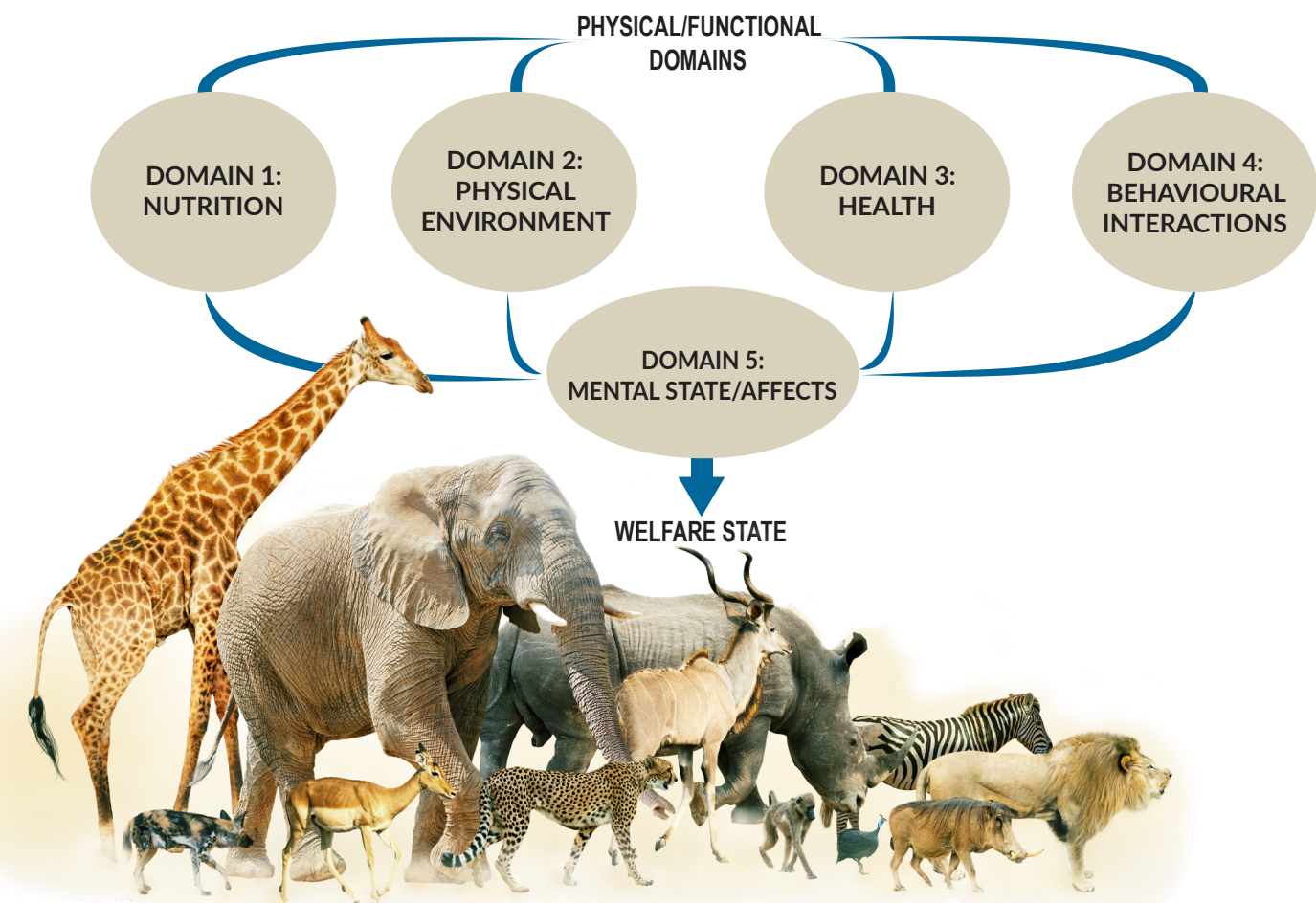


The 2020 Five Domains Model for Animal Welfare Assessment and Monitoring

Basic Structure of the Model:



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
Restricted food intake	➔ Hunger (general)	➔ Pleasure of salt taste	
	➔ Hunger (salt)	Eat a balanced diet	➔ Pleasures of food tastes/smells/textures
	➔ Weakness of starvation	Eat a variety of foods	➔ Masticatory pleasures
Poor food quality	➔ Malaise of malnutrition	Eat correct quantities of food	➔ Comfort of satiety
Low food variety	➔ Eating-related boredom		➔ Gastrointestinal comfort
Voluntary overeating	➔ Feeling bloated or overfull		
Force-feeding, excessive energy intake	➔ Gastrointestinal pain, nausea/malaise		



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



Domain 3: Health Conditions and their Associated Domain 5 Affects

Negative Conditions		Positive Conditions	
Presence of:	Negative affects:	Minimal or no:	Positive affects:
Injury: acute, chronic, husbandry mutilations	➔ Pain (many types), breathlessness, debility, weakness, sickness, malaise, nausea, dizziness	Injury	➔ Comfort of good health and functional capacity
Disease: acute, chronic		Disease	➔ 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 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	Varied, novel environment	➔ Interested, pleasantly occupied
Inescapable sensory impositions	➔ Depression, withdrawal	Congenial sensory inputs	➔ Likes novelty, post-inhibitory rebound
Choices markedly restricted	➔ Various combinations: startled by unexpected events, neophobia, hypervigilance, anger, frustration, negative cognitive bias	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	Bonding/reaffirming bonds	➔ Affectionate sociability
	➔ Yearning for company	Rearing young	➔ Maternal, paternal or group rewards
	➔ Thwarted desire to play	Playing	➔ Excitation/playfulness
	➔ Sexual frustration	Sexual activity	➔ Sexually gratified
	➔ Thwarted hunting drive	Hunting	➔ Alert engagement, highly stimulated
Significant threats	➔ Anger, anxiety, fear, panic, insecurity, neophobia	Absence of threats	➔ Secure, protected, confident
Limits on threat avoidance, escape or defensive activity		Using refuges, retreat or defensive attack	
Limitations on sleep/rest	➔ Exhaustion	Sleep/rest sufficient	➔ 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