Caring for the convalescent pig & euthanasia decisions

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Definition: Animal welfare – a multidisciplinary approach

Animal welfare is the state of an animal as it attempts to cope with its environment

- Behavior, Physiology, Biochemical markers, Health, Performance

Human action, responsibilities

- “Animal husbandry”, “Animal protection”, “Animal care”, “cruelty” “neglect”

Definition: Convalescence

To recover health and strength gradually after sickness or weakness

The period needed for returning to health after illness

Rethinking sickness behavior: Caring for the compromised animal

Jean Francois Millet, 1864

Behavioral responses of animals during acute illness are relatively consistent across species in response to bacterial, viral and protozoan pathogens

Hart suggested this “sickness behavior” is a highly organized, evolved behavioral strategy, and facilitates febrile response

Hart, B.L., 1988. Biological basis of the behavior of sick animals. Neurosci. Biobehav. Rev., 12:123-137

How do ill pigs differ from their healthy pen-mates?

↓ food consumption
↓ water consumption
↓ activity
↓ exploration
↓ social behavior
↓ grooming

↑ slow-wave (non-dream) sleep
↑ heat seeking
↑ pain sensitivity

How should we care for the compromised pig?

- More willing to compete for resting sites
- Less willing to compete for food and water
- At risk for bullying by pen-mates
- Different needs for heat or for cooling

How does the pig's priorities change when it is sick?

- Non-infectious illness model, based on antibiotic associated diarrhea
- 250 mg/kg ampicillin was fed to piglets in milk solution on successive days
- Mild to moderate diarrhea within 24-36 hours, recovery by 72 hours

(Gray, Colgoni, vanderVinne, Sheppard, Millman, 2005. ASM General Meeting, Atlanta)

Sick pigs do not want to be isolated from their pen-mates

During period when diarrhea occurred:

Pigs spent more time resting

Pigs preferred to rest in the heated area

Pigs spent more time in visual contact with pen-mates

(Millman ST, Sheppard KC, Gray JT, 2006. ISAE Meeting, Vancouver, BC)

Convalescence seems to be suppressed in mixed groups

Sickness was induced in 1 pig and 2 pen-mates were healthy

Sick pig did not spend more time resting

Sick pig spent LESS time resting on the heat mat

Sick pig behaved more aggressively to his pen-mates

Salmonella infection, pig behavior and transmission

- Biosecure rooms with 5 pigs, 1 inoculated with Salmonella. Necropsies at Day 7-tissue colonization
- In general, behavior of infected pigs did not differ from healthy pen-mates
  - Infected pigs spent less time on floor vs. raised deck
- Transmission of Salmonella associations:
  - Time on floor: Pigs in groups that spent less time on the floor were more likely to become infected
  - Hide score – Pigs in groups with dirty hides were more likely to become infected
  - Oral behavior – Pigs in groups that performed belly-nosing and ear biting were more likely to become infected

How should we manage sick pigs?

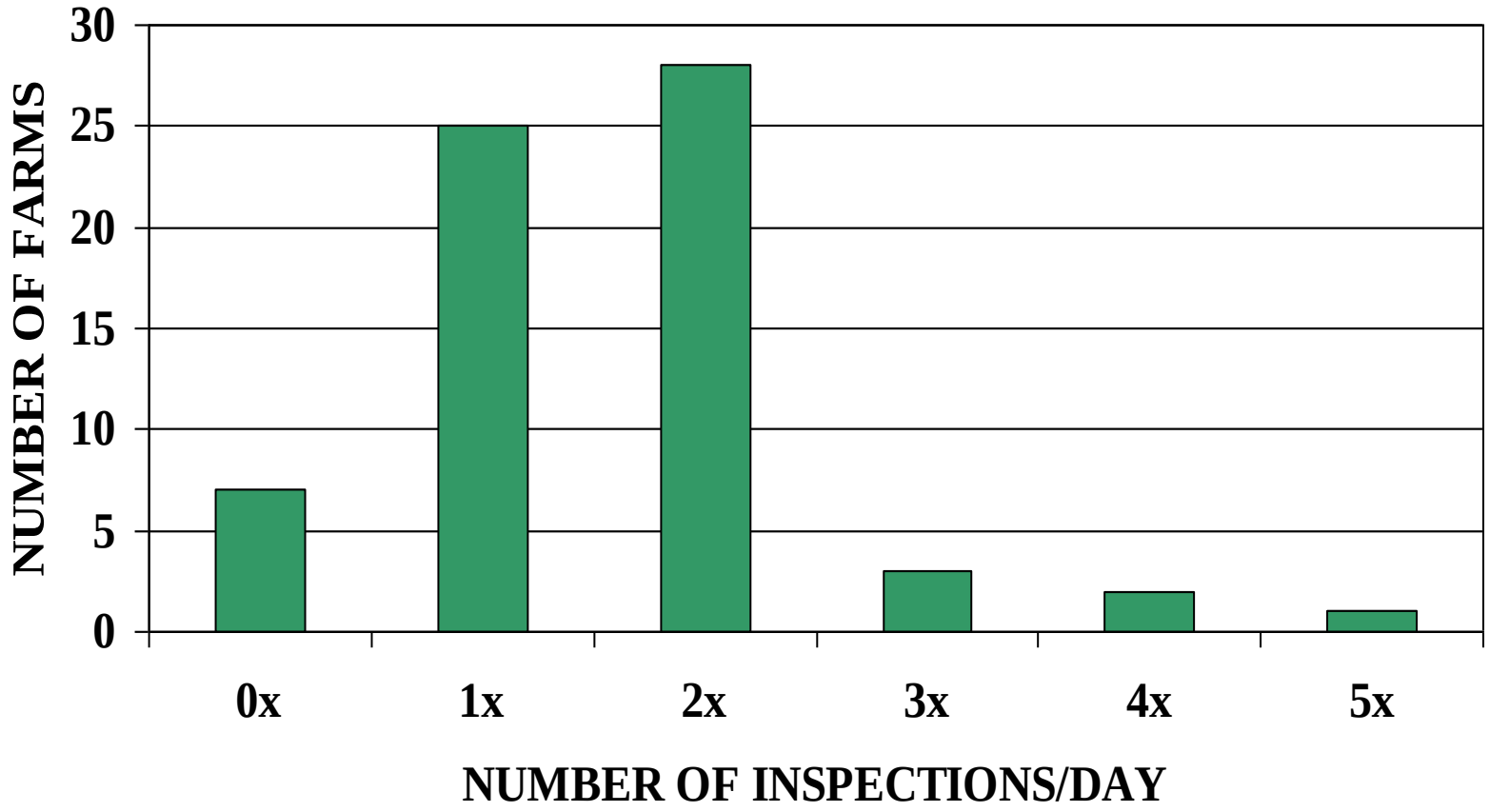
Variation in terminology used, and attitudes to sick pigs

- "Hospital pen"
- "Infirmary"
- "Treatment pen"
- "Isolation pen"
- "Sick pen"
- "Death pen"

Decisions about humane endpoints and euthanasia particularly difficult & inconsistent

- Psychological factors
- Economic factors
- Logistical factors

How often were pigs inspected when the hospital pen was used?



N= 66 Ontario swine farms where hospital pens were used

(Millman S, Sheppard K, Dewey C, Friendship R, 2003)

A management plan and standard operating procedures

Criteria for removal to a hospital pen

- Clinical signs (dehydration)
- Performance
- Evidence of bullying or excessive nosing, chewing

Criteria for on-farm euthanasia

- Failure to respond to treatment
- Pain and distress

Criteria for shipping out

- Direct to processor
- Notify processor

Track records for accountability and to refine your SOPs

Monitoring convalescence

- Appetite
  - Feed refusals
  - Latency to begin eating
  - Response to preferred foods (sweets, forage)
- Alertness
  - Attention in startle test
  - Withdrawl from touch
  - Avoidance in pen
- Dehydration
- Lesion scores
  - Aggression
  - Oral-nasal behavior by pen-mates (abdomen, ears)

Definition: euthanasia

- “good death”

- Painless
- Does not involve fear or distress

- Other practical considerations:
  - Worker safety
  - Aesthetics, acceptability
  - Technical skills, reliability
  - Cost, including carcass disposal

Scientific measurements to assess "humane death"

- Behavior
  - (conscious) Struggling
  - Vocalizations (frequency, pitch)
  - Aversion tests
- Physiology
  - Stress hormones
  - Heart rate, Respiratory rate
- Neuroscience
  - Brain activity
  - Post mortem analysis of traumatic brain injury

Assessing death

- Lack of eye blink response
- Lack of toe/tail pinch response
- Lack of “righting” response
- Cessation of respiration, heart beat
- Cessation of brain activity

- Note: with many techniques, muscle convulsions occur after loss of sensibility and death.
- Note: rapid eye blinking can occur during sensibility and insensibility, so is not a reliable measure of consciousness

Anesthetic overdose

- Most acceptable methods (AVMA)
  - Anesthesia, then respiratory & cardiac arrest
  - Sedation and cardiac puncture or IV administration
  - Minimal pain or distress
  - Animal restraint is required
  - Safe for workers

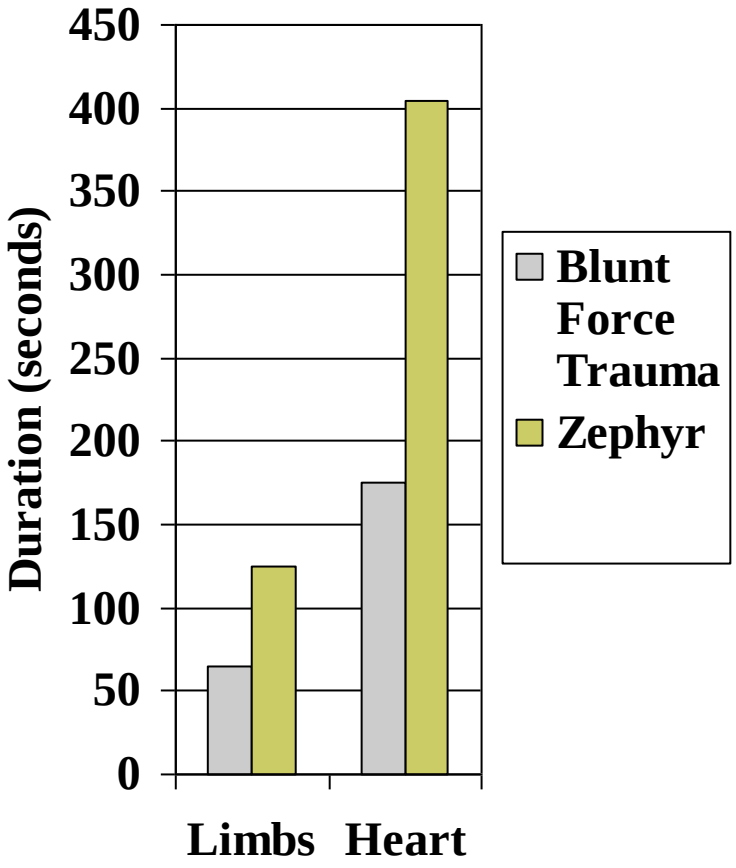
- Barriers to on-farm use
  - Requires veterinary intervention since controlled drugs
  - Carcass disposal is an issue

Concussive force

- Death results from traumatic brain injury. Animal restraint is required.
- Not aesthetically pleasing

- Blunt force trauma (farrowing room piglets only)
- Non-penetrating captive bolt pistol
  - “Zephyr” (for farrowing room pigs)
- Penetrating captive bolt pistol
  - Generally stuns only, exsanguination (bleed out) is needed
- Gunshot
  - 22 caliber most common

Zephyr vs. Blunt Force Trauma for baby pig euthanasia



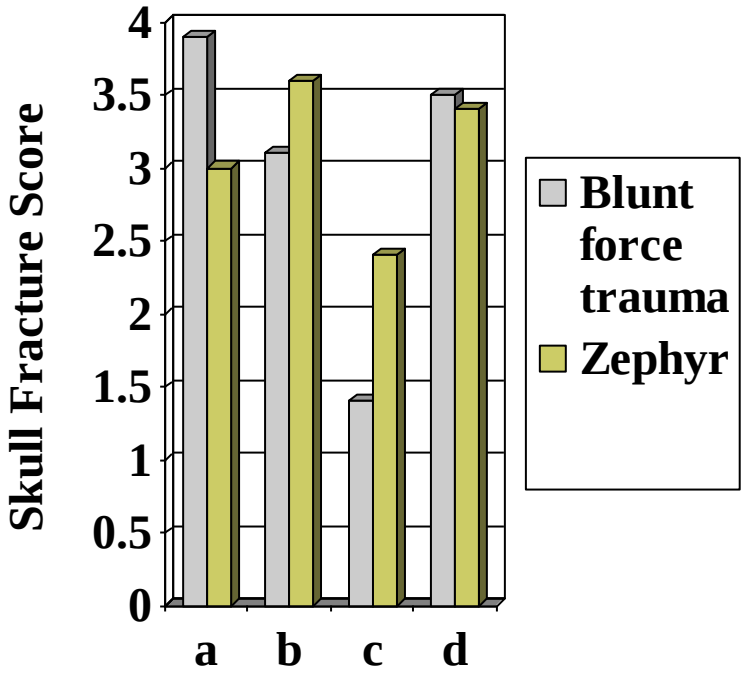
- Blunt force trauma was significantly better in terms of duration of limb movements (P<0.001)
- Blunt force trauma performed better in terms of duration of heart beat (P<0.001)
- 0/76 BFT piglets returned to sensibility vs.13/99 for Z

BUT, these experiments were performed piglets <24H old

Zephyr remodelled and performance is promising

Widowski, T., Elgie, R., Lawless, P., 2008. Assessing the effectiveness of a non-penetrating Captive bolt for euthanasia of newborn piglets. Leman Swine Conference, Minneaspolis MN

The human factor



- Stockperson “c” was less successful in achieving skull fracture scores when using blunt force trauma ($P<0.006$), and this differed from the performance of all other stockpersons with either method
- However, 0/9 piglets returned to sensibility with BFT vs. 5/10 with Z for this stockperson

Carbon dioxide gas

- 80-90% CO_2 causes unconsciousness with 13-30s
- Aversiveness?
  - Pigs will avoid feeding from chamber filled with CO_2, even after 24h feed deprivation (Raj & Gregory)
  - Higher epinephrine levels suggest emotional responses
  - However, pigs willing to enter chamber where they have been rendered unconscious with CO_2 previously vs. strong avoidance when previously exposed to electronic shock
- Argon gas may another option, but challenges with availability, practicality and cost just now

Electrocution

- Causes insensibility of the brain, followed by cardiac arrest and loss of oxygen to the brain
- Electrodes must be positioned on either side of head so current flow through brain, and an electrode to a hindleg ensure cessation of heart
- Requires 300V (many farms only have 110V)
- Human safety concerns
- Mobile unit under commercial development in Quebec, uses 110V and enclosed crate

Summary

- Compromised pigs represent a vulnerable population that needs specialized attention
- Thoughtful standard operating protocols and tracking of information is needed to ensure adequate husbandry during convalescence
- Euthanasia is a critical component