Improving animal housing and care

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Presentation overview

- Definition of good animal welfare and why it is important
- General principles of good housing and care
  - Health
  - Defining and satisfying animals’ needs
  - Practical issues
- Examples of good husbandry for common laboratory species
What is good animal welfare?

‘A state of wellbeing that occurs when all an animals needs are met’

- Physical needs – environment, temperature, lighting, humidity, noise
- Nutritional needs
- Behavioural needs
- Social needs

Includes physical and mental wellbeing
Why is good welfare important?

• **For animals:** spend most of their time in cages/pens so poor housing can significantly affect health and stress levels

• **For good science:** stressed animals do not make good research subjects (American Medical Association, 1992)

• **To comply with legislation**

• **To meet public expectations**
For animals

Examples of signs of poor welfare in laboratory species

• Abnormal repetitive behaviours
e.g. head-swaying, bar-biting, circling, pushing the hopper with head in rabbits; and bar-biting, circling, wheeling or flipping, tail-chasing in rodents...

• Compulsive behaviours
e.g. ‘self injurious biting’ in primates, or barbering in mice

• Fear-related responses
e.g. biting

Many stress responses are a lot more subtle!
Scientific implications of poor welfare:

• Anxiety, pain, fear and distress can affect normal development and biological functioning
  - heart rate
  - blood pressure
  - body temperature
  - immune responses
  - blood biochemistry
  - brain complexity
  - abnormal behaviours

• Even apparently minor welfare problems can influence the reliability, reproducibility and consistency of research
Effect of transport

- Harlan Sprague Dawley rats transported by van for 5hrs
- Heart rate, body temperature and activity patterns took 3 days to return to normal after transport
- Using animals within this period generates misleading data

Capdevila, Giral, Ruiz de la Torre, Russell & Kramer (2007) Laboratory Animals 41: 255-261
For EU & international laws and guidelines

**European Directive (2010)**

“Any restrictions on the extent to which an animal can satisfy its physiological and ethological needs are limited to a minimum”

**OIE (2010)**

“Good husbandry practices enhance the health and welfare of the animals used and contributes to the scientific validity of animal research...

The housing environment and husbandry practices should take into consideration the normal behaviour of the species, including their social behaviour and age of the animal, and should minimise stress to the animal”
USA ILAR Guide (2010)

“The design of animal facilities combined with appropriate animal housing and management are essential to animal well-being, to the quality of animal research...

An appropriate Program provides environments, housing, and management that are well-suited for the species or strains of animals maintained and takes into account their physical, physiologic and behavioural needs, allowing them to grow, mature and reproduce normally, while providing for their health and well-being”.


Good housing and care: General principles

Housing and care needs to:

• Ensure good health
• Satisfy physical and behavioural needs of the species, strain and individual animal
• Be practical in a laboratory environment
• Be implemented by well trained staff who understand the needs of the animals in their care
Animal health

Health is a component of good welfare so use a reliable, consistent source of animals.

A good breeder should:

• Produce animals of high health status
• Have a defined animal health programme with good veterinary care
• Minimise wastage of animals
• Operate to recognised standards (e.g. FELASA, AALAC)
Satisfying animals’ needs

• As science progresses, so does understanding of the cognitive ability and housing and care needs of animals – so be aware of scientific literature and use it to make improvements

• Animal behaviour science has been developed to ‘ask’ animals questions about what matters to them and how much these things matter
Defining animals’ needs

Example: Assessing the motivation of rats to gain access to nesting materials

- 2 cages linked by tubes to a central box with a weighted barrier
- Nesting material on one side only
- Weights could be adjusted to test motivation to access nest material
Results.....

<table>
<thead>
<tr>
<th>Animal has access to</th>
<th>Mean weight lifted (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Empty cage</td>
<td>150</td>
</tr>
<tr>
<td>Nest box</td>
<td>328</td>
</tr>
<tr>
<td>Nesting material</td>
<td>290</td>
</tr>
<tr>
<td>Nest box + nesting material</td>
<td>429</td>
</tr>
</tbody>
</table>

Manser et al. (1997) *Laboratory Animals* 32: 36-41

Rats will also lift 83% of their own body weight to move from a wire mesh or grid floor to a solid floor.
Practical issues to consider

1. Quantity and quality of space
2. Social housing
3. Environmental enrichment
4. Physical environment (light, noise, temperature, humidity)
5. Husbandry procedures e.g. cleaning regimes
6. Handling, restraint
7. Special needs for strains, sexes, individuals, experimental animals
8. Staff training
1. Cage/pen structure

- Size: dimensions given in legislation are the absolute minimum – try to improve on these
- Structure: think about how the animals use their cage/pen e.g.
  - Rats and rabbits stand on their hind legs so need height to allow this behaviour
  - Dogs like to jump on raised areas so the pen needs to incorporate these
  - Foraging animals need foraging material so floors must be solid
2. Social housing

• Keeping social animals on their own is highly stressful for them so maintain them in harmonious and stable pairs or groups

• Provide enough space for social behaviour

• System needs good management
  ▪ Obtain advice from specialists on behaviour
  ▪ Liaise with the breeder
  ▪ Lots of published guidance for many species
3. Environmental enrichment

- Should be part of good experimental design
- Stimulates natural behaviour and mental activity
- Allows animals some control of their environment
- Encourages them to interact with their environment
- Prevents development of abnormal behaviour
- Can facilitate monitoring of welfare states
Assessing welfare with environmental enrichment and behavioural indicators

Arras et al. (2007)
4. Physical environment

- Standards for temperature, humidity, lighting, are set out in regulations
- Take care with lighting (light intensity, spectrum, dawn/dusk transition, diurnal rhythm)
4. Physical environment: Noise

....and with noise - consider normal hearing range of animals, including ultrasound
For rodents (and other animals that depend on olfaction): consider need for hygiene versus disturbance of social odours, physiology and behaviour when cleaning cages
Practical examples of good husbandry for common laboratory species in industry and academia
Rats and mice

- Group housing
- Plenty of space and height
- Solid floor
- Wood shavings for digging
- Shelter and/or tunnel
- Nesting material
- Something to gnaw
- Opportunities to forage for preferred foods
- Appropriate lighting levels
- Acceptable levels of ultrasound
Guinea pigs

- Group housing
- Plenty of space
- Solid floor with wood shavings
- Hay to burrow in
- Covered refuge areas
- Something to gnaw
- Dietary enrichment and the ability to forage
Rabbits

Group housing
Plenty of space and height
Solid floor with substrate
Straw or shredded paper bedding
Nest box for breeding females
Refuges
Raised areas
Something to gnaw, and dietary enrichment

www.rspca.org.uk/sciencegroup/researchanimals/implementing3rs/refiningrabbitcare
Rabbits
Dogs

Group housing
Spacious pens
Solid floors
Daily access to in/outdoor runs
Warm, dry resting area
Raised areas
Balanced diet
Toys and items to chew
Protection from excess noise
Dogs
Pigs

Group housing in plenty of space
Solid floors
Material to manipulate with their noses
A comfortable area to lie
A means of keeping cool
Adequate feeder space
Nesting material for pregnant females
Toys and other things to keep them occupied
Human interaction
Pigs

Jane Cooper (RSPCA)
Chickens and quail

Group housing
Large pens (not cages)
Solid floor
Sand or wood shavings and chopped straw
Dust baths
Objects to peck
Nest box and material (laying hens)
15cm perch per bird at varying heights (for chickens)
Appropriate areas of cover (for quail)
Appropriate feeder length per bird (15cm for chickens/7cm for quail)
LAVA
Primates
African clawed frogs (*Xenopus laevis*)

- Sufficient water depth to lie fully submerged, swim and allow provision of environmental enrichment
- Refuges
- Surface cover
- Group housing
- Minimal environmental disturbance from Vibrations and noise
Frogs
7. Animals with special needs

Some individual strains, sexes or ages of animals and experimental models may have special needs e.g.

- diabetic mice
- aggressive strains
- aged animals
- male mice
- stroke, Parkinson’s models
- exteriorised cannulae

Adapt housing and enrichment to the animals’ needs
Good housing and care is essential for animal welfare and scientific quality.

The most reliable results will be obtained from animals that are healthy, unstressed and living in a good quality environment.

This is important for all species in all research.

Even the most recent legislation usually only gives ‘general requirements’ and sets out ‘minimum standards’ - this is helpful, but these can, and should be improved upon.

Make sure you understand the needs of your animals and can provide for these in the laboratory - there is a lot of information out there!
Further information

Journals:
- Laboratory Animals
- Lab Animal (US and Europe)
- ILAR journal
- Contemporary Topics in Lab Animal Science

Websites:
- NC3Rs  www.nc3rs.org.uk
- Altweb  http://altweb.jhsph.edu/
- Animal Welfare Institute  www.awionline.org
- RSPCA  www.rspca.org.uk/researchanimals

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Thank you!

www.rspca.org.uk/ethicalreview