Department of Primary Industries

Guide

Emergency Management Unit
Biosecurity and Food Safety
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Destruction of birds using carbon dioxide (CO2) gas in a container

Birds can be humanely euthanised using CO2 gas in various sized containers, from small boxes to commercial waste/skip bins and truck trays. Many commercial layer farms routinely depopulate using this method and are likely to have, or use contractors with, suitable equipment and experienced personnel which should be preferentially used in an emergency disease event.

Planning

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

a. Identification and mitigation of hazards, including safety controls from the task safe work method statement (SWMS)
b. Engaging contractors (e.g. mobile or on-site facilities) to conduct the task, where possible
c. Medical plan and emergency evacuation protocol, including alarms
d. Adequate resources available to conduct the task safely, efficiently and humanely
e. Access to sheds by catchers that minimises the movement of birds and is safe for personnel
f. Location of containers and gas cylinders to ensure birds can be placed in the container without being dropped from height (which may require a ramp to the low side of the container)
g. Shed environmental settings to maintain animal welfare and personnel safety, and minimise disease dispersal
h. Water and feed infrastructure positioned to allow easy and safe access. Removal of access to feed and water must be immediately before capture commences.
i. Containment of on-ground birds in shed to prevent escapees
j. Rotation of tasks to avoid fatigue, dehydration and excessive exposure to CO2
k. Disposal location and transport method (where relevant)
l. Addressing AVPMA permit 7472 requirements

Setting up

1. Prepare shed - move feed and water infrastructure (where possible), set up barriers for floor reared birds, have sufficient light and ventilation for catchers
2. Position container near the entry/exit for the catchers, leaving walking space between each. Ensure the birds can be easily **placed** into the container.
3. Cover the top of the container with a plastic sheet and tape the plastic to the container along the edge furthest from the loading side. The tape edge is to act as a hinge for the plastic. Note: Where the container is to be used for transport off site, it should be prepared in accordance with Transport of carcasses and contaminated material.

Skips

4. Position a CO2 cylinder at opposite ends of each skip, and secure it using ratchet strap/star picket or similar.
5. Fit regulator, regulator heater and hose to each cylinder.

Trucks

6. Where a truck tray is used with banks of cylinders (e.g. 2x5), the cylinders should be linked to a delivery hose system that allows even distribution of gas in the tray. The hose system can include in line control valves for each line off a Tee piece. The cylinder banks are used alternately to control freezing.
7. Where a bulk CO2 tank is used in conjunction with a vaporiser, both units should be set up on a platform e.g. tabletop truck, and connected to a hose delivery system as for the bank of cylinders described above. The vaporiser should be positioned so one end is higher than the other to encourage condensation to run off.

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Skips and trucks

8. Place hose in container tray and check it reaches to approximately 300mm above the height of the birds to prevent freezing the birds. The height of the hose above the birds will need to be adjusted as the container fills.
9. Smear regulator and hose line with Vaseline (to avoid freezing), especially if there is no in line heater.
10. If no regulator heater is available, ensure hot water is available to prevent freezing of regulator & hose.

Destruction

1. Using catching frames (if required), catch birds ensuring they are correctly handled to minimise trauma/injury.
2. Carry birds to and place them into container. The plastic cover should cover most of the opening, leaving a sufficient gap to allow catchers easy access. Loading may be assisted with a step for the catchers.
3. The container is loaded until there is an even layer of birds. There must be no stacking of birds. Once a layer is complete in one container, the catchers move to the next container, to allow the gas to be added.
4. Once loaded with the first layer of birds the container opening is closed with the plastic and taped in place. It is not necessary to get an absolute seal, as air needs to escape as the gas is fed in (CO_2 is heavier than air).
5. The regulator with the in-line heater operating is opened to provide a steady flow of gas, but not excessive enough to freeze the regulator/hose. Alternatively, industrial heaters can be used to warm the cylinders, subject to safety considerations.
6. Where bulk CO_2 is used, the start procedure is important to reduce the likelihood of freezing/"snow" in the delivery lines. All delivery lines must be shut at the container end, the output vaporiser valve opened, and rapidly ¾ open the bulk supply tank.
7. The regulator should be open for approximately 20 minutes, after which, an inspection of the container is made to confirm all birds are dead. If there are signs that one or more birds are still alive (e.g. gasping, flapping), the destruction process for these birds must be repeated. It is not appropriate to smother dying birds by placing a new layer of live birds on top of them. A CO_2 monitor can be used to confirm adequate level of the gas in the skip – 45-80%. Care must be taken to minimise exposure of the operator to excessive CO_2.
8. Catchers cycle between the skips/trucks, and steadily build layers in each, which can be filled to approximately 90% capacity. Loads must be within the load limit of the container/vehicle (if disposing off site).
9. Once filled, remove the hoses and cylinders from each container and secure the plastic to prevent access by animals. Protection from direct sunlight will slow decomposition. Note: Where bulk CO_2 is used, it is important to close the valve between the tank and vaporiser before closing the distribution valves. Failure to do so may cause personal injury and/or damage to the vaporiser during disconnection of hoses.

Responsibilities

The responsibilities of personnel on site include:

- Team Leader – coordinates on site destruction activities; liaises with Site Supervisor
- Animal handlers – catch the birds and place them in the container, catch strays outside the shed, maintain animal welfare
- Cylinder supply – safely store and move cylinders to destruction process and for refilling
- Cylinder operators – operate regulators to supply adequate flow of gas to the container, 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)
- Veterinarian/animal welfare officer – monitor task to ensure animals are being appropriately handled and humanely euthanised
- Record keeper – maintains task records, e.g. number of birds euthanised, amount CO_2 used

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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	• Destruction Team Leader • Teams of experienced animal handlers to collect birds – 10-20 depending on the size of the shed, number of birds and shed design • Field crew to operate gas delivery to skips/trucks, including controlling freezing • Field crew to move, set up and resupply gas cylinders • First aider/safety advisor • Animal welfare monitor
Containers free of holes e.g. skips or truck trays	• 5-6 x 4-6 cubic metre (m^3) skips or equivalent and vehicle to move the skips. Larger skips can be used, with proportional increase in other resources. Note: 10m^3 skip holds about 5000-6000 2kg birds • Truck tray e.g. grain truck with inner compartments removed
Consumables	1 roll black builders plastic (not clear); 150 micron (min) x 2m wide x 10m long 4 rolls of duct/fabric tape per container Knife to cut plastic and tape e.g. Stanley knife Vaseline
CO_2 cylinders or bulk supply	Size “g” 31kg (not with black strip as these deliver liquid CO2) • 2-3 cylinders for each skip bin (Note: 1 cylinder per 1000 layer birds) • Ten cylinders for semi-trailer sized tray Alternative to cylinders - bulk supply of CO2 e.g. 600kg tank with vaporiser (minimum of 16 warming fins x 2.5m long)
Regulator and hose	Minimum of six 800kpa (not 400kpa) regulators (to allow for rotation and failure) Each cylinder has a gas regulator fitted with a hose to reach 300mm above the bottom of the container
In-line heater	240v in-line heater for each regulator to prevent freezing Note: in the absence of the heater a source of hot water nearby to pour water over regulators e.g. electric jug.
Generator and fuel	Portable generator and tagged extension lead(s) may be needed for regulator heater if permanent electricity source not readily available. Fuel for generator in approved container.
Manual handling equipment	Gas cylinder trolley(s) and/or machinery e.g. forklift to move bulk cylinder clusters To secure cylinder: Ratchet straps, rope (5-8mm) or similar– at least 2-3m/cylinder Star pickets, caps and hammer

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Item	Description
Monitors	CO2 monitors – for personnel and to monitor CO2 in and around bin
PPE	Suitable for the task and conditions, e.g. enclosed, non-slip footwear, sun protection (hat, sunscreen), manual handling/cold burn protection gloves, wet weather gear, insect repellent (refer to the safety risk assessment/safe work method statement)
Safety	Warning signs for shed(s) and property indicating CO2 in use Portable lighting (if operating in non-daylight hours)
Recording devices with GPS capability	Paper, pens, clipboard and/or tablet Camera (preferably waterproof and GPS capable)
Waste disposal	For plastic and other on-site contaminated waste
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
First Aid	Kit with oxy viva or equivalent
Water and food	Food and water for personnel to assist in managing fatigue
Contact details	e.g. property owners/managers, Local Control Centre, other teams, destruction contractor, emergency numbers in communications plan
Animal handling	Catching frames/hooks for birds (as needed by shed design)

Further information

AUSVETPLAN manuals

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

AVPMA permit 7472 for liquid carbon dioxide
Best practice for on farm euthanasia of spent layer hens
Pre-ops site inspection