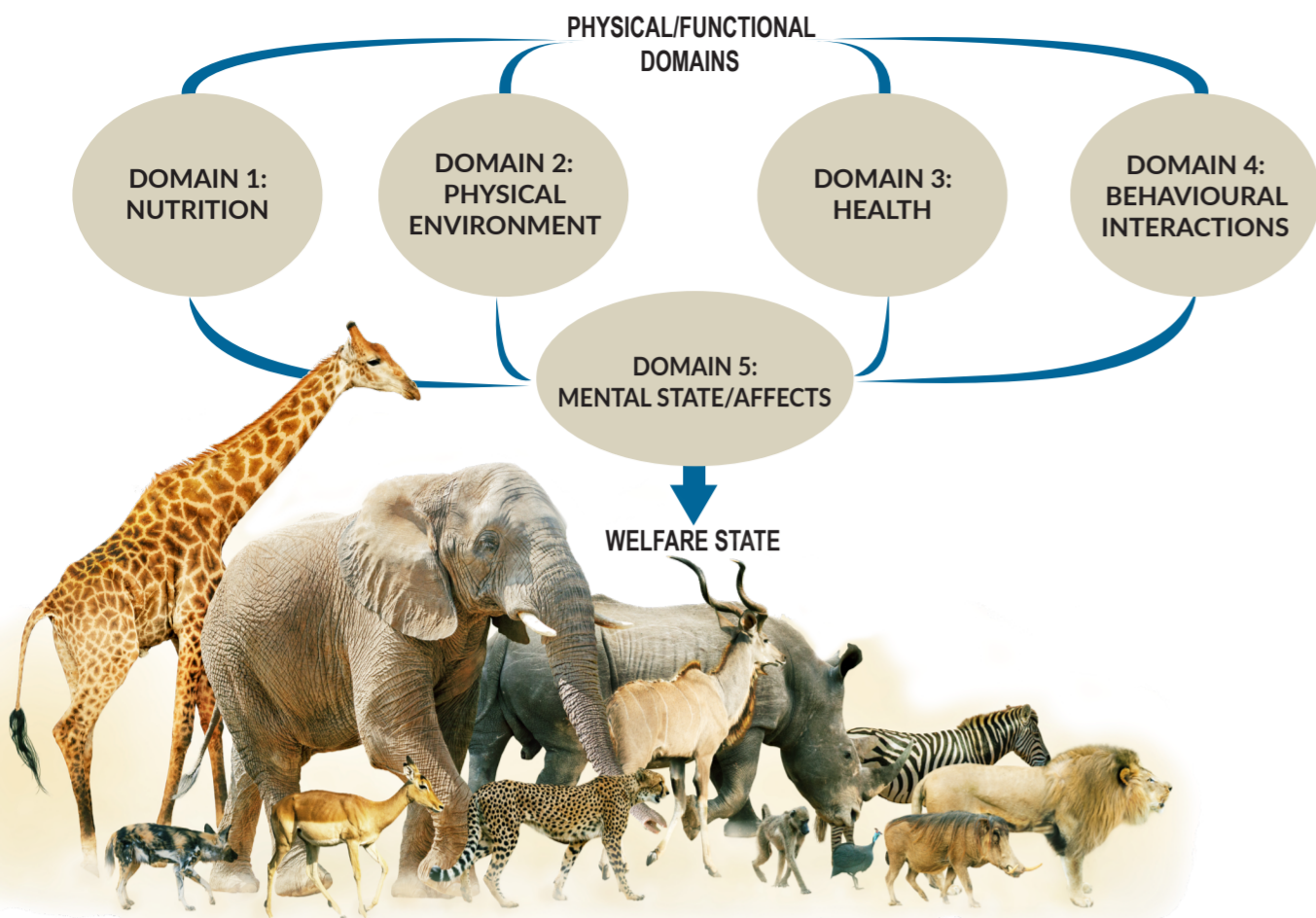


The 2020 Five Domains Model for Animal Welfare Assessment and Monitoring

Basic Structure of the Model:



Domain 3: Health Conditions and their Associated Domain 5 Affects

Negative Conditions		Positive Conditions	
Presence of: Injury: acute, chronic, husbandry mutilations Disease: acute, chronic	Negative affects: Pain (many types), breathlessness, debility, weakness, sickness, malaise, nausea, dizziness	Minimal or no: Injury Disease	Positive affects: Comfort of good health and functional capacity Comfort of good health and functional capacity
Functional impairment: due to limb amputation, other therapies; genetic, lung, heart, vascular, kidney, gut, neural, or other problems		Functional impairment	Comfort of good health and functional capacity
Obesity or leanness: physical and metabolic consequences	Affects of being too fat or thin, and of metabolic and pathophysiological sequelae	Extreme body condition scores	Comfort of good health and functional capacity
Poisons	Many affects due to mode of action	Poisoning	Comfort of good health and functional capacity
Poor physical fitness, muscle de-conditioning	Physical weakness and exhaustion	Poor fitness (fitness level good)	Vitality of fitness and pleasurable vigorous exercise

Domain 1: Nutritional Conditions and their Associated Domain 5 Affects

Negative Conditions		Positive Conditions	
Nutritional inadequacies:	Negative affects:	Nutritional opportunities:	Positive affects:
Restricted water intake	Thirst	Drink correct quantities of water	Wetting/quenching pleasures of drinking
Excessive water intake	Water intoxication	Eat enough food	Postprandial satiety Pleasure of salt taste
Restricted food intake	Hunger (general) Hunger (salt) Weakness of starvation	Eat a balanced diet Eat a variety of foods	Pleasures of food tastes/smells/textures Masticatory pleasures
Poor food quality Low food variety	Malaise of malnutrition Eating-related boredom	Eat correct quantities of food	Comfort of satiety Gastrointestinal comfort
Voluntary overeating	Feeling bloated or overfull		
Force-feeding, excessive energy intake	Gastrointestinal pain, nausea/malaise		



Domain 4: Behavioural Interactions and their Associated Domain 5 Affects

INTERACTIONS WITH THE ENVIRONMENT			
Exercise of 'agency' is impeded:	Negative affects:	Exercise of 'agency' is promoted	Positive affects:
Invariant, barren, confined environment (ambient, physical, biotic)	Boredom, helplessness Depression, withdrawal	Varied, novel environment	Interested, pleasantly occupied
Inescapable sensory impositions	Various combinations: startled by unexpected events, neophobia, hypervigilance, anger, frustration, negative cognitive bias	Congenial sensory inputs	Likes novelty, post-inhibitory rebound
Choices markedly restricted		Available engaging choices	Calm, in control
Environment-focussed activity constrained		Free movement	Engaged by activity
Foraging drive impeded		Exploration, foraging	Energised, focussed
INTERACTIONS WITH OTHER ANIMALS			
Animal-to-animal interactive activity constrained	Loneliness, depression Yearning for company	Bonding/reaffirming bonds Rearing young	Affectionate sociability Maternal, paternal or group rewards
	Thwarted desire to play Sexual frustration Thwarted hunting drive	Playing Sexual activity Hunting	Excitation/playfulness Sexually gratified Alert engagement, highly stimulated
Significant threats Limits on threat avoidance, escape or defensive activity Limitations on sleep/rest	Anger, anxiety, fear, panic, insecurity, neophobia Exhaustion	Absence of threats Using refuges, retreat or defensive attack Sleep/rest sufficient	Secure, protected, confident Energised, refreshed; post-inhibitory rebound
INTERACTIONS WITH HUMANS			
Negative human attributes and behaviour:	Animal behaviours and negative affects:	Positive human attributes and behaviour:	Animal behaviours and positive affects:
Attitude: uncertain, fearful, indifferent, insensitive, impatient, oppressive, belligerent, domineering, callous, cruel, vindictive	Behaviours (e.g.): long flight distance, hypervigilant, attack/fight, hyper-reactive, escape avoidance, freezing, cowering, appeasing, withdrawn, non-compliant	Attitude: confident, caring, sensitive, patient, kind, empathetic	Behaviours: short flight distance, calm alertness, at ease with imposed hands-off or hands-on contact, compliantly responsive, explores novel events, seeks contact, variably bonded with humans
Voice: hesitant, angry, loud, shouting		Voice: confident, calm, clear, encouraging, pleasantly rhythmic	
Aptitude: inexperienced, unskilled, untrained, unqualified		Aptitude: experienced, skilled, trained, qualified	
Handling/controlling: erratic, rough (slap, hit, kick, grab, poke, beat, whip); excessively forceful, violent; punishment-focussed; more negative pressure than is needed for training objective	Affects: anxiety, fear, panic, terror, neophobia; insecurity, confusion, uncertainty, persistent unease; helplessness; pain from injuries; negative cognitive bias	Handling/controlling: skillful, gentle (stroke, touch, push, guide); firm, temperate, restrained; reward-focussed; mimics allo-grooming by conspecifics; using subtle pressure cues, secondary reinforcers and timely release of aversive stimuli	Affects: calm, confident, at ease, feels in control; enjoys variety; finds being bonded with humans rewarding

Domain 2: Physical Environmental Conditions and their Associated Domain 5 Affects

Negative Conditions		Positive Conditions	
Unavoidable physical conditions:	Negative affects - forms of discomfort:	Enhanced physical conditions:	Positive affects - forms of comfort:
Close confinement; overcrowding	Physical: general stiffness, muscle tension	Space for spontaneous locomotion	Physical comfort
Unsuitable substrate, wet/soiled ground	Physical: musculoskeletal pain, skin irritation	Suitable substrate, well-drained ground	Physical comfort
Air pollutants: NH ₃ , CO ₂ , dust, smoke	Respiratory: breathlessness, air passage irritation/pain	Fresh air dissipates contaminants	Respiratory comfort
Aversive odours	Olfactory: revulsion at foul or repellent odours	Foul smells dissipated by fresh air & good hygiene	Olfactory comfort
Thermal extremes	Thermal: chilling, dampness, overheating	Effective shelter and shade available	Thermal comfort
Loud or otherwise unpleasant noise	Auditory: impaired hearing or ear pain	Effective noise control measures are in place	Auditory comfort
Light: inappropriate intensity	Visual: eye strain due to flashing, glare or darkness	Light intensity kept at tolerable levels	Visual comfort
Monotony: ambient, physical, lighting	Malaise from unnatural constancy	Within-day environmental variability maintained	Congenial variety and predictability
Unpredictable events	Anxiety, fear, hypervigilance	Predictability achieved by established routines	Relaxation-based ease and calmness
Physical limits on rest and sleep	Exhaustion	Conditions conducive to rest and sleep	Well rested

The Model emphasises that what matters to animals in welfare terms is their subjective experiences, i.e., their affects. It also recognises that particular physiological mechanisms and specific affects interact dynamically. When the conditions in Domains 1 to 4 give rise to negative affects, they tend to be welfare compromising; when they give rise to positive affects, they tend to be welfare enhancing. Thus, the Model provides a coherent and informative basis for evaluating the welfare significance of different conditions.

Adapted from: *The 2020 Five Domains Model: Including Human-Animal Interactions in Assessments of Animal Welfare*, by D.J. Mellor, N.J. Beausoleil, K.E. Littlewood, A.N. McLean, P.D. McGreevy, B. Jones and C. Wilkins. *Animals* 2020, DOI: 10.3390/ani10101870