Avian Egg Euthanasia

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Why would we euthanize eggs?

Sometimes birds in the wild are too prolific:

- invasive & pest species

And sometimes we are too successful at breeding them:

- domestic species
- gender selection
- space limitation
- severely damaged egg

methods used to prevent eggs from hatching

- break & discard
- discard without treatment
- oiling
- shaking
- piercing
- injecting
- "addling"
- maceration
- inhalant anesthetic
- cooling / freezing
- CO_2

not all methods are humane or fully effective

AVMA Guidelines for the Euthanasia of Animals: 2013 Edition

<u>Eggs, Embryos, and Neonates</u>

Bird embryos that have attained > 50% incubation have developed a neural tube sufficient for pain perception; therefore they should be euthanized by similar methods used in avian neonates such as:

- anesthetic overdose,
- decapitation, or
- prolonged (> 20 minutes) exposure to CO_2.

Eggs at < 50% incubation may be destroyed by:

- prolonged exposure (> 20 minutes) to CO_2
- cooling (< 4°C for 4 hours), or
- freezing.

Anesthesia can be used prior to euthanasia and is most easily accomplished with exposure to inhaled anesthetics via entry into the air cell at the large end of the egg.

Egg addling can also be used to destroy the viability of embryos.

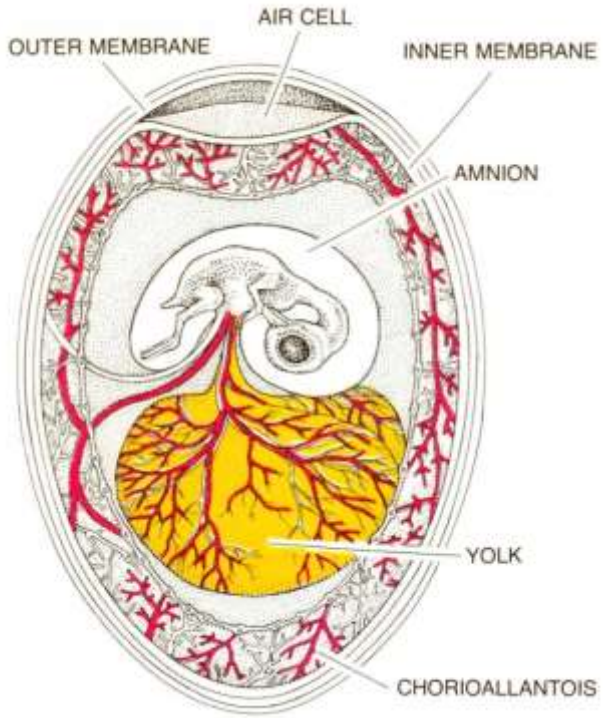
Canada goose nest depredation

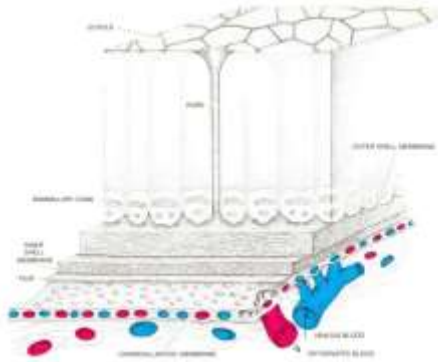
government-approved methods for preventing hatching:

- **USDA:**
  - oiling with 100% food grade corn oil
  - puncture with a probe to disrupt contents
  - shaking / addling until a sloshing sound is heard
- **Canadian Wildlife Service**
  - break & leave in nest
  - freeze for ≥ 12 hours
  - sterilization by
    - coating with non-toxic vegetable or mineral oil
    - shaking until internal fluids are heard slopping around
    - piercing a tiny hole in the eggshell and membrane (which will disrupt the water balance in the egg)

embryonic development & respiration

- no pulmonary respiration
- gas exchange by passive transpiration
  - O_2 in
  - CO_2 & H_2O out
- resistance to CO_2 – higher in nest environment





How well do these methods work?

Our goal should be to use methods that are both 100% effective and humane. These methods are questionable:

- **break & discard**
  - humane only during early incubation
  - 100% effective
- **discard without treatment**
  - development may occur
  - less than 100% effective!
- **oiling**
  - blocks shell pores, restricting respiration
  - slow suffocation
  - 95-100% effective
- **shaking**
  - humane only during early incubation
  - not 100% effective – deformed embryos may develop
- **piercing**
  - humane only during early incubation
  - not 100% effective – deformed embryos may develop
- **injection of drugs or other toxic substances**
  - inability to inject directly into target organs of embryo
  - not 100% effective – deformed embryos may develop

How well do these methods work?

Our goal should be to use methods that are both 100% effective and humane. Done properly, the following best practices are reliable:

- **refrigeration at 35-40°F (2-4°C)**
  - not considered humane after 50% incubation
  - 100% effective
  - recommended time periods vary & may be too low
    - 24-72 hours is safest
- **freezing at -4°F (-20°C)**
  - not considered humane after 50% incubation
  - 100% effective
  - recommended time period of ≥ 2 hours may be effective
  - shells will likely break due to expansion of water during freezing
- **CO_2**
  - considered humane at all stages
  - may be less effective during early incubation
  - 100% effective in late incubation
  - recommended time periods may be too low
    - ≥ 20 minutes exposure has proven insufficient
    - best to treat for 12-24 hours at 72°F (21°C)

Los Angeles Zoo Procedure for Avian Egg Euthanasia

- candle eggs to verify stage of development
- eggs known to be unincubated: break & discard
- eggs incubated for < 50% of term
  - refrigerate at 35-40°F (2-4°C) for ≥ 72 hours
- eggs incubated for ≥ 50% of term
  - treat eggs with CO_2 gas for 24 hours
  - refrigerate after treatment
- if unable to determine stage of development, process eggs as for ≥ 50% of incubation term

CO_2 Euthanasia of Avian Eggs

- eggs should be at incubation, or at least room, temperature
- place eggs on a cardboard flat or other tray or container to allow gas to circulate freely
- place egg tray(s) in a large plastic trash bag, pressing out most of the air
  - an induction box may also be used
- fill the bag to capacity with CO_2 & secure the opening tightly
- repeat a second time after 6-12 hours

references

Euthanasia

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Canada Goose Nest Depredation

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- Environment Canada – Canadian Wildlife Service: Canada Goose Management: Best Practices for Destroying Eggs or Preventing Hatching. 2011
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