The Five Domains Model for Animal Welfare Assessment: history, breadth, adaptability and uses

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Key Published Sources


• Littlewood, K. and Mellor, D.J. (2016). Changes in the welfare of an injured working farm dog assessed using the Five Domains Model. Animals 6(9), 58; doi:10.3390/ani6090058

• 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

Areas considered

• Introduction
• The Five Domains model – affective states
• The Five Domains model – structure
• The 2015 Five Domains model – overview
• The 2015 Five Domains model – state assessment
• Concluding comments
Areas considered

• Introduction
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  • Concluding comments

Introduction

• The Five Domains Model
  – Focus: assessment of research, teaching and testing (RTT) impacts
  – Purpose: evaluation and grading of animal welfare compromise
  – Rationale: systematising and expanding the scope of assessment
Introduction

- **The Five Domains Model**
  - *Focus:* assessment of research, teaching and testing (RTT) impacts
  - *Purpose:* evaluation and grading of animal welfare *compromise*
  - *Rationale:* systematising and expanding the *scope of assessment*

- **Major features of the original model**
  - Identifies: *four physical/functional domains* and *one mental domain*
  - The first 3: *nutrition, environment* and *health* draw attention to a range of disturbed internal *physical/functional states*
  - The 4th: *behaviour*, draws attention to *spatial/interactive restrictions*
  - The 5th: *mental state*, focuses attention on the *animals’ experiences*

- It is a **focusing device** to facilitate welfare impact assessment
- It is *NOT* a structure/function model of the body
Introduction

• The Model Integrates different Animal Welfare Concepts
  – *Biological functioning* – domains 1, 2 and 3
  – *Behavioural observations/insights* – domain 4
  – *Affective/mental state* – domain 5 – *what the animal experiences*

• Evolution of the Model
  – 1994 – Negative affective states/mental experiences
  – 2001-2015 – Expansion of the list of negative affective experiences
  – 2009-2015 – Introduction of positive affective experiences
  – 2015- – Current model configuration
Introduction

• The Model Integrates different Animal Welfare Concepts
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• Application of the model
  – 1997 – NZ government RTT regulations
  – 2001-2009 – Livestock, pets, sports animals
  – 2005-2016 – Assessing impacts of pest control methods (Aus., NZ, UK)
  – 2012-2016 – Zoo & Aquarium Sectors – Aus., NZ then Global

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The Five Domains Model – *affective states*

- The Five Domains model:
  - **Important:** affects arise from *two types of sensory inputs*:
    - Inputs that reflect the animal’s *internal functional state*
    - Inputs from the animal’s *environment* that contribute to its *perception of its external circumstances*

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**The Five Domains Model – *affective states***

**Physical Components**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Water deprivation,</td>
<td>Environmental</td>
<td>Disease, injury,</td>
<td>Behavioural or</td>
</tr>
<tr>
<td>Food deprivation,</td>
<td>Challenge</td>
<td>Functional impairment</td>
<td>Interactive restriction</td>
</tr>
<tr>
<td>Malnutrition</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Mental Components**

<table>
<thead>
<tr>
<th>Domain 5: Mental State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trust</td>
</tr>
<tr>
<td>Hunger</td>
</tr>
<tr>
<td>Pain (short lived)</td>
</tr>
<tr>
<td>Nausea</td>
</tr>
<tr>
<td>Fear</td>
</tr>
<tr>
<td>Debility</td>
</tr>
<tr>
<td>Weakness</td>
</tr>
<tr>
<td>Sicknes</td>
</tr>
<tr>
<td>Pain (moderate)</td>
</tr>
<tr>
<td>Discomfort</td>
</tr>
<tr>
<td>Boredom</td>
</tr>
<tr>
<td>Frustration</td>
</tr>
<tr>
<td>Distress</td>
</tr>
<tr>
<td>Pain (persistent, intolerable)</td>
</tr>
<tr>
<td>Breathlessness</td>
</tr>
<tr>
<td>(irregular)</td>
</tr>
</tbody>
</table>

**Animal Welfare Status**
The Five Domains Model – affective states

- The Five Domains:
  - Specified affects have been expanded over time:
    - 1994:
      - internally generated (-ve): thirst, hunger, pain // distress
      - external perception (-ve): anxiety, fear // distress
    - 2009:
      - internally generated: breathlessness, thirst, hunger, pain, dizziness, nausea, debility, weakness, sickness // distress
      - external perception: anxiety, fear, frustration, boredom, loneliness, helplessness // distress
The Five Domains Model – affective states

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      - external perception: anxiety, fear, frustration, boredom, loneliness, helplessness // distress
      - internally generated & via external perception (+ve): comfort, interest, engagement, reward, choice, challenge
    - 2012:  
      - internally generated: the list has expanded further
      - external perception: the list has expanded further
      - internally generated & via external perception (+ve):
        - this list is also expanding
The Five Domains Model – affective states

• Indices to assess the presence or absence of specified affects:

  – Negative (-ve) physical/functional-related affects:
    • Mainly anatomical, physiological, pathophysiological, clinical, behavioural – 50 years of research and use underpin these
    • Links between biological function and affects are well understood

  – Negative (-ve) and positive (+ve) situation-related affects:
    • Mainly behavioural indices – based on 25-30 years of research
    • Aligned affective-neuroscience mechanism are increasingly understood – based on 15-20 years of research
    • This understanding supports the use of behaviour in this way
Areas considered

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- **The Five Domains model – structure**
  - The 2015 Five Domains model – overview
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- Concluding comments

The Five Domains Model – *structure*

- **The Five Domains:**
  - Domains 1, 2 & 3 are mainly aligned to biological functioning - nutrition, environment and health
  - These address mainly survival-related factors
    - e.g. breathing, water/food intakes, escaping/avoiding injury
  - The aligned –ve experiences elicit survival-critical behaviours
    - e.g. thirst-drinking, hunger-eating, pain-escape/avoidance of injuries
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    e.g. thirst-drinking, hunger-eating, pain-escape/avoidance of injuries
  – Thus, animals are ‘internally’ motivated to behave in these ways
  – And they MUST do so to survive
  – The emphasis here is on minimising negative affective states
  – This usually produces no better than neutral states
The Five Domains Model – structure

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  – Thus, animals are ‘internally’ motivated to behave in these ways
  – And they MUST do so to survive
  – The emphasis here is on minimising negative affective states
  – This usually produces no better than neutral states
  – SO, the biological functioning approach reduces -ve welfare
  – BUT it does NOT explicitly promote +ve welfare

• The Five Domains:
  – Domain 4 – behaviour – accesses the animal’s perception of its external circumstances in affective state terms
  – Thus, these affects are mainly align with situation-related factors e.g. anger, frustration, loneliness, depression, boredom
The Five Domains Model – structure

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  - Domain 4 – behaviour – accesses the animal’s perception of its external circumstances in affective state terms
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  - The aligned –ve affects often require human intervention to correct

The Five Domains Model – structure

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  - Thus, these affects are mainly align with situation-related factors e.g., anger, frustration, loneliness, depression, boredom
  - The aligned –ve affects often require human intervention to correct
  - These interventions represent environmental enrichments
  - When successful, they usually produce +ve affective experiences
The Five Domains Model – *structure*

- **The Five Domains:**
  - Domain 4 – behaviour – accesses the *animal’s perception* of its *external circumstances* in *affective state terms*
  - Thus, these affects mainly align with *situation-related factors* e.g. anger, frustration, loneliness, depression, boredom
  - The aligned *-ve affects* often require *human intervention* to correct
  - These interventions represent *environmental enrichments*
  - When successful, they usually produce *+ve affective experiences*
    - Thus, *enrichments can REPLACE -ve affects with +ve affects*
    - This is how *enrichments can explicitly promote +ve welfare*

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**Areas considered**

- Introduction
- The Five Domains model – *affective states*
- The Five Domains model – *structure*
- **The 2015 Five Domains model – *overview***
- The 2015 Five Domains model – *state assessment*
- Concluding comments
The 2015 Five Domains Model – overview

• Key changes – the model now:
  – Distinguishes between:
    • Survival-related ‘biological functioning’ (domains 1-3)
    • Situation-related ‘environmental enrichment’ (domain 4)
  – 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 at its most up-to-date structure

Next an explanatory POSTER.
  Please remain calm!
The 2015 Five Domains Model – overview

- Key changes – the model now:
  - Distinguishes between:
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    - AND the aligned -ve and +ve affects
  - The foregoing details explain the biological/affective background to the model
  - Let us now look at its most up-to-date structure

This 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 2015 Five Domains Model – overview

• The Five Domains model – some specific points:
  – The examples given are NOT definitive or final
  – The examples are simply for illustration
  – Users should add examples based on their own experience
  – The model is adaptable

• For RTT impacts the focus is mainly on negative impacts
  – BUT promotion of positive states is increasingly considered
The 2015 Five Domains Model – overview

- The Five Domains model – some specific points:
  - The examples given are NOT definitive or final
  - The examples are simply for illustration
  - Users should add examples based on their own experience
  - The model is adaptable
  - For RTT impacts the focus is mainly on negative impacts
  - BUT promotion of positive states is increasingly considered

To date, users have found it helpful
The 2015 Five Domains Model – *affective states*

**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

*Positive*
- Wetting/quenching pleasures of drinking
- Pleasures of different tastes/smells
- Pleasure of salt taste
- Masticatory pleasures
- Postprandial satiety
- Gastrointestinal comfort
The Five Domains Model

### Physical/Functional Domains

<table>
<thead>
<tr>
<th>Identification</th>
<th>Varieties</th>
<th>Variety-related comfort</th>
<th>Variety-related discomfort</th>
<th>Variety-related negative</th>
<th>Variety-related positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hunger</td>
<td>Severe</td>
<td>Thirst</td>
<td>Hunger (salt)</td>
<td>Hunger (general)</td>
<td>Thirst</td>
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<tr>
<td>Hunger</td>
<td>Mild</td>
<td>Tasting/smells</td>
<td>Tastes/smells</td>
<td>Tastes/smells</td>
<td>Tastes/smells</td>
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<tr>
<td>Malaise</td>
<td>Physical</td>
<td>Physical discomfort</td>
<td>Physical discomfort</td>
<td>Physical discomfort</td>
<td>Physical/mounted</td>
</tr>
<tr>
<td>Malaise</td>
<td>Injuries</td>
<td>Physical discomfort</td>
<td>Physical discomfort</td>
<td>Physical discomfort</td>
<td>Physical discomfort</td>
</tr>
<tr>
<td>Malaise</td>
<td>Thermo</td>
<td>Thermal discomfort</td>
<td>Thermal discomfort</td>
<td>Thermal discomfort</td>
<td>Thermal discomfort</td>
</tr>
<tr>
<td>Malaise</td>
<td>Endurance</td>
<td>Physical discomfort</td>
<td>Physical discomfort</td>
<td>Physical discomfort</td>
<td>Physical discomfort</td>
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<tr>
<td>Malaise</td>
<td>Function</td>
<td>Physical discomfort</td>
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</table>

### Health

<table>
<thead>
<tr>
<th>Identification</th>
<th>Varieties</th>
<th>Health-related comfort</th>
<th>Health-related discomfort</th>
<th>Health-related negative</th>
<th>Health-related positive</th>
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</thead>
<tbody>
<tr>
<td>Poverty</td>
<td>Mild</td>
<td>Economic stability</td>
<td>Economic stability</td>
<td>Economic stability</td>
<td>Economic stability</td>
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<tr>
<td>Physical fitness</td>
<td>Severe</td>
<td>Physical fitness</td>
<td>Physical fitness</td>
<td>Physical fitness</td>
<td>Physical fitness</td>
</tr>
<tr>
<td>Physical fitness</td>
<td>Mild</td>
<td>Physical fitness</td>
<td>Physical fitness</td>
<td>Physical fitness</td>
<td>Physical fitness</td>
</tr>
<tr>
<td>Obesity/leanness</td>
<td>Severe</td>
<td>Obesity/leanness</td>
<td>Obesity/leanness</td>
<td>Obesity/leanness</td>
<td>Obesity/leanness</td>
</tr>
<tr>
<td>Obesity/leanness</td>
<td>Mild</td>
<td>Obesity/leanness</td>
<td>Obesity/leanness</td>
<td>Obesity/leanness</td>
<td>Obesity/leanness</td>
</tr>
<tr>
<td>Health problems</td>
<td>Severe</td>
<td>Health problems</td>
<td>Health problems</td>
<td>Health problems</td>
<td>Health problems</td>
</tr>
<tr>
<td>Health problems</td>
<td>Mild</td>
<td>Health problems</td>
<td>Health problems</td>
<td>Health problems</td>
<td>Health problems</td>
</tr>
<tr>
<td>Morbidity</td>
<td>Severe</td>
<td>Morbidity</td>
<td>Morbidity</td>
<td>Morbidity</td>
<td>Morbidity</td>
</tr>
<tr>
<td>Morbidity</td>
<td>Mild</td>
<td>Morbidity</td>
<td>Morbidity</td>
<td>Morbidity</td>
<td>Morbidity</td>
</tr>
</tbody>
</table>

### Behaviour

<table>
<thead>
<tr>
<th>Identification</th>
<th>Varieties</th>
<th>Behaviour-related comfort</th>
<th>Behaviour-related discomfort</th>
<th>Behaviour-related negative</th>
<th>Behaviour-related positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical activity</td>
<td>Severe</td>
<td>Physical activity</td>
<td>Physical activity</td>
<td>Physical activity</td>
<td>Physical activity</td>
</tr>
<tr>
<td>Physical activity</td>
<td>Mild</td>
<td>Physical activity</td>
<td>Physical activity</td>
<td>Physical activity</td>
<td>Physical activity</td>
</tr>
<tr>
<td>Physical activity</td>
<td>Young</td>
<td>Physical activity</td>
<td>Physical activity</td>
<td>Physical activity</td>
<td>Physical activity</td>
</tr>
<tr>
<td>Physical activity</td>
<td>Old</td>
<td>Physical activity</td>
<td>Physical activity</td>
<td>Physical activity</td>
<td>Physical activity</td>
</tr>
<tr>
<td>Social isolation</td>
<td>Severe</td>
<td>Social isolation</td>
<td>Social isolation</td>
<td>Social isolation</td>
<td>Social isolation</td>
</tr>
<tr>
<td>Social isolation</td>
<td>Mild</td>
<td>Social isolation</td>
<td>Social isolation</td>
<td>Social isolation</td>
<td>Social isolation</td>
</tr>
<tr>
<td>Social isolation</td>
<td>Young</td>
<td>Social isolation</td>
<td>Social isolation</td>
<td>Social isolation</td>
<td>Social isolation</td>
</tr>
<tr>
<td>Social isolation</td>
<td>Old</td>
<td>Social isolation</td>
<td>Social isolation</td>
<td>Social isolation</td>
<td>Social isolation</td>
</tr>
</tbody>
</table>

### Affective Experience Domain

<table>
<thead>
<tr>
<th>Identification</th>
<th>Varieties</th>
<th>Affective-related comfort</th>
<th>Affective-related discomfort</th>
<th>Affective-related negative</th>
<th>Affective-related positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comfort</td>
<td>Severe</td>
<td>Comfort</td>
<td>Comfort</td>
<td>Comfort</td>
<td>Comfort</td>
</tr>
<tr>
<td>Comfort</td>
<td>Mild</td>
<td>Comfort</td>
<td>Comfort</td>
<td>Comfort</td>
<td>Comfort</td>
</tr>
<tr>
<td>Comfort</td>
<td>Young</td>
<td>Comfort</td>
<td>Comfort</td>
<td>Comfort</td>
<td>Comfort</td>
</tr>
<tr>
<td>Comfort</td>
<td>Old</td>
<td>Comfort</td>
<td>Comfort</td>
<td>Comfort</td>
<td>Comfort</td>
</tr>
<tr>
<td>Anxiety</td>
<td>Severe</td>
<td>Anxiety</td>
<td>Anxiety</td>
<td>Anxiety</td>
<td>Anxiety</td>
</tr>
<tr>
<td>Anxiety</td>
<td>Mild</td>
<td>Anxiety</td>
<td>Anxiety</td>
<td>Anxiety</td>
<td>Anxiety</td>
</tr>
<tr>
<td>Anxiety</td>
<td>Young</td>
<td>Anxiety</td>
<td>Anxiety</td>
<td>Anxiety</td>
<td>Anxiety</td>
</tr>
<tr>
<td>Anxiety</td>
<td>Old</td>
<td>Anxiety</td>
<td>Anxiety</td>
<td>Anxiety</td>
<td>Anxiety</td>
</tr>
</tbody>
</table>

### Situational Factors

<table>
<thead>
<tr>
<th>Identification</th>
<th>Varieties</th>
<th>Situational-related comfort</th>
<th>Situational-related discomfort</th>
<th>Situational-related negative</th>
<th>Situational-related positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Situational factors</td>
<td>Severe</td>
<td>Situational factors</td>
<td>Situational factors</td>
<td>Situational factors</td>
<td>Situational factors</td>
</tr>
<tr>
<td>Situational factors</td>
<td>Mild</td>
<td>Situational factors</td>
<td>Situational factors</td>
<td>Situational factors</td>
<td>Situational factors</td>
</tr>
</tbody>
</table>

### The 2015 Five Domains Model – affective states

**Domain 2: Environment**

*Unavoidable/imposed conditions:*
- Thermal extremes
- Injurious physical features
- Injuries from close confinement
- Atmospheric pollutants: e.g. CO₂, ammonia, dust
- Environmental monotony: ambient, physical

**Domain 5: Mental State**

*Negative*
- Thermal discomfort: e.g. chilling or hyperthermic distress
- Physical discomfort/pain due to: e.g.
  - bruises, cuts, fractures
  - arthritis, skin rashes
- Respiratory discomfort: e.g. inflammation, breathlessness
- Malaise from unnatural constancy
The 2015 Five Domains Model – affective states

Domain 2: Environment

Unavoidable/imposed conditions:
- Thermal extremes
- Injuries from close confinement
- Atmospheric pollutants: e.g. CO₂, ammonia, dust
- Environmental monotony: ambient, physical

Available conditions:
- Thermally tolerable
- Space for freer movement
- Fresh air
- Normal environmental variability

Domain 5: Mental State

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- Thermal discomfort: e.g. chilling or hyperthermic distress
- Physical discomfort/pain due to: e.g. - bruises, cuts, fractures - arthritis, skin rashes
- Respiratory discomfort: e.g. inflammation, breathlessness
- Malaise from unnatural constancy

Positive
- Thermal comfort
- Physical comfort
- Respiratory comfort
- Variety-related comfort
The 2015 Five Domains Model – affective states

Domain 3: Health

Presence of:
- Disease: acute, chronic
- Injury: acute, chronic
- Functional impairment:
  - acute or chronic limitation e.g. after limb amputation, partial lung resection or renal, cardiovascular, or other disease
- Poor physical fitness

Domain 5: Mental State

Negative
- Breathlessness
- Pain: many types
- Debility/weakness
- Sickness, Nausea, Dizziness
- Muscle weakness

Positive
- Comfort of high functional capacity
- Vitality of fitness
The Five Domains Model

Physical/Functional Domains

<table>
<thead>
<tr>
<th>Survival-Related Factors</th>
<th>Situation-Related Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1: Nutrition</strong></td>
<td><strong>3: Health</strong></td>
</tr>
<tr>
<td><strong>2: Environment</strong></td>
<td></td>
</tr>
<tr>
<td><strong>3: Behaviour</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>1: Nutrition</strong></th>
<th><strong>2: Environment</strong></th>
<th><strong>3: Health</strong></th>
<th><strong>4: Behaviour</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nutrition</strong></td>
<td><strong>Environmental</strong></td>
<td><strong>Health</strong></td>
<td><strong>Agency</strong></td>
</tr>
<tr>
<td><em>Survival</em> Related Factors*</td>
<td><em>Situation</em> Related Factors *</td>
<td><em>Life or not</em></td>
<td><em>Agency or not</em></td>
</tr>
</tbody>
</table>
| Restricted on: Water intake | Air quality or not | Disease states * | Not humanised, not availed of or unneeded |}

**Affective Experience Domain**

<table>
<thead>
<tr>
<th>Negative</th>
<th>Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thirst</td>
<td>Hunger</td>
</tr>
<tr>
<td>Hunger</td>
<td>thirst</td>
</tr>
<tr>
<td>Malnutrition</td>
<td>Nausea</td>
</tr>
<tr>
<td>Nausea</td>
<td>Malnutrition</td>
</tr>
<tr>
<td>Fatigue</td>
<td>Hunger</td>
</tr>
<tr>
<td>Hunger</td>
<td>Fatigue</td>
</tr>
<tr>
<td>Malnutrition</td>
<td>Fatigue</td>
</tr>
<tr>
<td>Fatigue</td>
<td>Malnutrition</td>
</tr>
</tbody>
</table>

**Welfare Status**

<table>
<thead>
<tr>
<th>Healthy</th>
<th>Unhealthy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Environment</strong></td>
<td><strong>Health</strong></td>
</tr>
<tr>
<td><em>Restricted on:</em> Water intake</td>
<td><em>Restricted on:</em> Diet quality</td>
</tr>
<tr>
<td><em>Voluntary overeating:</em></td>
<td><em>Voluntary underfeeding:</em></td>
</tr>
<tr>
<td><em>Forced feeding:</em></td>
<td><em>Forced fasting:</em></td>
</tr>
</tbody>
</table>

**The 2015 Five Domains Model – affective states**

**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
The 2015 Five Domains Model – affective states

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
- Free movement, Exploration
- Foraging/hunting, Bonding/Reaffirming bonds, Rearing young, Playing,
- Sexual activity
- Using refuges, retreat, or defensive attack

Domain 5: Mental State

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

Positive
- Calmness
- Vitality/reward
- Affectionate sociability
- Maternally/paternally/group rewarded
- Excitation/playfulness
- Sexually gratified
- Energised/refreshed
- Secure/protected/confident
### The Five Domains Model

#### Physical/Functional Domains

<table>
<thead>
<tr>
<th>Domain</th>
<th>Survival-Related Factors</th>
<th>Situation-Related Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: Nutrition</td>
<td>Diet, water, and food quality</td>
<td>Disease, injury, and pain</td>
</tr>
<tr>
<td>2: Environment</td>
<td>Temperature, humidity, and air quality</td>
<td>Physiological capacity</td>
</tr>
<tr>
<td>3: Health</td>
<td>Physical health and function</td>
<td>Physical fitness</td>
</tr>
<tr>
<td>4: Behaviour</td>
<td>Activity, affection, and interaction</td>
<td>Affectionate and engaged behavior</td>
</tr>
</tbody>
</table>

#### Affective Experience Domain

<table>
<thead>
<tr>
<th>Domain</th>
<th>Negative</th>
<th>Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thirst, Hunger (general/salt)</td>
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<td>Pleasures of drinking, tastes/smells, chewing</td>
</tr>
<tr>
<td>Malnutrition malaise</td>
<td>Malnutrition malaise</td>
<td>Postprandial satiety</td>
</tr>
<tr>
<td>Bloated, over full</td>
<td>Bloated, over full</td>
<td>Gastrointestinal comfort</td>
</tr>
</tbody>
</table>

#### Welfare Status

<table>
<thead>
<tr>
<th>Negative</th>
<th>Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malnourished, underweight</td>
<td>Well-nourished, healthy</td>
</tr>
<tr>
<td>Fatigued, weak</td>
<td>Vital</td>
</tr>
<tr>
<td>Painful, distressed</td>
<td>Calm, engaged</td>
</tr>
</tbody>
</table>

---

The 2015 Five Domains Model – affective states

**Domain 5: Mental experiences**

**Negative**

- Thirst, Hunger (general/salt)
- Malnutrition malaise
- Bloated, over full

**Positive**

- Pleasures of drinking, tastes/smells, chewing
- Postprandial satiety
- Gastrointestinal comfort
### The 2015 Five Domains Model – affective states

#### Domain 5: Mental experiences

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<tr>
<td>Bloated, over full</td>
<td>Gastrointestinal comfort</td>
</tr>
<tr>
<td>Thermal discomfort (cold/hot)</td>
<td>Thermal comfort</td>
</tr>
<tr>
<td>Physical discomfort (pain/stiffness)</td>
<td>Physical comfort</td>
</tr>
<tr>
<td>Respiratory discomfort (inflammation, breathlessness)</td>
<td>Respiratory comfort</td>
</tr>
<tr>
<td>Malaise from unnatural constancy</td>
<td>Variety-related comfort</td>
</tr>
<tr>
<td>Breathlessness, Pain, Debility/weakness, Sickness, Nausea, Dizziness</td>
<td>Comfort of high functional capacity and fitness</td>
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The 2015 Five Domains Model – *affective states*

**Domain 5: Mental experiences**

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**Areas considered**

- Introduction
- The Five Domains model – *affective states*
- The Five Domains model – *structure*
- The 2015 Five Domains model – *overview*
- The 2015 Five Domains model – *state assessment*
- Concluding comments
The 2015 Five Domains model – state assessment

How can these subjective, emotional or affective experiences be assessed?

NEGATIVE AFFECTS (-ve): mainly physical/functional indices
Reference standard: The worst suffering that can be experienced
Purpose of assessment: To minimise the –ve experiences

POSITIVE AFFECTS (+ve): mainly behavioural indices
Reference standard: The pleasure inherent in rewarding experiences
Purpose of assessment: To promote +ve experiences
The 2015 Five Domains model – *state assessment*

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Purpose of assessment: *To minimise the –ve experiences*

**POSITIVE AFFECTS (+ve):** mainly behavioural indices

Reference standard: *The pleasure inherent in rewarding experiences*

Purpose of assessment: *To promote +ve experiences*

*The bases for assessment are therefore different*

---

**NEGATIVE AFFECTIVE STATE INDICES**

- Based on at least 50 years of clinical, scientific and practical work:
  - By veterinarians, animal-based scientists, stock handlers, pet owners and others
  - Numerous well-validated clinical indices - e.g., diagnostic tests
  - Many state-specific physiological, pathophysiological & behavioural indices in applied nutritional, environmental, behavioural and neural/cognitive spheres
The 2015 Five Domains model – *state assessment*

**NEGATIVE AFFECTIVE STATE INDICES**
- Based on at least 50 years of clinical, scientific and practical work:
  - By veterinarians, animal-based scientists, stock handlers, pet owners and others
  - Numerous well-validated clinical indices - e.g. diagnostic tests
  - Many state-specific physiological, pathophysiological & behavioural indices in applied nutritional, environmental, behavioural and neural/cognitive spheres

- These indices relate to *functional disruptions* in the ‘five domains’
- We cautiously infer what the associated affective states are
- There is good neuroscience evidence supporting these inferences

---

**The 2015 Five Domains model – *state assessment***

**NEGATIVE AFFECTIVE STATE INDICES**
- BUT it is not necessary to be able to *measure* these experiences directly to manage them practically
- Knowledgeable and good husbandry and veterinary care are sufficient to *minimise* the physical/functional disruptions that give rise to *negative affective states* of animal welfare concern
The 2015 Five Domains model – *state assessment*

**NEGATIVE AFFECTIVE STATE INDICES**

- BUT it is not necessary to be able to *measure* these experiences directly to *manage* them practically
- *Knowledgeable* and good *husbandry* and veterinary care are sufficient to *minimise* the physical/functional disruptions that give rise to negative affective states of animal welfare concern
- However, note that *minimising* such disruptions *usually* does *not* result in *positive* welfare states – merely *mainly* neutral states
- NOTE: *exclusive minimisation* of negative affects mainly deals with *survival-critical* biological function, not welfare enhancement

---

Welfare compromise is graded in terms of overall –ve affect, graded A (low) to E (high) on a 5-point scale
The 2015 Five Domains model – state assessment

GRADING WELFARE COMPROMISE

- Welfare compromise is assessed in terms of overall –ve affect, and graded A (low) to E (high) on a 5-point, or 7-point, scale:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Compromise</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>None</td>
</tr>
<tr>
<td>B</td>
<td>Low-level</td>
</tr>
<tr>
<td>C – C₁</td>
<td>Mild</td>
</tr>
<tr>
<td>C₂</td>
<td>Moderate</td>
</tr>
<tr>
<td>D – D₁</td>
<td>Marked</td>
</tr>
<tr>
<td>D₂</td>
<td>Severe</td>
</tr>
<tr>
<td>E</td>
<td>Very Severe</td>
</tr>
</tbody>
</table>

See Littlewood & Mellor (2016). Animals 6(9), 58: Injured working farm dog example

Distinctions between grades are made qualitatively in terms of:

- The severity of the physical/functional impairment or disruption
- The related intensity and duration of the inferred affective impacts and their reversibility
- Whether these impacts need to be mitigated and/or ended by:
  - Relocation to more benign conditions
  - Animal care or veterinary interventions
  - And/or euthanasia

Such grading is applied cautiously to all to physical/functional domains
The 2015 Five Domains model – *state assessment*

**POSITIVE AFFECTIVE STATE INDICES**
- There is an alignment between *affective neuroscience* and *behavioural science* observations

This alignment supports three key propositions:
1. Certain behaviours of animals can be interpreted in terms of what the animals intend to achieve, i.e. their goals;
2. Such goal-directed behaviours and behavioural responses to success or failure allow associated positive or negative affects to be inferred;
3. Positive affects would likely be experienced when animals’ engage in behaviours linked to neural processing within reward circuits.
The 2015 Five Domains model – state assessment

**POSITIVE AFFECTIVE STATE INDICES**
- There is an alignment between affective neuroscience and behavioural science observations.
- This alignment supports three key propositions:
  1. *Certain behaviours* of animals can be interpreted in terms of what the animals intend to achieve, i.e., their goals;
  2. Such goal-directed behaviours and behavioural responses to success or failure allow associated positive or negative affects to be inferred;
  3. *Positive affects* would likely be experienced when animals’ engage in behaviours linked to neural processing within reward circuits.
- We cautiously infer what the associated +ve affective states are.
- Affective neuroscience evidence supports these inferences.

The 2015 Five Domains model – state assessment

**POSITIVE AFFECTIVE STATE INDICES**
- As with negative affects, it is not necessary to be able to measure positive affects to manage them practically.
- Here we focus on rewarding behaviours, i.e., those that affective neuroscience indicates are associated with pleasurable experiences.
The 2015 Five Domains model – *state assessment*

**POSITIVE AFFECTIVE STATE INDICES**

- As with negative affects, it is not necessary to be able to *measure* positive affects to *manage* them practically
- Here we focus on *rewarding* behaviours, i.e. those that *affective neuroscience* indicates are associated with *pleasurable experiences*
- **Practically we assess:**
  - The *available opportunities* to engage in the behaviour, e.g. the facilities provided
  - The *actual behavioural utilisation* of those opportunities, e.g. facilities
  - Then we *infer* the *overall* +ve affective outcome

Finally, we grade the degree of *enhanced welfare* on a 4-point scale: ‘none’, ‘low’, ‘medium’ or ‘high’: 0, +, ++ or +++
The 2015 Five Domains model – *state assessment*

**GRADING ENHANCED WELFARE**

The degree of *enhanced welfare* is graded on a *4-point scale*:

<table>
<thead>
<tr>
<th>Enhancement</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>0</td>
</tr>
<tr>
<td>Low</td>
<td>+</td>
</tr>
<tr>
<td>Medium</td>
<td>++</td>
</tr>
<tr>
<td>High</td>
<td>+++</td>
</tr>
</tbody>
</table>

- The degree of *enhanced welfare* is graded by *cautiously* assessing three key elements:
  1. The availability of *opportunities* for animals to engage in rewarding behaviours
  2. The actual *utilisation* of those opportunities
  3. Cautious judgement about the *over level of positive affective experience* the animals my thereby have

- At present such assessments are: *qualitative, situation specific and species specific*, and, within those limits, *relative*

- Nevertheless, they *redirect attention* towards *positive experiences*. 
Areas considered

- Introduction
- The Five Domains model – affective states
- The Five Domains model – structure
- The 2015 Five Domains model – overview
- The 2015 Five Domains model – state assessment
- Concluding comments

Concluding comments

- The Five Domains model:
  - *Directs attention* towards a wide range of *-ve and +ve affects* animals may experience
  - This enables *factors that contribute* to the presence or absence of those affective states to be *assessed*
  - Such assessment *help to identify* when *husbandry and therapeutic interventions are required*
  - Attention *must* always be given to *minimising*, as appropriate, *-ve affective states*
  - BUT for animal welfare to be balanced, *opportunities for animals to experience +ve welfare states must also be made available*
Concluding comments

Seven key applications of 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.

THANK YOU