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and Bioethical Analysis:
Founding Partner

http://animalwelfare.massey.ac.nz

Animal Welfare:
Surviving, thriving and promoting rewarding wildlife behaviours

Using the Five Domains Model to understand and improve zoo animal welfare

Professor David J Mellor
BSc(Hons), PhD, HonAssocRCVS, ONZM

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Key Published Sources

- Mellor, D.J. (2017). Operational details of the Five Domains Model and its key applications to the assessment and management of animal welfare. *Animals* 7(8), 60; doi:10.3390/ani7080060

OUR PURPOSE:

FOR ANIMALS TO ‘THRIVE’
NOT MERELY ‘SURVIVE’
Areas considered

• The Freedoms, Provisions and Welfare Aims
  - The Five Freedoms and importance of the Provisions
  - The Five Provisions / Welfare Aims Paradigm

• The Five Domains Model
  - Overview
  - Examples of its operation

• Seven Key Applications of the Model
  - Key general foci of AW management
  - Foundations of specific AW management objectives
  - Identifies previously unrecognised features of poor and good welfare
  - Monitoring changes in AW
  - Grading of AW compromise and/or enhancement
  - Prospective and retrospective AW assessments
  - Quality of Life assessments relevant to end-of-life decisions

• Concluding comments
The ‘Five Freedoms’ – overview

<table>
<thead>
<tr>
<th>Freedoms</th>
<th>Provisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Freedom from thirst, hunger and malnutrition</td>
<td>By providing ready access to fresh water and a diet to maintain full health and vigour</td>
</tr>
<tr>
<td>2. Freedom from discomfort and exposure</td>
<td>By providing an appropriate environment including shelter and a comfortable resting area</td>
</tr>
<tr>
<td>3. Freedom from pain, injury and disease</td>
<td>By prevention or rapid diagnosis and treatment</td>
</tr>
<tr>
<td>4. Freedom from fear and distress</td>
<td>By ensuring conditions and treatment which avoid mental suffering</td>
</tr>
<tr>
<td>5. Freedom to express normal behaviour</td>
<td>By providing sufficient space, proper facilities and the company of the animal’s own kind</td>
</tr>
</tbody>
</table>

The ‘Five Provisions’

- The Freedoms are problematic
- BUT, the PROVISIONS are still practically useful in some ways

<table>
<thead>
<tr>
<th>Domain/category</th>
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<td>3. Health</td>
<td>Prevent or rapidly diagnose and treat injury and disease</td>
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<td>4. Behaviour</td>
<td>Provide sufficient space, proper facilities and the company of the animal’s own kind</td>
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<td>Ensure conditions and treatment which avoid mental suffering</td>
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Three key issues regarding the ‘Five Freedoms’:

1. The **Provisions** more influential than the ‘Freedoms’ because they provide **practical advice on animal welfare management**

2. Most negative experiences listed in the ‘Five Freedoms’ can only be **minimised, NOT eliminated**

3. The ‘Freedoms’ mostly focussed on negative experiences, BUT now we must ALSO include positive experiences.

**Three steps are therefore recommended:**

1. **Avoid reference to the ‘Five Freedoms’ to reduce misconceptions and confusion**

2. **Emphasise the ‘Provisions’, BUT update them to give attention both to negative and positive experiences or states**

3. **Align each Provision with salient Animal Welfare Aims that emphasise animals’ experiences that most affect their welfare.’**
### The ‘Five Provisions / Welfare Aims’ paradigm

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<thead>
<tr>
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<tr>
<td><strong>1. Good nutrition:</strong> Provide ready access to</td>
<td>Minimise thirst and hunger and enable eating to be a</td>
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<td>fresh water and a diet to maintain full health</td>
<td>pleasurable experience</td>
</tr>
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<td>and vigour</td>
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<td><strong>2. Good environment:</strong> Provide shade/shelter or</td>
<td>Minimise discomfort and exposure and promote thermal,</td>
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<td>suitable housing, good air quality and</td>
<td>physical and other comforts</td>
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<td>comfortable resting areas</td>
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Mellor 2016. *Animals* 6, 59
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<td>3. <strong>Good health</strong>: Prevent or rapidly diagnose and treat disease and injury, and foster good muscle tone, posture and cardiorespiratory function</td>
<td>Minimise breathlessness, nausea, pain and other aversive experiences and promote the pleasures of robustness, vigour, strength and well coordinated physical activity</td>
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<td>4. <strong>Appropriate behaviour</strong>: Provide sufficient space, proper facilities, congenial company and appropriately varied conditions</td>
<td>Minimise threats and unpleasant restrictions on behaviour and promote engagement in rewarding activities</td>
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<td><strong>5. Positive mental experiences:</strong> Provide safe, congenial and species-appropriate opportunities to have pleasurable experiences</td>
<td>Promote various forms of comfort, pleasure, interest, confidence and a sense of control</td>
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Mellor 2016. *Animals* 6, 59

### Areas considered

- **The Freedoms, Provisions and Welfare Aims**
  - The Five Freedoms and importance of the Provisions
  - The Five Provisions / Welfare Aims Paradigm
- **The Five Domains Model**
  - Overview
  - Examples of its operation
- **Seven Key Applications of the Model**
  - Key general foci of AW management
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  - Quality of Life assessments relevant to end-of-life decisions
- **Concluding comments**
The 2015 Five Domains Model – overview

• The Model:
  – Is NOT a definition of animal welfare
    • Characterising welfare is preferred to defining it
    • Characterisation is in terms of the key attributes of welfare
  – Is NOT an accurate representation of body structure/function
    • Each Domain focuses attention on areas relevant to animal welfare assessment and management

• Therefore, it IS a focusing device
  – It is designed to facilitate systematic, structured, coherent and comprehensive animal welfare assessments
### The 2015 Five Domains Model – overview

#### The Model:
- **Is NOT a definition of animal welfare**
  - Characterising welfare is preferred to defining it
  - Characterisation is in terms of the key attributes of welfare
- **Is NOT an accurate representation of body structure/function**
  - Each Domain focuses attention on areas relevant to animal welfare assessment and management
- Thus, it is a focusing device
- **It is designed to facilitate systematic, structured, coherent and comprehensive animal welfare assessments**

The following POSTER gives more explicit guidance on, and numerous examples of, how to use the model to identify negative experiences and promote positive welfare states.

### The Five Domains Model

#### Physical/Functional Domains

<table>
<thead>
<tr>
<th>Domain</th>
<th>Survival-Related Factors</th>
<th>Situation-Related Factors</th>
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<tbody>
<tr>
<td>1: Nutrition</td>
<td>Adequate food</td>
<td>Availability of food, food quality, food variety</td>
</tr>
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<td>2: Environment</td>
<td>Environmental conditions</td>
<td>Environmental conditions, environmental control</td>
</tr>
<tr>
<td>3: Health</td>
<td>Physical condition</td>
<td>Physical condition, health and high vitality</td>
</tr>
<tr>
<td>4: Behaviour</td>
<td>Activity levels</td>
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#### Affective Experience Domain

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### Welfare Status

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**Note:** The image contains a table and a diagram illustrating the Five Domains Model, with examples of how to use the model to identify negative experiences and promote positive welfare states.
The 2015 Five Domains Model – operation

• Key features of the Model:
  – Distinguishes between:
    • Survival-related ‘biological functioning’ (domains 1-3):
      Related to sensory inputs from inside the body
    • Situation-related ‘environmental enrichment’ (domain 4):
      Related to sensory inputs from outside the body
  – Identifies both -ve and +ve elements in each domain:
    • Physical/functional states (1-3)
    • Perceived external circumstances (4)
    • AND the aligned –ve and +ve affective experiences (5)

The foregoing details explain the biological/affective
background to the model

Let us now look as a few examples
The Five Domains Model

### Physical/Functional Domains

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<td><strong>2: Environment</strong></td>
</tr>
<tr>
<td>Hunger</td>
<td>Disease, stress, traffic, flooding, heat, cold</td>
</tr>
<tr>
<td>Thirst</td>
<td>Pain, discomfort, pain, stress, cold climatic conditions</td>
</tr>
<tr>
<td>Food variety</td>
<td>Available engaging environments</td>
</tr>
<tr>
<td>Food quality</td>
<td>Space for free movement</td>
</tr>
<tr>
<td>Food intake</td>
<td>Below ground level, under water, poor quality water, disease, injury, stress, threat</td>
</tr>
<tr>
<td>Water intake</td>
<td>避难所, 刺激xis, 增加, 酌量</td>
</tr>
<tr>
<td>Restrictions on:</td>
<td>Negative feedback, threats, avoidance, escape</td>
</tr>
<tr>
<td>Voluntary overeating</td>
<td></td>
</tr>
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### Affective Experience Domain

<table>
<thead>
<tr>
<th>Domain 5: Mental State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative</td>
</tr>
<tr>
<td>Thirst</td>
</tr>
<tr>
<td>Hunger (general)</td>
</tr>
<tr>
<td>Hunger (salt)</td>
</tr>
<tr>
<td>Malnutrition malaise</td>
</tr>
<tr>
<td>Bloated, over full</td>
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</tbody>
</table>

### The 2015 Five Domains Model – operation

#### Domain 1: Nutrition

**Restrictions on:**
- Water intake
- Food intake
- Food quality
- Food variety

Voluntary overeating

#### Domain 5: Mental State

**Negative**
- Thirst
- Hunger (general)
- Hunger (salt)
- Malnutrition malaise
- Bloated, over full
The 2015 Five Domains Model – *operation*

**Domain 1: Nutrition**

**Restrictions on:**
- Water intake
- Food intake
- Food quality
- Food variety
- Voluntary overeating

**Opportunities to:**
- Drink enough water
- Eat enough food
- Eat a balanced diet
- Eat a variety of foods

**Domain 5: Mental State**

**Negative**
- Thirst
- Hunger (general)
- Hunger (salt)
- Main nutrition malaise
- Malaise from unnatural constancy

**Positive**
- Wetting/quenching pleasures of drinking
- Pleasures of different tastes/smells
- Pleasure of salt taste
The 2015 Five Domains Model – operation

Domain 4: Behaviour

An animal exercises ‘agency’ when it engages in voluntary, self-generated and goal-directed behaviours

Many such behaviours are rewarding and are accompanied by +ve affects

Exercise of ‘agency’ impeded by:
- Invariant, barren environment
- Constraints on environment-focussed activity
- Constraints on animal-to-animal interactive activity
- Limited sleep/rest
- Limits on threat avoidance, escape or defensive activity

Domain 5: Mental State

Negative
- Anger, frustration
- Boredom, helplessness
- Loneliness, isolation
- Depression, withdrawal
- Unsatisfied sexually
- Exhaustion
- Anxiety, fearfulness, panic, neophobia

Calmness
- Vitality/reward
- Affectionate sociability
- Maternally rewarded
- Excitation/playfulness
- Sexually gratified
- Energised/refreshed
- Secure/protected/confident
The 2015 Five Domains Model – operation

Domain 4: Behaviour

Exercise of ‘agency’ impeded by:
- Invariant, barren environment
- (ambient, physical, biotic)
- Constraints on environment-focused activity
- Constraints on animal-to-animal interactive activity
- Limited sleep/rest
- Limits on threat avoidance, escape or defensive activity

Opportunities to exercise ‘agency’ via:
- Varied, novel, engaging environmental challenges
- Foraging/hunting, Bonding/Reaffirming bonds, Rearing young, Playing, Sexual activity
- Sleeping/resting
- Using refuges, retreat, or defensive attack

Domain 5: Mental State

Negative
- Anger, frustration
- Boredom, helplessness
- Loneliness, isolation
- Depression, withdrawal
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- Anxiety, fearfulness, panic, neophobia

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- Calmness
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- Maternally/paternally/group rewarded
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Areas considered

- The Freedoms, Provisions and Welfare Aims
  - The Five Freedoms and importance of the Provisions
  - The Five Provisions / Welfare Aims Paradigm

- The Five Domains Model
  - Overview
  - Examples of its operation

- Seven Key Applications of the Model
  - Key general foci of AW management
  - Foundations of specific AW management objectives
  - Identifies previously unrecognised features of poor and good welfare
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- Concluding comments
Seven Key Applications of the Model

The Model:

1. Specifies key general foci for animal welfare management
2. Highlights the foundations of specific welfare management objectives
3. Identifies previously unrecognised features of poor and good welfare
4. Enables monitoring of responses to specific welfare-focused remedial interventions and/or maintenance activities
5. Facilitates qualitative grading of particular features of welfare compromise and/or enhancement
6. Enables both prospective and retrospective welfare assessments to be conducted
7. Provides adjunct information to support Quality of Life evaluations in the context of end-of-life decisions.

Seven Key Applications of the Model

The Model:

1. Specifies key general foci for animal welfare management

• These foci relate to the targets of the Provisions:
  – Good nutrition
  – Good environment
  – Good health
  – Appropriate behaviour

• Good application of the Provisions achieves welfare-relevant affective outcomes

• We cannot measure affects directly, but we can manage them practically via the Provisions
Seven Key Applications of the Model

The Model:

2. **Highlights the foundations of specific welfare management objectives**
   - **Survival-critical negative affects:**
     - Minimise to low/tolerable levels that still motivate the required behaviours
     - Valence range is ‘negative-to-neutral’
   - **Situation-related negative affects:**
     - Replace them with situation-related positive affects via enrichments
     - Valence range is ‘negative-to-neutral’
   - **Situation-related positive affects:**
     - Provide opportunities to experience comfort, pleasure, interest, confidence and a sense of being in control
     - Valence range is ‘neutral-to-positive’
Seven Key Applications of the Model

The Model:

3. Identifies previously unrecognised features of poor and good welfare

- Common misconception: “No pain, no welfare compromise”
- Related to laws that refer to “Pain and suffering”
- Suffering taken to include: mental cruelty, discomfort or distress
- All of these descriptors are generic – non-specific

- The Model is much more specific with regard to negative affects
Seven Key Applications of the Model

The Model:

3. Identifies previously unrecognised features of poor and good welfare

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   - All of these descriptors are generic – non-specific
   - The Model is much more specific with regard to negative affects
   - The Model is ALSO very specific about possible positive affects
   - This specificity enables more precise targeting, via the Provisions, to correct particular welfare compromises and/or to promote particular welfare enhancements
Seven Key Applications of the Model

The Model:

4. Enables monitoring of responses to specific welfare-focused remedial interventions and/or maintenance activities
   - Clearly, this is achieved by repeated Model-based welfare assessments
   - Note: only welfare attributes for which particular indices are available and observable can be monitored

5. Facilitates qualitative grading of particular features of welfare compromise and/or enhancement
   - Five-tier compromise scale
   - Relates to degrees/durations of physical/functional and situational impacts:
     - A: None
     - B: Low
     - C: Mild-to-Moderate
     - D: Marked-to-Severe
     - E: Very Severe
Seven Key Applications of the Model

The Model:

5. Facilitates qualitative grading of particular features of welfare compromise and/or enhancement
   - Five-tier compromise scale
     - Relates to degrees/durations of physical/functional and situational impacts:
       - A: None
       - B: Low
       - C: Mild-to-Moderate
       - D: Marked-to-Severe
       - E: Very Severe
   - Four-tier enhancement scale
     - Relates mainly to use of opportunities for rewarding behaviours:
       - 0: None
       - +: Low-level enhancement
       - ++: Medium-level enhancement
       - +++: High-level enhancement

Six Key Applications of the Model

The Model:

6. Enables both prospective and retrospective welfare assessments to be conducted
   - Prospective applications to anticipated –ve and/or +ve impacts:
     - During the devising of new zoo and aquarium enrichments
     - Changes in husbandry/housing of farm, working and sports animals
     - Evaluation of ‘pest’ control devices/tools and procedures
     - Evaluating RTT procedures – regulated in NZ since 1997
Seven Key Applications of the Model

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     – Changes in husbandry/housing of farm, working and sports animals
     – Evaluation of ‘pest’ control devices/tools and procedures
     – Evaluating RTT procedures – regulated in NZ since 1997
   • Retrospective applications to situations that have occurred:
     – Same as above
     – Forensic use in preparing Expert Witness Statements for cruelty court cases
       • Canadian experience
       • Recent visit to NZ and Melbourne by Dr. Rebecca Ledger

7. Provides adjunct information to support Quality of Life evaluations in the context of end-of-life decisions.
   • QoL assessment is complex
   • No ‘all-inclusive’ metric for QoL exists
   • The welfare compromise and enhancement scales do not have a common base
   • Only welfare attributes for which particular indices are available and observable can be monitored
Seven Key Applications of the Model

The Model:

7. Provides adjunct information to support Quality of Life evaluations in the context of end-of-life decisions.

- QoL assessment is complex
- No ‘all-inclusive’ metric for QoL exists
- The welfare compromise and enhancement scales do not have a common base
- Only welfare attributes for which particular indices are available and observable can be monitored
- Nevertheless, the Model can provide helpful adjunct information when making end-of-life decisions
- This relates to interactions between survival-critical negative affects and the motivation to engage in behaviours that may give rise to positive situation-related affects

Seven Key Applications of the Model

### Negative
- Survival-critical negative experiences
  - Internal imbalances or disruptions
    - Breathlessness, Thirst, Hunger, Pain
    - Nausea, Dizziness, Debility
    - Weakness, Sickness
- Situation-related negative experiences
  - Threatening; Barren; Restricted; Isolated
  - Anxiety, Fear, Panic, Helplessness
  - Loneliness, Bereavement, Depression
  - Frustration, Anger

### Neutral
- Internal factors

### Positive
- Survival-critical positive experiences
  - Safe; Stimulus-rich; Spacious; Companions
  - Calm, Secure, Protected, Confident
  - Engaged, interested, in control
  - Affectionately sociable, bonded
  - Rewarded maternally, paternally, or as a group
- Situation-related positive experiences
  - Excitedly playful; Sexually gratified

Environmental enrichment

Inhibit
Areas considered

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- **Concluding comments**

Concluding comments

QUESTIONS

Q: Is the minimalist aim of mere survival sufficient?

A: The biological functioning approach, focused on survival-related factors, can achieve survival, but this will usually only minimise or neutralise –ve affective states. Nevertheless: it is important to do this!
Concluding comments

QUESTIONS

Q: Is the minimalist aim of mere survival sufficient?
A: The biological functioning approach, focused on survival-related factors, can achieve survival, BUT this will usually only minimise or neutralise –ve affective states. NEVERTHELESS: it is important to do this!

Q: How can survival be accompanied by a good Quality of Life?
A: By identifying +ve affective experiences that animals may have AND by providing them with opportunities to have those experiences.

Q: How can such +ve experiences be identified?
A: By using the latest version of the Five Domains model.
Concluding comments

QUESTIONS
Q: How can the 2015 model be used to improve Quality of Life?
A: First, consider the potential +ve affects that are known to be aligned with survival-related and situation-related factors.
Second, for each domain, assess whether the circumstances would impede or allow animals to have +ve (i.e. rewarding) experiences.
Third, seek to introduce and/or maintain beneficial circumstances, recognising that such changes are enrichments.

QUESTIONS THAT SUPPORT ENRICHMENT INITIATIVES
- What opportunities have been provided for the animals’ comfort, pleasure, interest, confidence, choice and challenge?
- What provisions have been made to ensure that consuming the food provided will be an enjoyable experience?
Concluding comments

QUESTIONS THAT SUPPORT ENRICHMENT INITIATIVES

- What opportunities have been provided for the animals’ comfort, pleasure, interest, confidence, choice and challenge?

- What provisions have been made to ensure that consuming the food provided will be an enjoyable experience?

- How will expressions of normal behaviour be encouraged and harmless wants met?

- What environmental choices will be available that will encourage exploratory and food acquisition activities which are rewarding?

- What provisions have been made to enable social species to engage in bonding and bond affirming activities and, as appropriate, other affiliative interactions such as maternal, paternal and group care of young, play behaviour and sexual activity?
Concluding comments

Let us be clear:

It is NOT possible to completely eliminate all of the negative experiences that animals may have

BUT it IS possible to MINIMISE them

AND it IS also possible to REPLACE some situation-related negative affects by positive ones using ENRICHMENTS.

THANK YOU