The importance & relevance of animals in research, and their welfare

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Third OIE Global Conference on Animal Welfare.

Kuala Lumpur, Malaysia
6th November 2012
Summary

- History of animal research and what has changed
- Three “key principles” for the ethical use of research animals
- Formulating an appropriate regulatory framework and roles for veterinarians
The ‘Father’ of modern medical research

- Physician and philosopher
- Used observation, dissection and **vivisection**
- Experimented on pigs and goats
- No anaesthesia!

Claude Galen
AD 129-199
The ‘Father’ of modern philosophy

- Only humans have minds - consciousness
- Animals are as machines (automata) - cannot feel pain
- Vivisection widely practised in Europe till late 18th century
- No anaesthesia!

René Descartes
1596 - 1650
The moral status of research animals

- “The question is not can they reason ... but can they **suffer**?” (1789)
- Utilitarianism – balancing harms & benefits

Jeremy Bentham
1748-1832
Laws about Animal Welfare in Research

- “Martin’s Act” 1822
  - Cruel Treatment of Horses & Cattle Act
- Cruelty to Animals Acts 1835, 1849 & 1876
- Animals (Scientific Procedures) Act 1986 – 2012
- "There is no man who kills [even] a sparrow or anything smaller, without its deserving it, but God will question him about it [on the judgment day]"

“Trial of Bill Burns”
Richard Martin MP (Galway)
1754-1834
From “Avoiding Cruelty” to a “Duty of Care”

SO WHAT HAS CHANGED BETWEEN 1876 AND 2012?
Three “Key Principles”

1. **Justify animal use**
   - Perform a harm-benefit analysis

2. **Focus on alternatives**
   - Promote and implement the 3Rs

3. **Achieve Balance**
   - Assure public confidence
The growth of the animal rights movement

- “Animal Liberation” published 1975
- Speciesism – humans and animals considered equal
  - “…man has dominion over animals…” - Qur’an & Bible
- First key principle: Justify animal use
  - Benefits must balance the harms caused (utilitarianism)
Scale of annual research animal use internationally

- Estimated numbers used in research:
  - USA ~17 - 22 million*
  - Europe ~10 - 12 million (UK 3.5 million)
  - Australia ~ 5 million
  - Rest of the World ~ 20 million
  - Total ~ 60 million (mainly vertebrates)

- Estimated numbers slaughtered for meat:
  - Total ~ 1.75 billion (cattle, sheep, goats & pigs)

* US official figures exclude rodents, birds, & fish - estimated here to be 90% of use
What animals are being used?

UK Statistics 2011*

- Rats, mice & other rodents, small mammals & rabbits 79.7%
- Fish, amphibians, reptiles & birds 19.7%
- Sheep, cows, pigs & other large mammals 0.44%
- Dogs, cats (no strays), ferrets & small carnivores 0.12%
- Primates: marmoset & macaque monkeys (no apes) 0.04%

Species used

Procedures using mice by genetic status, 1995 - 2011

Millions of procedures

- Normal animals
- Harmful genetic defect
- GM animals
Fish by genetic status - UK

Procedures using fish by genetic status, 1995 - 2011

Millions of procedures

- Normal animals
- Harmful genetic defect
- GM animals
Why are these animals being used?

Purposes in UK 2011*

- Breeding (mostly genetically altered animals for research & development of new treatments) 44%
- Basic biological and medical research 35%
- Developing new treatments for diseases or ways of preventing disease 18%
- Safety testing of non-medical products used in the home, agriculture and industry (no cosmetic or toiletries after 1998) 2%
- Developing new methods of diagnosis 1%

What are the benefits?

- Polio vaccine
- Organ transplants
- High blood pressure
- Tuberculosis
- Burkitt's lymphoma
- Alzheimer's disease
- Premature babies
- Breast cancer
- Anticoagulants
- Blood transfusion
- Parkinson's disease
- Veterinary vaccines
- MRSA
- Asthma
- Cervical cancer vaccine
- Penicillin
- Insulin for diabetes
- Stem cell therapies
- HIV & AIDS
- Lou Gehrig syndrome (ALS)
- Chronic fatigue syndrome
- Leukaemia
- Muscular dystrophy
1. Justify animal use: Perform a harm-benefit analysis

- Important ethical evaluation of projects
- Needs to be done on a case by case basis
- Typically performed either by government ‘Competent Authority’ (UK & EU) or by in-house committees (USA)
- Significant role for veterinarians, especially in assessing and reducing harms
- Scientific and independent lay opinion may also be sought
- Benefits often difficult to predict, even in applied research
- Post-approval monitoring also important
Focus on alternatives: The 3Rs

- “Principles of Humane Experimental Technique”
- Published by UFAW in 1959
- Introduced the 3Rs
  - Replacement
  - Reduction &
  - Refinement
- Second key principle

William Russell & Rex Burch
2. Focus on alternatives: Promote and implement the 3Rs

- **Replacement:**
  - Using totally non-animal methods e.g. *in silico, human data* (absolute)
  - Using cells, tissues, organs of animals *in vitro* (relative)

- **Reduction:**
  - Using fewer animals, often through good experimental design
  - Obtain same information from fewer animals or more information from the same number of animals

- **Refinement:**
  - Using methods which minimise pain or distress
  - Using species with less capacity to feel pain
  - Includes improvements in housing and care e.g. enrichment

- Continue to apply the 3Rs throughout the project
- Significant in assessing ‘harms’ in harm-benefit analysis
3. Achieve balance: Assure public confidence
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- Science Quality
- Animal Welfare
3. Achieve balance: Assure public confidence
Formulating a regulatory framework – role of OIE

- Where to start?
- Complex area –
  - Science & Technology is critical to success of all nations
  - Animal research is essential to that success
  - Reputational risk of poor or non-existent regulation is significant
  - Companies & universities in scientifically developed countries place studies in countries with appropriate welfare regulation

- Chapter 7.8 in OIE Terrestrial Code – Use of Animals in Research and Education
  - Formulated by OIE ad hoc Group on Laboratory Animal Welfare
  - Provides essential elements for a regulatory framework with great flexibility for cultural, economic, religious and social factors
  - ad hoc Group continuing as a virtual group to consider on-going issues
    - e.g. transportation of research animals, especially internationally.
Roles for veterinarians

- **Biosecurity**
  - Avoid infection of animals and humans

- **Care, health and welfare of animals**
  - Clinical health, post mortems, medical records

- **Advice on experimental techniques**
  - Surgery and post operative care
  - Anaesthesia, analgesia and euthanasia
  - Humane end-points

- **Participate in ethical review processes**
  - Especially in relation to refinement

- **Inspection and project assessment & authorisation**
  - Ideally qualified for both these functions

- **Training of scientists and animal care staff**
  - Research and husbandry procedures
  - Environmental enrichment
Conclusions:

- Science & Technology is key to the success of all nations
- Animal research plays an essential role in that success
- Our views of the moral status of research animals, and how we should treat them, has changed over time
- Focus now is on our “duty of care”, not just avoiding “unnecessary suffering”
- Reflected in the OIE “Regulatory Framework”
- Three key principles:
  1. **Justify animal use**
     - Perform a harm-benefit analysis
  2. **Focus on alternatives**
     - Promote and implement the 3Rs
  3. **Achieve Balance**
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http://www.oie.int/international-standard-setting/terrestrial-code/access-online/
and select Chapter 7.8 – Use of Animals in Research and Education

"Whoever is kind to the creatures of God, is kind to himself."
The Prophet Muhammad