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Professor Kevin J Stafford – Co-Director
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Dr Ngaio J Beausoleil – Deputy Director

Professor David J Mellor – Foundation Director

Oie *Collaborating Centre for Animal Welfare Science and Bioethical Analysis: Founding Partner*

http://animalwelfare.massey.ac.nz

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

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Key Published Sources

- Mellor, D.J. & Reid, C.S.W. (1994). Concepts of animal well-being and predicting the impact of procedures on experimental animals. In: *Improving the Well-being of Animals in the Research Environment*. Australian and New Zealand Council for the Care of Animals in Research and Teaching, Glen Osmond, South Australia pp 3-18.

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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**

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Introduction

- **The Five Domains Model**
  - *Formulated:* **in 1993, published by ANZCCART in 1994**
  - *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*

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- **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*

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

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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*

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- **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*

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  - *2009-2015 – Introduction of* <u>*positive affective experiences*</u>
  - *2015- – Current model configuration*
- **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**

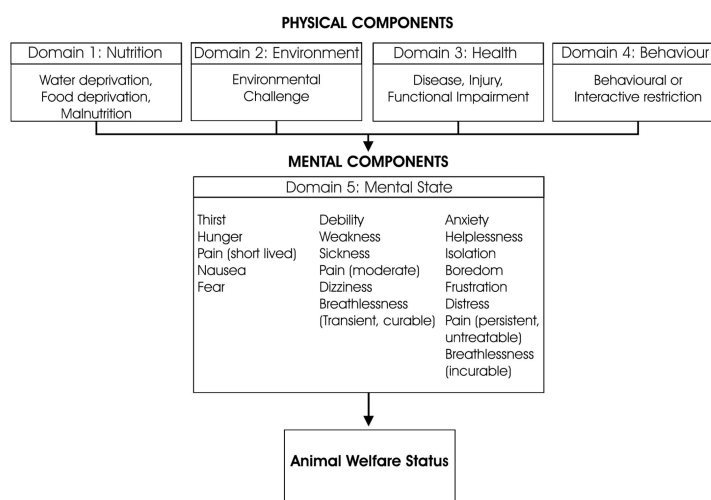**Massey University**

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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

Domain 1: Nutrition	Domain 2: Environment	Domain 3: Health	Domain 4: Behaviour
Water deprivation, Food deprivation, Malnutrition	Environmental Challenge	Disease, Injury, Functional Impairment	Behavioural or Interactive restriction

MENTAL COMPONENTS

Domain 5: Mental State

Thirst	Debility	Anxiety
Hunger	Weakness	Helplessness
Pain (short lived)	Sickness	Isolation
Nausea	Pain (moderate)	Boredom
Fear	Dizziness	Frustration
	Breathlessness	Distress
	(Transient, curable)	Pain (persistent, untreatable)
		Breathlessness (incurable)

Animal Welfare Status

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The Five Domains Model – *affective states*

- **The Five Domains:**
  - *Specified affects* **have been expanded over time:**
    - **1994:** - <u>internally generated</u> **(-ve):** *thirst, hunger, pain // distress*
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    - **2012:** - <u>internally generated</u>: *the list has expanded further*
      - <u>external perception</u>: *the list has expanded further*
      - <u>internally generated & via external perception</u> (+ve): *– this list is also expanding*

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The Five Domains Model – *affective states*

- *Indices to <u>assess the presence or absence</u> of specified affects:*
  - *Negative (-ve) <u>physical/functional-related affects</u>:*
    - Mainly anatomical, physiological, pathophysiological, clinical, behavioural – *<u>50 years of research and use underpin these</u>*
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    - Links between biological function and affects are well understood
  - *Negative (-ve) and positive (+ve) <u>situation-related affects</u>:*
    - Mainly behavioural indices – *<u>based on 25-30 years of research</u>*
    - Aligned *affective-neuroscience* mechanism are increasingly understood – *<u>based on 15-20 years of research</u>*
    - This understanding supports the use of behaviour in this way

Areas considered

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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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  - *Thus, animals are 'internally' motivated to behave in these ways*
  - *And they MUST do so to survive*

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  - The emphasis here is on *minimising negative affective states*
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  - **SO, the *biological functioning* approach *reduces -ve welfare***
  - **BUT it does *NOT* explicitly *promote +ve welfare***

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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 are mainly align with *situation-related factors***
    e.g. *anger, frustration, loneliness, depression, boredom*

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  - **When successful, they usually produce** *+ve affective experiences*

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    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 affect*s with *+ve affects*
  - This is how *enrichments can explicitly promote +ve welfare*

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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)*

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- **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!**

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The Five Domains Model

Physical/Functional Domains

Survival-Related Factors						Situation-Related Factors	
1: Nutrition		**2: Environment**		**3: Health**		**4: Behaviour**	
Restrictions on:	*Opportunities to:*	*Unavoidable/imposed conditions*	*Available conditions:*	*Presence of:*	*Little or no:*	*Exercise of 'agency' impeded by:*	*'Agency' exercised via:*
Water intake	Drink enough water	Thermal extremes	Thermally tolerable	Disease: acute, chronic	Disease	Invariant, barren environment	Varied, novel, engaging
Food intake	Eat enough food	Unsuitable substrate	Suitable substrate	Injury: acute, chronic;	Injury	(ambient, physical, biotic)	environmental challenges
Food quality	Eat a balanced diet	Close confinement	Space for freer movement	husbandry mutilations		Inescapable sensory impositions	Congenial sensory inputs
Food variety	Eat a variety of foods	Atmospheric pollutants: CO₂,	Fresh air	Functional impairment:	Functional	Choices markedly restricted	Available engaging
		ammonia, dust, smoke		due to limb amputation;	impairment		choices
		Unpleasant/strong odours	Pleasant/tolerable odours	or lung, heart, vascular,		Constraints on environment-	Free movement
Voluntary overeating	Eating correct quantities	Light: inappropriate intensity	Light intensity tolerable	kidney, neural or other		focused activity	Exploration
Force-feeding		Loud/otherwise unpleasant noise	Noise exposure acceptable	problems			Foraging/hunting
				Poisons	Poisoning	Constraints on animal-to-	Bonding/reaffirming bonds
		Environmental monotony:	Normal environmental			animal interactive activity	Rearing young
		ambient, physical, lighting	variability	Obesity/leanness	Body condition		Playing
					appropriate		Sexual activity
		Unpredictable events	Predictability	Poor physical fitness:	Good fitness level	Limits on threat avoidance,	Using refuges, retreat, or
				muscle de-conditioning		escape or defensive activity	defensive attack
						Limitations on sleep/rest	Sleep/rest sufficient

Affective Experience Domain

5: Mental State							
Negative	*Positive*	*Negative*	*Positive*	*Negative*	*Positive*	*Negative*	*Positive*
Thirst	Wetting/quenching	*Forms of discomfort:*	*Forms of comfort:*	Breathlessness	Comfort of good	Anger, frustration	Calmness
	pleasures of drinking	Thermal: chilling, overheating	Thermal	Pain: many types	health and high	Boredom, helplessness	Engaged, in control
Hunger (general)	Pleasures of different	Physical: joint pain, skin irritation	Physical	Debility, weakness	functional capacity	Loneliness, isolation	Affectionate sociability
	tastes/smells	Physical: stiffness, muscle tension		Sickness, malaise			Maternally rewarded
Hunger (salt)	Pleasure of salt taste	Respiratory: e.g. breathlessness	Respiratory	Nausea		Depression	Excitation/playfulness
	Masticatory pleasures	Olfactory	Olfactory	Dizziness		Sexual frustration	Sexual gratification
Malnutrition malaise	Postprandial satiety	Auditory: impairment, pain	Auditory				
		Visual: glare/darkness eye strain	Visual	Physical exhaustion	Vitality of fitness	Anxiety, fearfulness, panic, anger	Secure/protected/confident
Bloated, over full	Gastrointestinal comfort					Neophobia	Likes novelty
Gastrointestinal pain		Malaise from unnatural constancy	Variety-related comfort			Exhaustion	Energised/refreshed

Welfare Status

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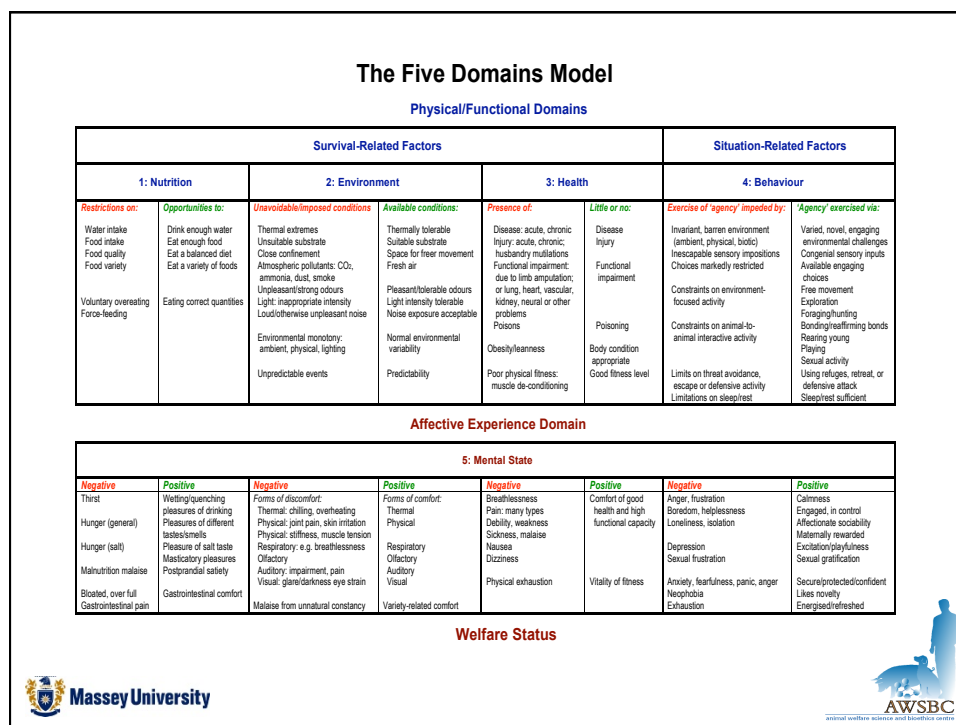*animal welfare science and bioethics centre*

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- **The foregoing details explain the** <u>*biological/affective background to the model*</u>
- **Let us now look at its** <u>*most up-to-date structure*</u>

  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

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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*

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    - **For *RTT impacts* the focus is mainly on *negative impacts***
    - **BUT *promotion of positive states is increasingly considered***

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To date, *users have found it helpful*

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Hunger (general)	Pleasures of different	Physical: joint pain, skin irritation	Physical	Sickness, malaise	functional capacity	Loneliness, isolation	Affectionate sociability
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Hunger (salt)	Pleasure of salt taste	Respiratory: e.g. breathlessness	Respiratory	Nausea		Depression	Excitation/playfulness
	Masticatory pleasures	Olfactory	Olfactory	Dizziness		Sexual frustration	Sexual gratification
Malnutrition malaise	Postprandial satiety	Auditory: impairment, pain	Auditory				
		Visual: glare/darkness eye strain	Visual	Physical exhaustion	Vitality of fitness	Anxiety, fearfulness, panic, anger	Secure/protected/confident
Bloated, over full						Neophobia	Likes novelty
Gastrointestinal pain	Gastrointestinal comfort	Malaise from unnatural constancy	Variety-related comfort			Exhaustion	Energised/refreshed

Welfare Status

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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

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The 2015 Five Domains Model – *affective states*

Domain 1: Nutrition

Restrictions on:	*Opportunities to:*
Water intake	Drink enough water
Food intake	Eat enough food
Food quality	Eat a balanced diet
Food variety	Eat a variety of foods
Voluntary overeating	Eating correct quantities

Domain 5: Mental State

Negative	*Positive*
Thirst	Wetting/quenching pleasures of drinking
Hunger (general)	Pleasures of different tastes/smells
Hunger (salt)	Pleasure of salt taste
	Masticatory pleasures
Malnutrition malaise	Postprandial satiety
Bloated, over full	Gastrointestinal comfort

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The Five Domains Model

Physical/Functional Domains

Survival-Related Factors						Situation-Related Factors	
1: Nutrition		**2: Environment**		**3: Health**		**4: Behaviour**	
Restrictions on:	*Opportunities to:*	*Unavoidable/imposed conditions*	*Available conditions:*	*Presence of:*	*Little or no:*	*Exercise of 'agency' impeded by:*	*'Agency' exercised via:*
Water intake	Drink enough water	Thermal extremes	Thermally tolerable	Disease: acute, chronic	Disease	Invariant, barren environment	Varied, novel, engaging
Food intake	Eat enough food	Unsuitable substrate	Suitable substrate	Injury: acute, chronic;	Injury	(ambient, physical, biotic)	environmental challenges
Food quality	Eat a balanced diet	Close confinement	Space for freer movement	husbandry mutilations		Inescapable sensory impositions	Congenial sensory inputs
Food variety	Eat a variety of foods	Atmospheric pollutants: CO₂,	Fresh air	Functional impairment:	Functional	Choices markedly restricted	Available engaging
		ammonia, dust, smoke		due to limb amputation;	impairment		choices
		Unpleasant/strong odours	Pleasant/tolerable odours	or lung, heart, vascular,		Constraints on environment-	Free movement
Voluntary overeating	Eating correct quantities	Light: inappropriate intensity	Light intensity tolerable	kidney, neural or other		focused activity	Exploration
Force-feeding		Loud/otherwise unpleasant noise	Noise exposure acceptable	problems			Foraging/hunting
				Poisons	Poisoning	Constraints on animal-to-	Bonding/reaffirming bonds
		Environmental monotony:	Normal environmental			animal interactive activity	Rearing young
		ambient, physical, lighting	variability	Obesity/leanness	Body condition		Playing
					appropriate		Sexual activity
		Unpredictable events	Predictability	Poor physical fitness:	Good fitness level	Limits on threat avoidance,	Using refuges, retreat, or
				muscle de-conditioning		escape or defensive activity	defensive attack
						Limitations on sleep/rest	Sleep/rest sufficient

Affective Experience Domain

5: Mental State							
Negative	*Positive*	*Negative*	*Positive*	*Negative*	*Positive*	*Negative*	*Positive*
Thirst	Wetting/quenching	*Forms of discomfort:*	*Forms of comfort:*	Breathlessness	Comfort of good	Anger, frustration	Calmness
	pleasures of drinking	Thermal: chilling, overheating	Thermal	Pain: many types	health and high	Boredom, helplessness	Engaged, in control
Hunger (general)	Pleasures of different	Physical: joint pain, skin irritation	Physical	Debility, weakness	functional capacity	Loneliness, isolation	Affectionate sociability
	tastes/smells	Physical: stiffness, muscle tension		Sickness, malaise			Maternally rewarded
Hunger (salt)	Pleasure of salt taste	Respiratory: e.g. breathlessness	Respiratory	Nausea		Depression	Excitation/playfulness
	Masticatory pleasures	Olfactory	Olfactory	Dizziness		Sexual frustration	Sexual gratification
Malnutrition malaise	Postprandial satiety	Auditory: impairment, pain	Auditory				
		Visual: glare/darkness eye strain	Visual	Physical exhaustion	Vitality of fitness	Anxiety, fearfulness, panic, anger	Secure/protected/confident
Bloated, over full	Gastrointestinal comfort					Neophobia	Likes novelty
Gastrointestinal pain		Malaise from unnatural constancy	Variety-related comfort			Exhaustion	Energised/refreshed

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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

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Slide 1

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. CO_2, ammonia, dust
- Environmental monotony: ambient, physical

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

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

Positive
- Thermal comfort
- Physical comfort
- Respiratory comfort
- Variety-related comfort

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Slide 2

The Five Domains Model

Physical/Functional Domains

Survival-Related Factors						Situation-Related Factors	
1: Nutrition		**2: Environment**		**3: Health**		**4: Behaviour**	
Restrictions on:	*Opportunities to:*	*Unavoidable/imposed conditions*	*Available conditions:*	*Presence of:*	*Little or no:*	*Exercise of 'agency' impeded by:*	*'Agency' exercised via:*
Water intake	Drink enough water	Thermal extremes	Thermally tolerable	Disease: acute, chronic	Disease	Invariant, barren environment (ambient, physical, biotic)	Varied, novel, engaging environmental challenges
Food intake	Eat enough food	Unsuitable substrate	Suitable substrate	Injury: acute, chronic; husbandry mutilations	Injury	Inescapable sensory impositions	Congenial sensory inputs
Food quality	Eat a balanced diet	Close confinement	Space for freer movement	Functional impairment:		Choices markedly restricted	Available engaging choices
Food variety	Eat a variety of foods	Atmospheric pollutants: CO_2; ammonia, dust, smoke	Fresh air	due to limb amputation;	Functional impairment		Free movement
		Unpleasant/strong odours	Pleasant/tolerable odours	or lung, heart, vascular, kidney, neural or other		Constraints on environment-focused activity	Exploration
Voluntary overeating	Eating correct quantities	Light: inappropriate intensity	Light intensity tolerable	problems			Foraging/hunting
Force-feeding		Loud/otherwise unpleasant noise	Noise exposure acceptable	Poisons	Poisoning	Constraints on animal-to-animal interactive activity	Bonding/reaffirming bonds
							Rearing young
		Environmental monotony: ambient, physical, lighting	Normal environmental variability	Obesity/leanness	Body condition appropriate		Playing
							Sexual activity
		Unpredictable events	Predictability	Poor physical fitness: muscle de-conditioning	Good fitness level	Limits on threat avoidance, escape or defensive activity	Using refuge, retreat, or defensive attack
						Limitations on sleep/rest	Sleep/rest sufficient

Affective Experience Domain

5: Mental State							
Negative	*Positive*	*Negative*	*Positive*	*Negative*	*Positive*	*Negative*	*Positive*
Thirst	Wetting/quenching pleasures of drinking	*Forms of discomfort:*	*Forms of comfort:*	Breathlessness	Comfort of good health and high functional capacity	Anger, frustration	Calmness
		Thermal: chilling, overheating	Thermal	Pain: many types		Boredom, helplessness	Engaged, in control
Hunger (general)	Pleasures of different tastes/smells	Physical: joint pain, skin irritation	Physical	Debility, weakness		Loneliness, isolation	Affectionate sociability
		Physical: stiffness, muscle tension		Sickness, malaise			Maternally rewarded
Hunger (salt)	Pleasure of salt taste	Respiratory: e.g. breathlessness	Respiratory	Nausea		Depression	Excitation/playfulness
	Masticatory pleasures	Olfactory	Olfactory	Dizziness		Sexual frustration	Sexual gratification
Malnutrition malaise	Postprandial satiety	Auditory: impairment, pain	Auditory				
		Visual: glare/darkness eye strain	Visual	Physical exhaustion	Vitality of fitness	Anxiety, fearfulness, panic, anger	Secure/protected/confident
Bloated, over full	Gastrointestinal comfort					Neophobia	Likes novelty
Gastrointestinal pain		Malaise from unnatural constancy	Variety-related comfort			Exhaustion	Energised/refreshed

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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

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Domain 3: Health

Presence of:	*Little or no:*
Disease: acute, chronic	Disease
Injury: acute, chronic	Injury
Functional impairment:	Functional impairment
acute or chronic limitation e.g. after	
limb amputation, partial lung	
resection or renal, cardiovascular,	
or other disease	
Poor physical fitness	Good fitness level

Domain 5: Mental State

Negative	*Positive*
Breathlessness	Comfort of high functional
Pain: many types	capacity
Debility/weakness	
Sickness, Nausea, Dizziness	
Muscle weakness	Vitality of fitness

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The Five Domains Model

Physical/Functional Domains

Survival-Related Factors						Situation-Related Factors	
1: Nutrition		**2: Environment**		**3: Health**		**4: Behaviour**	
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Water intake	Drink enough water	Thermal extremes	Thermally tolerable	Disease: acute, chronic	Disease	Invariant, barren environment	Varied, novel, engaging
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Force-feeding		Loud/otherwise unpleasant noise	Noise exposure acceptable	problems			Foraging/hunting
				Poisons	Poisoning	Constraints on animal-to-	Bonding/reaffirming bonds
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				muscle de-conditioning		escape or defensive activity	defensive attack
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Affective Experience Domain

5: Mental State							
Negative	*Positive*	*Negative*	*Positive*	*Negative*	*Positive*	*Negative*	*Positive*
Thirst	Wetting/quenching	*Forms of discomfort:*	*Forms of comfort:*	Breathlessness	Comfort of good	Anger, frustration	Calmness
	pleasures of drinking	Thermal: chilling, overheating	Thermal	Pain: many types	health and high	Boredom, helplessness	Engaged, in control
Hunger (general)	Pleasures of different	Physical: joint pain, skin irritation	Physical	Debility, weakness	functional capacity	Loneliness, isolation	Affectionate sociability
	tastes/smells	Physical: stiffness, muscle tension		Sickness, malaise			Maternally rewarded
Hunger (salt)	Pleasure of salt taste	Respiratory: e.g. breathlessness	Respiratory	Nausea		Depression	Excitation/playfulness
	Masticatory pleasures	Olfactory	Olfactory	Dizziness		Sexual frustration	Sexual gratification
Malnutrition malaise	Postprandial satiety	Auditory: impairment, pain	Auditory				
		Visual: glare/darkness eye strain	Visual	Physical exhaustion	Vitality of fitness	Anxiety, fearfulness, panic, anger	Secure/protected/confident
Bloated, over full	Gastrointestinal comfort					Neophobia	Likes novelty
Gastrointestinal pain		Malaise from unnatural constancy	Variety-related comfort			Exhaustion	Energised/refreshed

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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

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Domain 4: Behaviour

Exercise of 'agency' impeded by:
Invariant, barren environment
(ambient, physical, biotic)
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

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The 2015 Five Domains Model – *affective states*

Domain 4: Behaviour

Exercise of 'agency' impeded by:	*Opportunities to exercise 'agency' via:*
Invariant, barren environment	Varied, novel, engaging
(ambient, physical, biotic)	environmental challenges
Constraints on environment-	Free movement, Exploration
focussed activity	Foraging/hunting, Bonding/Reaffirming
Constraints on animal-to-	bonds, Rearing young, Playing,
animal interactive activity	Sexual activity
Limited sleep/rest	Sleeping/resting
Limits on threat avoidance,	Using refuges, retreat, or
escape or defensive activity	defensive attack

Domain 5: Mental State

Negative	*Positive*
Anger, frustration	Calmness
Boredom, helplessness	Vitality/reward
Loneliness, isolation	Affectionate sociability
Depression, withdrawal	Maternally/paternally/group rewarded
	Excitation/playfulness
Unsatisfied sexually	Sexually gratified
Exhaustion	Energised/refreshed
Anxiety, fearfulness, panic, neophobia	Secure/protected/confident

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The Five Domains Model

Physical/Functional Domains

	Survival-Related Factors					Situation-Related Factors	
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Force-feeding		Loud/otherwise unpleasant noise	Noise exposure acceptable	problems			Foraging/hunting
				Poisons	Poisoning	Constraints on animal-to-	Bonding/reaffirming bonds
		Environmental monotony:	Normal environmental			animal interactive activity	Rearing young
		ambient, physical, lighting	variability	Obesity/leanness	Body condition		Playing
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		Unpredictable events	Predictability	Poor physical fitness:	Good fitness level	Limits on threat avoidance,	Using refuges, retreat, or
				muscle de-conditioning		escape or defensive activity	defensive attack
						Limitations on sleep/rest	Sleep/rest sufficient

Affective Experience Domain

	5: Mental State						
Negative	*Positive*	*Negative*	*Positive*	*Negative*	*Positive*	*Negative*	*Positive*
Thirst	Wetting/quenching	*Forms of discomfort:*	*Forms of comfort:*	Breathlessness	Comfort of good	Anger, frustration	Calmness
	pleasures of drinking	Thermal: chilling, overheating	Thermal	Pain: many types	health and high	Boredom, helplessness	Engaged, in control
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	tastes/smells	Physical: stiffness, muscle tension		Sickness, malaise			Maternally rewarded
Hunger (salt)	Pleasure of salt taste	Respiratory: e.g. breathlessness	Respiratory	Nausea		Depression	Excitation/playfulness
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Bloated, over full	Gastrointestinal comfort					Neophobia	Likes novelty
Gastrointestinal pain		Malaise from unnatural constancy	Variety-related comfort			Exhaustion	Energised/refreshed

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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

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Domain 5: Mental experiences

Negative	*Positive*
Thirst, Hunger (general/salt)	Pleasures of drinking, tastes/smells, chewing
Malnutrition malaise	Postprandial satiety
Bloated, over full	Gastrointestinal comfort
Thermal discomfort (cold/hot)	Thermal comfort
Physical discomfort (pain/stiffness)	Physical comfort
Respiratory discomfort (inflammation, breathlessness)	Respiratory comfort
Malaise from unnatural constancy	Variety-related comfort

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The 2015 Five Domains Model – *affective states*

Domain 5: Mental experiences

Negative	*Positive*
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Bloated, over full	Gastrointestinal comfort
Thermal discomfort (cold/hot)	Thermal comfort
Physical discomfort (pain/stiffness)	Physical comfort
Respiratory discomfort (inflammation, breathlessness)	Respiratory comfort
Malaise from unnatural constancy	Variety-related comfort
Breathlessness, Pain, Debility/weakness, Sickness, Nausea, Dizziness	Comfort of high functional capacity and fitness

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The 2015 Five Domains Model – *affective states*

Domain 5: Mental experiences

Negative	*Positive*
Thirst, Hunger (general/salt)	Pleasures of drinking, tastes/smells, chewing
Malnutrition malaise	Postprandial satiety
Bloated, over full	Gastrointestinal comfort
Thermal discomfort (cold/hot)	Thermal comfort
Physical discomfort (pain/stiffness)	Physical comfort
Respiratory discomfort (inflammation, breathlessness)	Respiratory comfort
Malaise from unnatural constancy	Variety-related comfort
Breathlessness, Pain, Debility/weakness, Sickness, Nausea, Dizziness	Comfort of high functional capacity and fitness
Anger, frustration	Calmness
Boredom, helplessness	Vitality/reward
Loneliness, isolation	Affectionate sociability
Depression, withdrawal	Maternal/paternal/group rearing rewards
	Excitation/playfulness
Unsatisfied sexually	Sexually gratified
Exhaustion	Energised/refreshed
Anxiety, fearfulness, panic, neophobia	Secure/protected/confident

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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**

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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*

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The 2015 Five Domains model – *state assessment*

**How can these *subjective, emotional or affective*
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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*

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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 bases for assessment are therefore different

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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

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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**

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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***

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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*

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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: e*xclusive 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*

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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:**

Grade	Compromise
A	None
B	Low-level
C – C_1	Mild
C_2	Moderate
D – D_1	Marked
D_2	Severe
E	Very Severe

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

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The 2015 Five Domains model – *state assessment*

GRADING WELFARE COMPROMISE

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*

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The 2015 Five Domains model – *state assessment*

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

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- 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.

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The 2015 Five Domains model – *state assessment*

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- We *cautiously infer* what the *associated +ve affective states* are
- *Affective neuroscience evidence* supports these inferences

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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*

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- *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

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  - 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 +++**

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The 2015 Five Domains model – *state assessment*

GRADING ENHANCED WELFARE

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

Enhancement	Grade
None	0
Low	+
Medium	++
High	+++

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The 2015 Five Domains model – *state assessment*

GRADING ENHANCED WELFARE

- **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.***

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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**

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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*

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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*.

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THANK YOU

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