

Destruction of birds using carbon dioxide (CO₂) gas in a shed

Birds can be humanely euthanised by injecting carbon dioxide (CO₂) gas in to a shed. This method is best suited to sheds where birds are floor reared, but is adaptable to sheds with tiered cages, and is suitable to most avian species of any size. Leaving the birds in situ (where possible) improves personnel safety, reduces biosecurity risks, and maintains animal welfare.

Planning

Bulk gas (in a tanker), equipment and an operator are supplied by a contractor and includes a 'lance' to inject gas into the shed.

Prior to the commencement of the destruction process, develop an on-site plan that includes:

- a. Identification and mitigation of hazards on site and within sheds, including safety controls from the [task safe work method statement](#) (SWMS)
- b. Engaging contractors to conduct the entire or parts of the task, where possible
- c. Medical plan and emergency evacuation protocol, including alarms
- d. Adequate [resources](#) available to conduct the task safely and humanely
- e. Access to sheds is controlled and safe for personnel
- f. Shed dimensions and design to calculate gas volumes required (refer to contractor for details)
- g. Location of bulk gas tanker and delivery lance position to reduce noise and cold impact to birds
- h. Restricted access area to avoid excessive exposure to CO₂
- i. Bird removal from cages timed to avoid rigor mortis and decomposition effects
- j. Disposal location and transport method (where relevant)
- k. Addressing [AVPMA permit 7472](#) requirements

Setting up

1. Prepare shed only after sufficient bulk gas is available and weather forecast is suitable to contain the gas in the shed, e.g. cool, still conditions with temperature less than 20°C and wind speed less than 10kph. Closure of the shed for prolonged periods in higher temperatures will impact on animal welfare.
2. Prior to and/or whilst wrapping the shed, a minimum number of personnel should:
 - a. isolate any necessary services e.g. electricity, water, feed
 - b. drain drinker lines to minimise damage to lines if the water freezes
 - c. raise drinking and feed systems (where possible) to their maximum height
 - d. place remotely accessible CO₂ monitors in the shed:
 - i. above bird level at the farthest end of the shed from the injection point
 - ii. below bird level at the closest end of the shed to the injection point
 - iii. other points to monitor for adequate distribution of gas
 - e. install remotely accessible video monitoring near birds
 - f. turn off lights when leaving the shed for the last time (to allow birds to settle)
3. Place CO₂ monitors around the shed on the edge of the exclusion zone, particularly at any low points, to check for escaped gas.
4. Close the shed as much as possible using normal procedures e.g. close blinds/shutters.
5. Ensure the shed is free of large openings from ground level to above the height of the highest bird.
 - a. Leave openings at the highest possible point to allow air to escape when CO₂ is injected. CO₂ is a heavy gas and will flow through openings to the lowest point.
 - b. Secure plastic to cover openings using staples, nails, cable ties (depending on the shed). Duct tape is primarily for joining sheets and closing around any obvious penetrations.
 - c. Weigh down the bottom edge of the plastic as needed to reduce gas escaping.
6. Tanker and gas delivery equipment and procedures are the responsibility of the contractor. Set up of gas delivery equipment to include:
 - a. Locating tanker near the shed

- b. Placing lines/lance inside the shed as central as possible, above bird height (where possible) as gas flows down, and away from the birds to reduce noise and avoid freezing the birds
- c. Erect warning signs on the shed and access ways to the shed(s)

NOTE: For electronically controlled environment sheds, wrapping to minimise gas leakage should not be necessary, but an inspection of the shed should be undertaken to confirm there are no obvious holes where gas may leak out e.g. doors, windows, fans, vents, water and manure drains. Air supply should be shut down when the gas is ready for injection into the sheds. If it is necessary to wrap the shed, care should be taken not to cover the air supply and/or exhaust until switched off.

Destruction

1. Gas injection **must only** commence when:
 - a. current and predicted weather for the duration of the task is within limits
 - b. Team Leader and Site Supervisor are satisfied the shed is adequately wrapped
 - c. all personnel are outside the shed
 - d. all personnel including owner/staff and contractors are accounted for at the marshalling area or specific work location (with CO₂ monitors)
 - e. suitably qualified self-contained breathing apparatus (SCBA) personnel are in attendance
 - f. confirmation there is adequate CO₂ to complete the task once it starts.
2. Turn shed thermostats down so fan override will not prevent fans from starting when it is time to vent the shed.
3. Turn off fans and seal with pre-cut plastic.
4. Start-up of the gas flow by the contractor. Gas injection should:
 - a. aim to fill the shed in 30-60 minutes
 - b. deliver the gas so there is minimal noise to avoid birds packing up
5. Record the injection start time and when CO₂ reaches the following concentrations:
 - a. 20% as birds will lose consciousness
 - b. 45% for all monitoring points (fatal concentration)
 - c. 45% for at least 30 minutes (to ensure sufficient time to kill all birds)
 - d. Note: water fowl and younger chickens may require higher concentrations or longer periods
6. Shut down of the CO₂ should be done when appropriate gas concentrations are held for given period.
7. After completion of the injection time:
 - a. monitor for any movement of birds via the remotely accessed video (if available)
 - b. check for any leakage from the shed with CO₂ monitor/s.

Shed venting

1. Leave shed closed at least two hours, where possible.
2. In electronically ventilated sheds, remove the covers from the fans and activate the fans from the outside of the shed.
3. In other sheds, a person using SCBA is to remove the plastic and open blinds.
4. Allow the shed to ventilate for 30 minutes to four hours (depending on shed type).
5. Check monitors until CO₂ is at safe levels.
6. Only personnel in SCBA may enter the shed to confirm bird death and check CO₂ levels using a hand held monitor, particularly at low spots.
7. Other personnel are permitted to enter the exclusion zones and shed when declared safe by the Site Supervisor, on advice from the Safety Advisor and SCBA personnel.
8. Any live birds should be euthanised using an alternate method.
9. Birds in cages will need to be removed promptly to avoid the complications associated with rigor mortis.

Responsibilities

The responsibilities of personnel on site include:

- Team Leader – coordinates on site destruction activities; liaises with Site Supervisor
- Field crew – ‘wrap’ shed if required, raise drinking and feed systems, install monitors and video equipment, maintain animal welfare

- Record keeper (field crew) – maintains task records, e.g. number of birds euthanised, amount CO₂ used, CO₂ concentrations over time for each monitor inside the shed, manually or using data loggers
- Bulk gas contractor – operates regulators to supply adequate flow of gas to the shed, including controlling freezing of regulators and lines
- First aid and safety officer(s) – monitor health and well-being of personnel, provide first aid, access emergency support (if required)
- SCBA crew – monitor and provide first aid to personnel, ventilate shed
- Veterinarian/animal welfare officer – monitor task to ensure animal welfare is maintained and are humanely euthanised

Safety

Safety issues must be addresses by implementing appropriate controls. Risks may include:

- [Animal destruction and disposal activities in emergencies](#)
- [Animal handling in emergencies](#)
- [Dealing with aggressive stakeholders](#)
- [Destruction of poultry using carbon dioxide](#)
- [Driving vehicles](#)
- [Fatigue](#)
- [Manual handling](#)
- [Property visits](#)

Resources

Suggested resources that may be required for gassing of birds. Resource requirements will vary with the site, shed design and number of birds.

Item	Description
Personnel	<ul style="list-style-type: none"> • Destruction Team Leader • Field crew to 'seal' and set up shed – 8-12 depending on the number, size and design of sheds, maintain records • Contractor to deliver and conduct gas operations • First aider/safety advisor • Animal welfare monitor
Self-contained breathing apparatus (SCBA) personnel with gear	Minimum of two SCBA (qualified) personnel with their equipment
Builders plastic	Black builders plastic (not clear); 150 micron (min) x 2m wide x 10m long
Waste disposal	For plastic and other on-site contaminated waste
Smaller items	20 rolls of duct/fabric tape Knife to cut plastic and tape e.g. Stanley knife Cable ties Danger/do not operate tags for isolated equipment Step ladder/s
Bulk CO ₂ supply with vaporiser, manifold and hoses	'ISO' bulk container (not baffled) for CO ₂ gas, and tanker (baffled for transport) to maintain supply to "ISO" unit (note: typical ISO unit has 20 tonne capacity) Vaporiser ('heats' gas for delivery) Trained operator to be provided with each bulk supply unit Manifold and hoses to deliver gas to shed
Shed sealing items	Timber battens e.g. 150 x 25 or 38mm rough sawn, nail guns(s), industrial stapler, nails/clouts etc. to support application of plastic to shed. Weights e.g. sand bags or timber to hold plastic at ground level.

Item	Description
Safety	Warning signs for shed(s) and property indicating CO2 in use Barrier/danger tape (for exclusion zone designation) Pickets with caps (for exclusion zone designation) Portable lighting (if operating in non-daylight hours)
Weather station	Portable weather reading equipment e.g. Kestrel meter (for temperature and wind)
First Aid	Kit with oxy viva or equivalent
Manual handling equipment	Machinery to hold plastic roll and unroll it – capable of going around outside of shed. Alternatively where access is difficult, smaller rolls of plastic on hand-held pipe poles.
Monitors	CO2 monitors – for personnel and to monitor CO2 in and around shed (capable of reading high CO2 levels of at least 60%)
Video	Video equipment for inside shed to monitor birds, with remote (Wi-Fi) access
PPE	Suitable for the task and conditions, e.g. enclosed, non-slip footwear, sun protection (hat, sunscreen), manual handling gloves, hard hat, wet weather gear, insect repellent (refer to the safety risk assessment/safe work method statement)
Recording devices with GPS capability	Paper, pens, clipboard and/or tablet Camera (preferably waterproof and GPS capable)
Identification	EM identification card
Data collection forms	Event log, Destruction log (in case management system)
Communication/safety devices	Suitable for the task and area, e.g. mobile phones, radios (on GRN), satellite phones, personal locating beacon (PLB) or tracking device/App for remote/isolated work
Water and food	Food and water for personnel to assist in managing fatigue
Contact details	e.g. property owners/managers, LCC, other teams, contractors, emergency numbers in communications plan

Further information

[AUSVETPLAN manuals](#)

- Operational – Destruction of animals
- Resource – Destruction of birds (methods for destruction of poultry, pet/zoo birds & aviary species)

[AVPMA permit 7472 for liquid carbon dioxide](#)

[Best practice for on farm euthanasia of spent layer hens](#)

[Pre-ops site inspection](#)