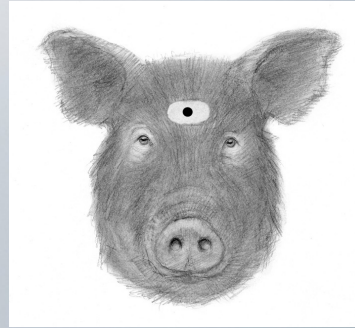
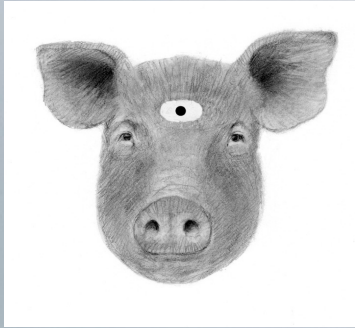
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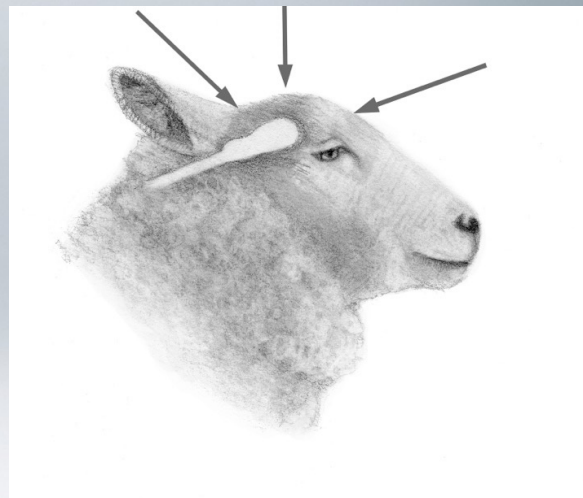
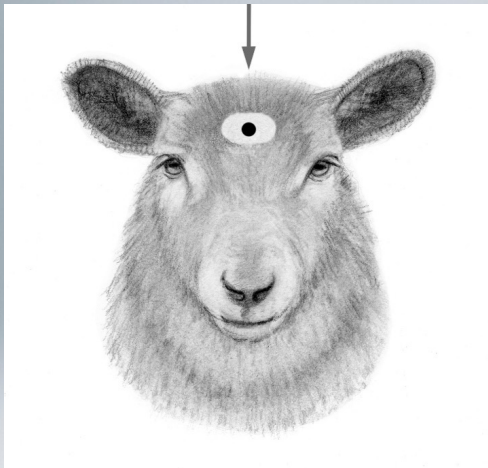
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Best Training Tool



Captive Bolt Gun



The penetrating captive bolt consists of a steel bolt, with a flange and piston at one end, which is housed in a barrel. When fired, the expansion of gases propels the piston forwards and forces the bolt out of the muzzle of the barrel. The bolt is retained within the barrel by a series of cushions that absorb the excess energy of the bolt and keep it within the barrel. The bolt is then retracted back into the gun either automatically or manually depending upon the design of the gun. These guns are powered by either gunpowder in a cartridge or compressed air.

The two main factors affecting the effectiveness of the captive bolt gun is bolt velocity and accurate placement.

- To be effective, the bolt must have sufficient bolt velocity for the weight class and animal type it is being used on. Bolt velocity is dependent on grain strength (or PSI), maintenance, repair and storage.
- The gun must be accurately placed on the animals head - this includes location of shot and flushness of the gun to the skull.

There are a variety of penetrating captive bolt guns with the most common being 9 mm, .22 calibre and .25 calibre.

Cartridge powered styles are available as in-line (cylindrical) and pistol grip (resembles a handgun).



There are pneumatic penetrating bolt guns, but these are normally found in large slaughter plants.

accles & shelvoke QUICK REFERENCE GUIDE "CASH" DISPATCH KIT PRODUCT CODE: 4121K www.acclesandshelvoke.co.uk

Consists of -
Equipment:
 1. 25 Heavy duty Barrel Assembly and action code: 4121K1
 2. Bolt Assembly Heavy Duty long code: 4121K2
 3. Bolt Assembly Heavy Duty medium code: 4121K3
 4. Bolt Assembly short code: 4121K5
 5. Cash Special Knocker Head Assembly code: 4121K6
 Note: Equipment number 2 to 5 are all used with item 1.4121K1

Powerloads:

A. 25 Pink	code 4121KA
B. 25 Yellow	code 4121KB
C. 25 Blue	code 4121KC
D. 25 Orange	code 4121KD

Powerload Selection:
 (using Equipment number and Powerload letter)

Animal	Stance/Powerload combination
Faunty	5A
Newborns & Suckling Pig - Up to 15+ lbs	5A
Nursery Pig - 15-40 lbs	5B
Nursery Pig - Up to 60 lbs	4A
Grown - Up to 100 lbs	4B
H Growers & L. Finishers - Up to 200 lbs	3B
Finishers - Up to 300 lbs	3C
H Finishers & Gilts	3D
Sows & Boars	2D
Neonate Lamb	5B
Lamb	4A
Sheep	3B
Mature Sheep & Rams	3C
Mature Sheep & Rams - with extensive horn structure	2D
Neonate Calf	5B
Average size Cattle	3C
Heavy Cattle & Bulls	2D
Average Size Horse	3D
Large Horse	2D

Note: IMPORTANT - Ensure selected powerload is no more powerful than maximum stated on the muzzle of the tool being used.

Cartridges vary in strength and are classified by the amount of propellant they contain. This is measured in grains. The higher the amount of grains, the larger the animal for which they are intended. Manufacturers should include a guide which matches cartridges to weight class and bolt heads when required.

- Only trained handlers should use this method and must be familiar with the gun's features and directions for use.
- The shooter should wear both protective ear and eye gear.
- The gun must not be cocked until the shooter is ready to fire.
- The safety must be set until the handler is ready to discharge it.
- The discharge end of the captive bolt must be pointed towards the ground at all times.

- In the case of a misfire, the stunner breech must be kept closed for 30 seconds in case the problem is a “hang fire”. A “hang fire” is when there is delay between the gun being fired and the ammunition discharging. This is caused by slow ignition of the primer.
- Animals may need to be restrained as the animal’s head must be stationary before shooting. Animals that are upright and mobile may be more difficult to safely captive bolt without restraint.

- Same frontal location as gunshot. (See Gunshot section)
- All styles of captive bolt guns must be held firmly against the animal’s head. If it is not held flush to the animal’s head, the bolt may not penetrate or provide the required energy to be effective.
- The animal can be approached from head on or from behind and off to the side, out of the line of sight of the animal.
- The recoil will vary depending on calibre, buffer configuration, manufacturer, cartridge used and animal size. If necessary, the handler should use two hands when firing the gun.



- One shot should be enough; however, a second shot or a secondary action such as pithing or exsanguination may be necessary.
- If a second shot is required, it must not be administered in the same place as the first shot. If the first shot was correctly placed, the second shot should be applied slightly above and to the side of the first hole. If the first shot was incorrectly placed, the second shot should be placed in the correct spot.

Routine Maintenance & Storage

Only have enough ammunition out for the current shift (2 for each animal)

Always have a back up gun - rotate usage

Store ammunition in an airtight container

Regularly clean the gun

Captive bolt guns must be cleaned and maintained in order to operate effectively - poor maintenance is the leading cause of failed kill.



Guns should be cleaned and inspected following each day of use.

Guns that are not used regularly still need to be cleaned and oiled at least once a month according to the manufacturer's instruction manual for cleaning.

Captive bolt guns and cartridges must be stored in a dry area. Exposure to humidity will affect both the gun and the effectiveness of the ammunition.

Insensibility

The signs of insensibility can vary depending on:

- the method of stunning,
- how well the stun was carried out,
- the species and age of the animal,

Some methods of stunning cause violent kicking or wing flapping, there may be only a few seconds available to test for insensibility.

Confirmation of insensibility should occur within the first 30 seconds following the stun. (For head only electrical stunning, it should be within the first 10 seconds as the animal must bleed within 15 seconds of stunning.)

Method	Observations
Absence of rhythmic breathing.	Rhythmic breathing is when they are breathing in a normal manner with the ribs moving in and out at least twice. Intermittent gasping (agonal)- like a fish out of water - is acceptable after electrical stunning - this is not a sign of sensibility. Should not see with firearm or captive bolt gun.
Fixed, glassy eyes with no natural blinking or reflexes	Natural blinking like you would see on an animal standing out in a field. In electrical stunning there may be the occurrence of nystagmus which is when the eye vibrates. Involuntary muscle twitching in the muscles around the eye cannot be mistaken for blinking.
Palpebral reflex	Run your finger along the eyelashes of the animal, if it blinks then you have the presence of palpebral reflex. There are some people who suggest you do this before you do corneal reflex as if the animal is sensible touching the cornea will be painful.
Corneal reflex	For corneal reflex you should touch the inside corner of the animals actual eyeball to see if you get a reflex - blinking. This does not require poking the animal in the eye, just a gentle touch to the eyeball will be sufficient.
Head is loose and floppy, tongue is flaccid.	Head will be dead - it will hang straight for cattle and pigs, but sheep will have the neck on an angle with a limp and floppy head. The tongue will be straight and limp.
No pain response (e.g., nose pinch or prick).	You can prick or pinch their nose to see if there is any pain response. A needle works well for pricking. A pain response would be pulling away or finching. This should only be applied to the nose to avoid confusion with any spinal reflexes.
No vocalization.	Animals will not vocalize when they are insensible - no moo, baa or squeal.

The head must be dead

The legs may be kicking but the head will be floppy.

Though it does not always occur, the tongue hanging out and limp is sign of "dead head".

Head hangs straight - no righting reflex.



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Order of events (return to sensibility)

Electrical stunned animals*

1. Return of rhythmic breathing
2. Spontaneous natural blinking w/o touch
3. Response to pain
4. Righting reflex
5. Fully conscious

With CO₂ , Corneal reflex occurs 1st or 2nd

*Corneal reflex not used for electrically stunned pigs

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Signs of a Properly Stunned Animal by Stunning Method									
	Head	Tongue	Back	Eyes	Limbs	Vocalization	Respiration	Tail	Response to pain
Cattle captive bolt	Must appear dead, hang straight and floppy	Straight and limp	Hanging straight, no righting reflex	No natural blinking. Wide open, blank stare, no response to touch; nystagmus absent	Uncoordinated kicking of hind legs acceptable, no righting reflex present	None	Rhythmic breathing (ribs moving in and out at least twice) is absent. Agonal gasping not acceptable.	Relaxes shortly after being on the rail	A pinch or pinprick may be applied to nose only and no response should be observed.
Cattle electric	Must appear dead, hang straight and floppy	Straight and limp	Hanging straight, no righting reflex	Eyes may vibrate (nystagmus), but no natural blinking	Uncoordinated kicking of hind legs acceptable, no righting reflex present	None	Agonal gasping like a fish out of water normal. Rhythmic breathing (ribs moving in and out at least twice) is absent.	Relaxes shortly after being on the rail	A pinch or pinprick may be applied to nose only and no response should be observed.
Pigs CO ₂	Must appear dead, hang straight and floppy	Straight and limp	Hanging straight, no righting reflex	No natural blinking	Uncoordinated kicking of hind legs acceptable, no righting reflex present	None	Agonal gasping like a fish out of water normal. Rhythmic breathing (ribs moving in and out at least twice) is absent.	Relaxes shortly after being on the rail	A pinch or pinprick may be applied to nose only and no response should be observed.
Pigs electric	Must appear dead, hang straight and floppy	Straight and limp	Hanging straight, no righting reflex	Eyes may vibrate (nystagmus), but no natural blinking	Uncoordinated kicking of hind legs acceptable, no righting reflex present	None	Agonal gasping like a fish out of water normal. Rhythmic breathing (ribs moving in and out at least twice) is absent.	Relaxes shortly after being on the rail	A pinch or pinprick may be applied to nose only and no response should be observed.
Pigs captive bolt	Must appear dead, hang straight and floppy	Straight and limp	Hanging straight, no righting reflex	No natural blinking. Wide open, blank stare, no response to touch; nystagmus absent	Uncoordinated kicking of hind legs acceptable, no righting reflex present	None	Rhythmic breathing (ribs moving in and out at least twice) is absent. Agonal gasping not acceptable.	Relaxes shortly after being on the rail	A pinch or pinprick may be applied to nose only and no response should be observed.
Sheep electric	Must appear dead; neck hangs on angle with limp and floppy head	Straight and limp	Due to anatomical differences in sheep, back may not hang completely straight; no righting reflex	Eyes may vibrate (nystagmus), but no natural blinking	Uncoordinated kicking of hind legs acceptable, no righting reflex present	None	Agonal gasping like a fish out of water normal. Rhythmic breathing (ribs moving in and out at least twice) is absent.	Relaxes shortly after being on the rail	A pinch or pinprick may be applied to nose only and no response should be observed.

If an animal shows any signs of sensibility, you will need to immediately shoot the animal again.

If the first shot was not accurately placed, target to the correct spot. If the first shot was accurately placed, target approximately one inch above and slightly to the side of the first shot.

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