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Poultry Extension Collaborative Newsletter

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On-farm euthanasia methods for poultry

Euthanasia methods

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As discussed in our previous newsletter, circumstances arise that require poultry to be humanely euthanized. This newsletter provides a brief overview on-farm methods for the euthanasia of small numbers of poultry. Most of these methods are different from methods used at processing and methods used for culling or depopulation during disease outbreaks and other emergencies.

All methods used for poultry euthanasia require training and skill; therefore, it is important that personnel are trained beforehand to identify birds that are not doing well and to appropriately apply euthanasia methods.

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Euthanasia methods

The American Veterinary Medical Association (AVMA) Guide for the Euthanasia of Animals is the main source of information for euthanasia methods for poultry (and other species). These methods are summarized below. For poultry, the AVMA classifies some methods as being acceptable for poultry euthanasia and other methods as being acceptable with conditions.

Acceptable methods

Acceptable methods are those that "consistently produce a humane death when used as the sole means of euthanasia". These methods include anesthetic overdose and injected barbiturates; however, these methods are not typically readily available for on-farm euthanasia of poultry.

Methods that are acceptable with conditions

Methods that are classified as being acceptable with conditions are

1. Acceptable under certain circumstances,
2. Are associated with higher chances of error and risks to personnel safety, or
3. There is not much scientific research available to examine how effective these methods are.

These are the methods that are most commonly used for on-farm euthanasia of poultry

Conditionally acceptable methods include:

1. Gaseous methods and low-atmospheric-pressure stunning
   - How to: see HSA**(a)** and Boyal et al. 2020a
     - Carbon dioxide (CO_2)
     - Carbon monoxide (CO)
     - Nitrogen (N_2) and Argon gas (Ar)
     - Low-atmospheric-pressure stunning

2. Physical methods
   - Cervical dislocation: see HSA(b) and Boyal et al. 2020b
   - Decapitation: see HSA(b)
   - Manual blunt force trauma
   - Electrocution: see HSA(c) and Boyal et al. 2020c
   - Gunshot
   - Captive bolt: see HSA(d)

Methods that are acceptable with conditions

Note: these methods can result in convulsions (involuntary muscle movements) such as wing flapping and leg paddling, but if animals are unconscious when these muscle movements occur, the presence of the movements do not mean that animals are experiencing pain or distress.

A. Gases and low-atmospheric-pressure stunning

Method	Mechanism	Considerations

Carbon dioxide (CO2)	Concentrations of CO2 above 40% result in anesthesia and then loss of consciousness	• Loss of consciousness is faster with rapid increases in the rate at which CO2 is administered
		• However, animals react less when the concentration of CO2 is increased gradually rather than rapidly and loss of consciousness takes longer
		• Some birds are more resistant to CO2:
		  • young (neonatal) birds and
		  • birds that can dive under water
		  • higher concentrations of CO2 may be needed for these birds

Carbon monoxide (CO)	CO is believed to be painless	• CO is colorless and odorless, and is a human safety concern • Use this gas in a well ventilated area, • Use appropriate containers • Follow state and federal regulations • See AVMA Guide, page 27 for additional details
Nitrogen (N2) and Argon gas (Ar)	• N2 and Ar used at 100% concentration, or mixtures of N2 and Ar (80% N2 and 20% Ar, or 80% Ar and 20% N2), can be used • Ar mixed with less than 2% oxygen has been shown to result in death in about 1 minute	Appropriate safety procedures need to be followed when working with any gases
Low-atmospheric-pressure stunning	• This method involves "reducing the atmospheric pressure by drawing a vacuum in a chamber" • Effects on poultry are similar to the effects seen when using N2 or Ar	

Methods that are acceptable with conditions

Note: these methods can result in convulsions (involuntary muscle movements) such as wing flapping and leg paddling, but if animals are unconscious when these muscle movements occur, the presence of the movements are not indicative of consciousness.

B. Physical methods

Method	Mechanism	Considerations
Cervical dislocation	Cervical dislocation involves separating the vertebrae as close to the base of the skull as possible without crushing the vertebrae and spinal cord and can be applied manually or mechanically (with the use of a tool)	• This method is usually applied by hand • Effectiveness of the method depends heavily on the skill and training of the person applying cervical dislocation • Cervical dislocation does not always result in immediate unconsciousness
Decapitation	Decapitation involves severing the head from the rest of the body, and must be done using a sharp instrument	Decapitation causes blood loss, which may be a health concern for people and other birds
Manual blunt force trauma	A heavy, blunt object is used to strike the bird's head	• Training and skill are essential, because improper application may fail to cause unconsciousness • This method can be used for poultry that are too large to be euthanized using cervical dislocation

Proper way to hold a chicken for manual cervical dislocation.
Image credit: Humane Slaughter Association: https://www.hsa.org.uk/neck-dislocation/manual

Methods that are acceptable with conditions

B. Physical methods continued

Method	Mechanism	Considerations
Electrocution	Electrocution involves the use of alternating current	• This method can be used for individual birds • Birds must be monitored to ensure that they do not regain consciousness, or • Cervical dislocation or exsanguination should be performed immediately thereafter to make sure that the bird is dead
Gunshot	The use of a gunshot is only recommended for free range poultry in situations where it is not possible to capture and restrain the animals without causing stress or endangering people	Gunshot should not be used for intensively housed poultry and poultry that can be captured and safely restrained

Captive bolt	Captive bolts can be penetrating (penetrate the skull and cause damage to the brain) or non-penetrating (designed to deliver a blow to the skull without entering the brain)
	
	Placement of the non-penetrating captive bolt. Image credit: Humane Slaughter Association: https://www.hsa.org.uk/mechanical-methods-poultry/non-penetrative-captive-bolt
	 
		• Operator skill and training are very important
		• Captive bolts can pose risks to operator safety, and if improperly applied, can cause pain and suffering to the animal
		• The device used should be appropriate for the size and weight of the animal
		• Older, heavier poultry require greater force to ensure unconsciousness and death
		• Proper placement is key, as shown in the image to the left
		• Various types of captive bolt devices are commercially available, including, but not limited to:
		  • Cash Poultry Killer: https://www.accles-shelvoke.com/tools
		  • Turkey Euthanasia Device (TED) and Zephyr-EXL: http://www.bock-industries.com/

Methods for embryonated eggs


Image Source: PIxabay

According to the AVMA Guidelines, embryos of eggs that have reached 80% of incubation should be euthanized using:

- Anesthetic overdose
- Decapitation
- Carbon dioxide exposure for more than 20 minutes

Embryos of eggs that have not yet reached 80% of incubation should be euthanized using:

- Carbon dioxide exposure for more than 20 minutes
- Cooling at a temperature of less than 4°C for 4 hours
- Freezing

The Humane Slaughter Association also has guidelines for chicks less than 72 hours old and embryonated eggs

Resources and further reading

1. AVMA guidelines for the euthanasia of animals https://www.avma.org/sites/default/files/2020-02/Guidelines-on-Euthanasia-2020.pdf
2. Boyal et al., 2020a. Single bird CO2 system. https://www.aces.edu/blog/topics/farming/poultry-euthanasia-single-bird-carbon-dioxide-system/ The Alabama Cooperative Extension System.
3. Boyal, et al. 2020b. Poultry Euthanasia: Koechner Euthanizing Device. https://www.aces.edu/blog/topics/farming/poultry-euthanasia-koechner-euthanizing-device/ The Alabama Cooperative Extension System.
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5. Canadian Food Inspection Agency. 2019. Guidelines for stunning techniques for avian food animals, including ratites. https://inspection.canada.ca/food-safety-for-industry/food-specific-requirements-and-guidance/meat-products-and-food-animals/guidelines-for-stunning-techniques/eng/1538160892409/1538160892704
6. Canadian Poultry Industry Council. 2016. Practical guidelines for on-farm euthanasia of poultry. https://www.poultryindustrycouncil.ca/downloads/practical-guidelines-for-on-farm-euthanasia-of-poultry.pdf
7. Humane Slaughter Association (a). Gaseous methods. https://www.hsa.org.uk/gaseous-methods/gaseous-methods
8. Humane Slaughter Association (b). Cervical dislocation and decapitation. https://www.hsa.org.uk/stunning-and-killing-poultry-using-electricity/cervical-dislocation-and-decapitation-manual-and-mechanical
9. Humane Slaughter Association (c). Stunning poultry using electricity followed by a killing method. https://www.hsa.org.uk/stunning-and-killing-poultry-using-electricity/stunning-poultry-using-electricity-followed-by-a-killing-method
10. Humane Slaughter Association (d). Non-penetrating captive bolt. https://www.hsa.org.uk/mechanical-methods-poultry/non-penetrative-captive-bolt
11. Humane Slaughter Association (e). Chicks (less than 72 hours old) and embryonated eggs. https://www.hsa.org.uk/chicks-less-than-72-hours-old-and-embryonated-eggs/chicks-less-than-72-hours-old-and-embryonated-eggs
12. Jacob, J. and Martin, G. 2022. Poultry end-of-life situations in small and backyard flocks. https://poultry.extension.org/articles/poultry-management/poutry-end-of-life-situations-in-small-and-backyard-flocks/
13. Jacobs et al., 2019. Manual and mechanical cervical dislocation. https://www.pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/APSC/apsc-161/APSC-161.pdf