

Introduction of Animal Welfare Science

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Today's interest

Animal Welfare

動物福祉

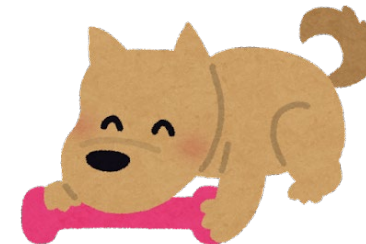
アニマルウェルフェア

What is Animal Welfare

physical and mental state of an animal
in relation to the conditions in which it lives and dies



bad, poor/negative

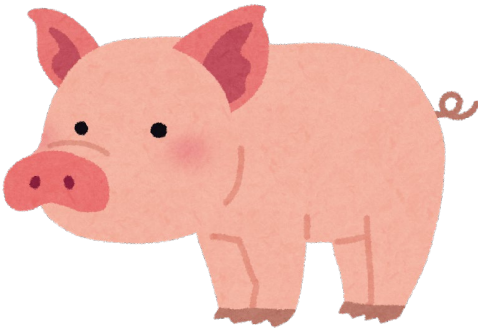
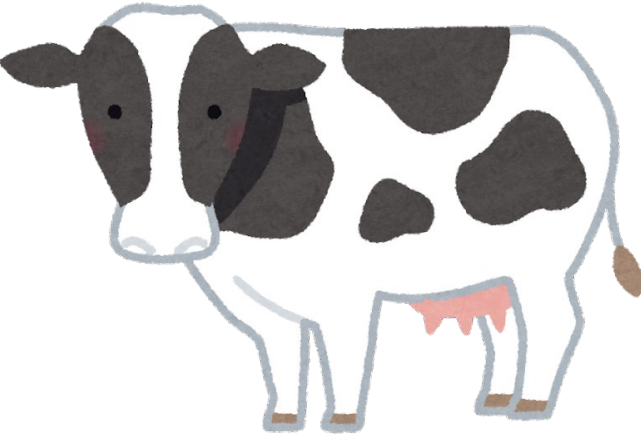


good/positive

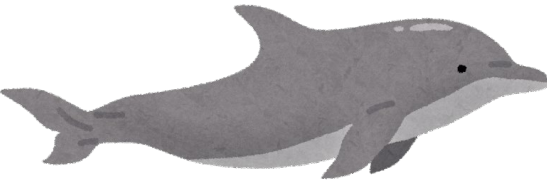
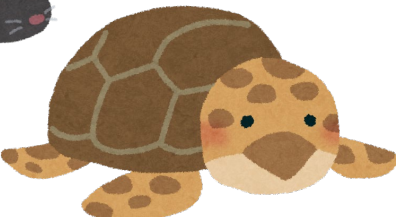
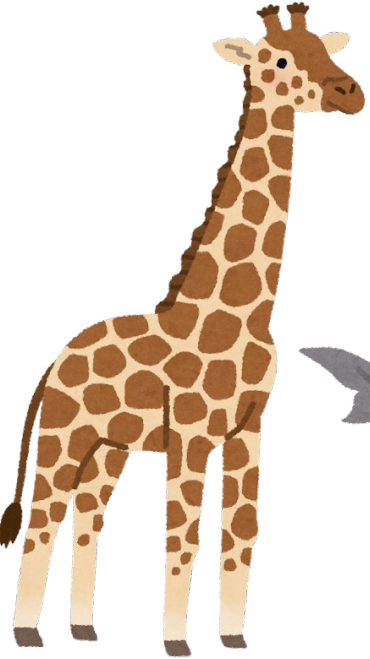
What is Animal Welfare

What is
physical and mental state of an animal
in relation to the conditions in which it lives and dies

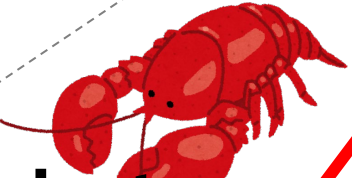
Can animals feel?



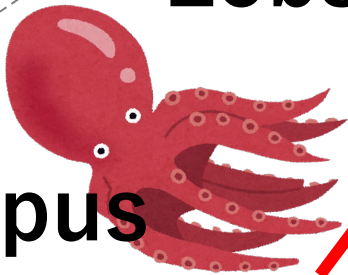
vertebrate



Lobster

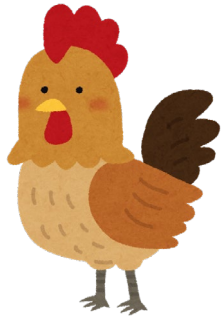
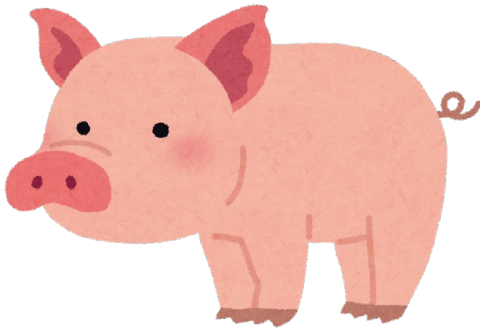
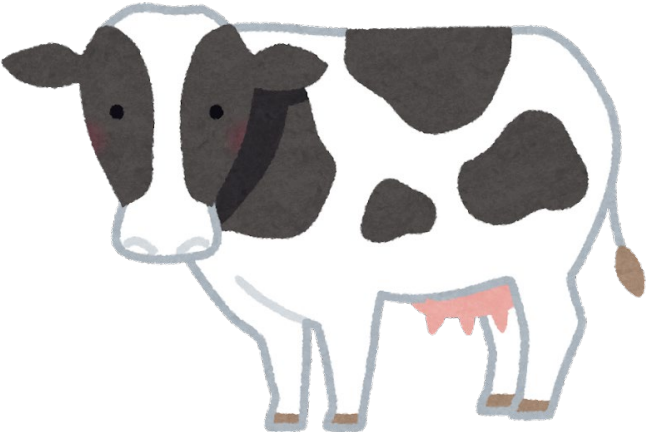
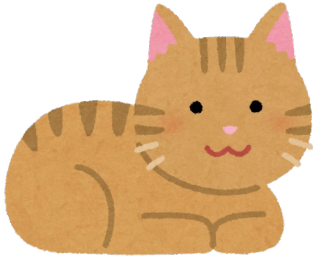


Octopus

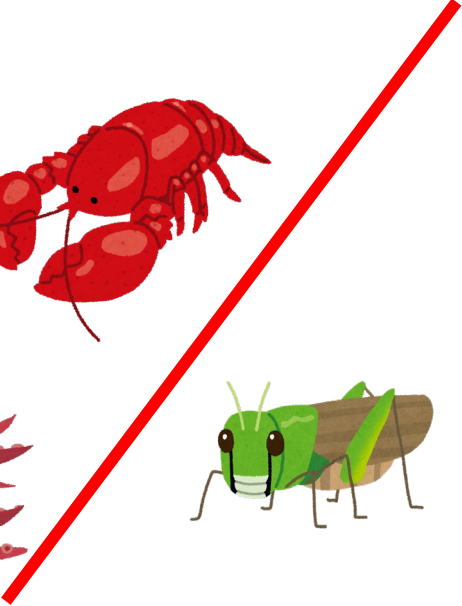
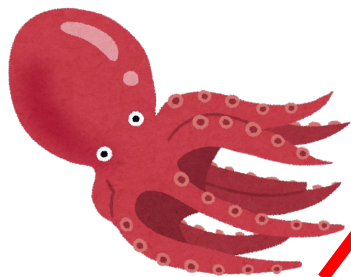
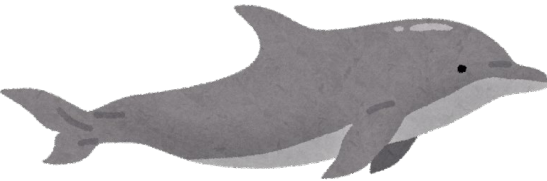
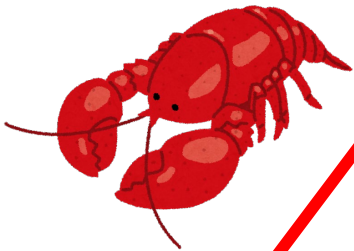
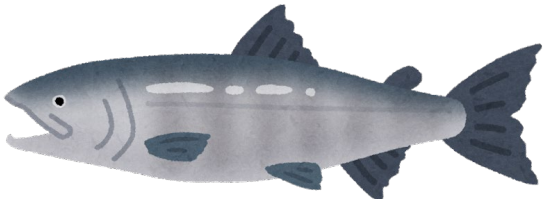
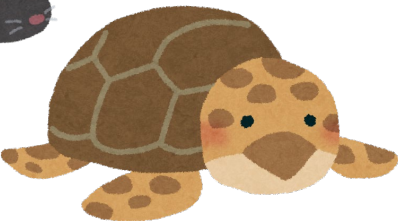
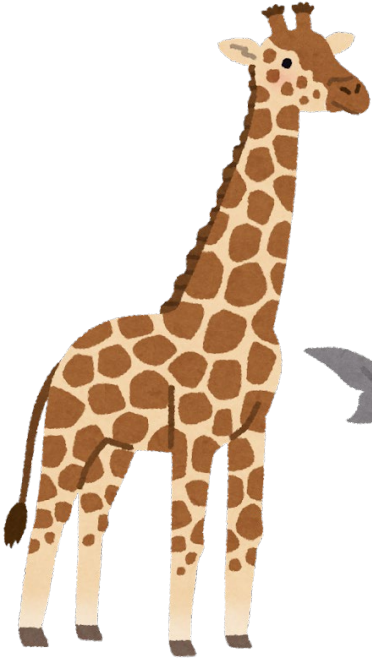


Insect?

Can animals feel?



Sentient beings



Why we have to define

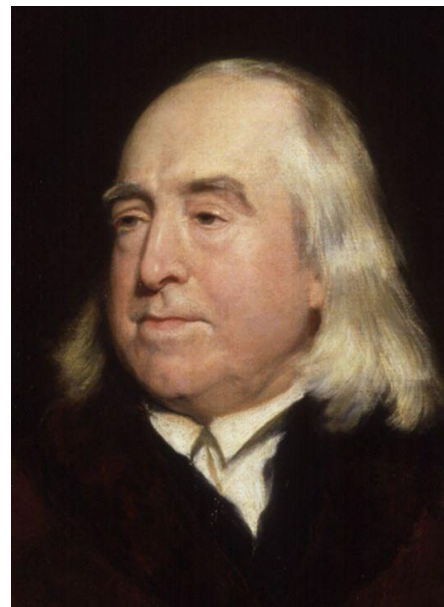
I think,
therefore I am



Rene Descartes
ルネ・デカルト
(1596-1650、France)

‘animals as automata’
自動機械

utilitarianism

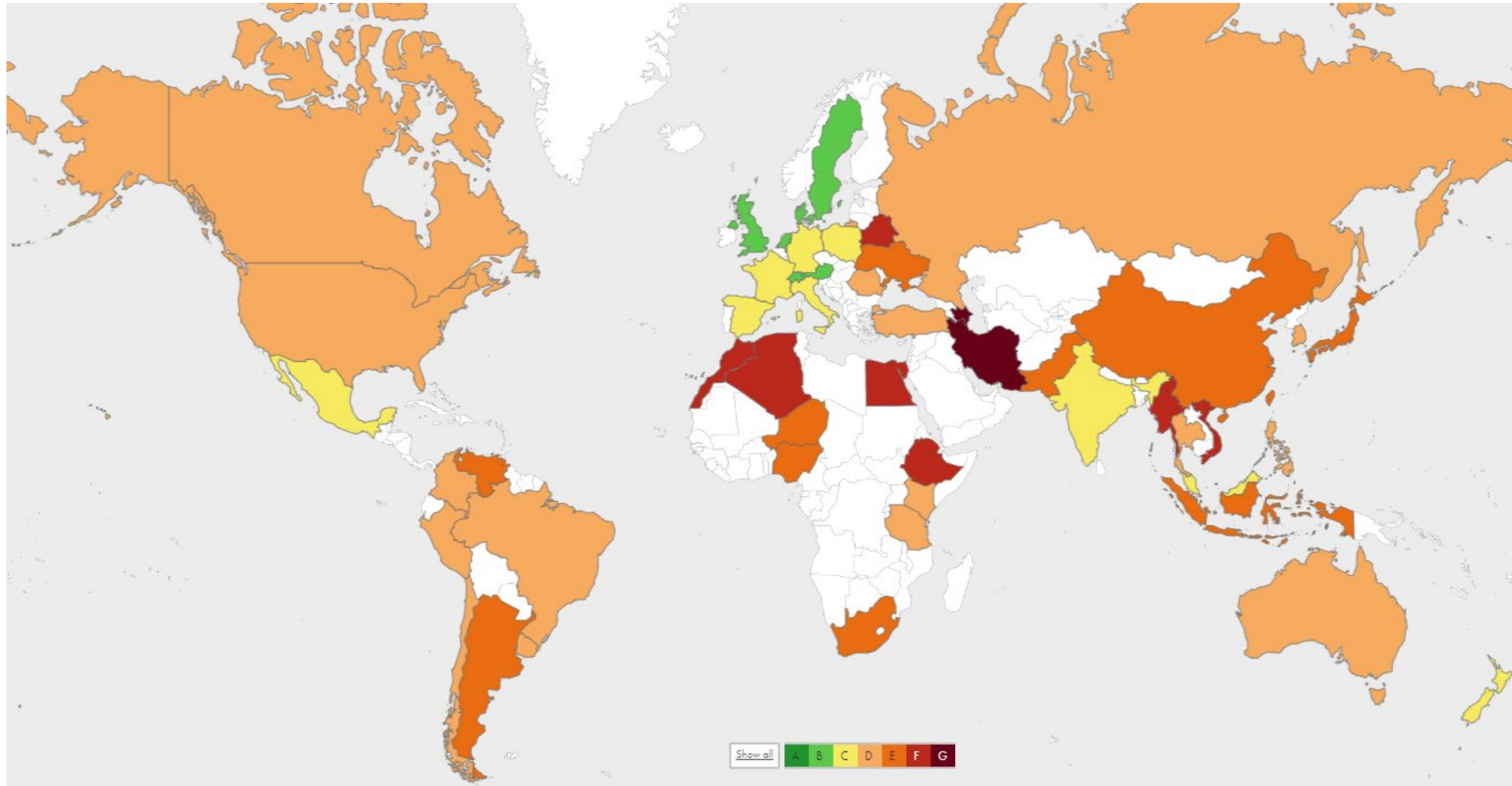


Jeremy Bentham
ジェレミー・ベンサム
(1748-1832、UK)

‘The question is not ‘Can they reason?’ nor ‘Can they talk?’ but ‘Can they suffer?’

How is animal welfare in your country?

Animal Protection Index 2022 (World Animal Protection)



How is animal welfare in Japan?

Animal Protection Index 2022 (World Animal Protection)

E

Japan

B

United Kingdom

D

USA

C

Germany

Recognition of animal sentience and prohibition of animal suffering

Animal Sentience is formally recognised in legislation



Laws against causing animal suffering



Presence of animal welfare legislation

Protecting animals used in farming



History of animal welfare

1822 Cruel Treatment of Cattle Act (Martin's Act)

1876 Cruelty to Animal Act

1911 Protection of Animals Act (ex Animal Welfare Act)

1964 Animal Machine (Ruth Harrison)

: raised awareness of public about intensive (factory) farming

Early 1900



1960's



History of animal welfare

1822 Cruel Treatment of Cattle Act (Martin's Act)

1876 Cruelty to Animal Act

1911 Protection of Animals Act (ex Animal Welfare Act)

1964 Animal Machine (Ruth Harrison)

1965 The Brambell report (UK government)



Public pressure

“We accept that animals can experience emotions such as rage, fear, apprehension, frustration and pleasure...”

History of animal welfare

- 1822 Cruel Treatment of Cattle Act (Martin's Act)
- 1876 Cruelty to Animal Act
- 1911 Protection of Animals Act (ex Animal Welfare Act)
- 1964 Animal Machine (Ruth Harrison)
- 1965 The Brambell report (UK government)
- 1974 Five Freedoms (FAWC: Farm Animal Welfare Council)

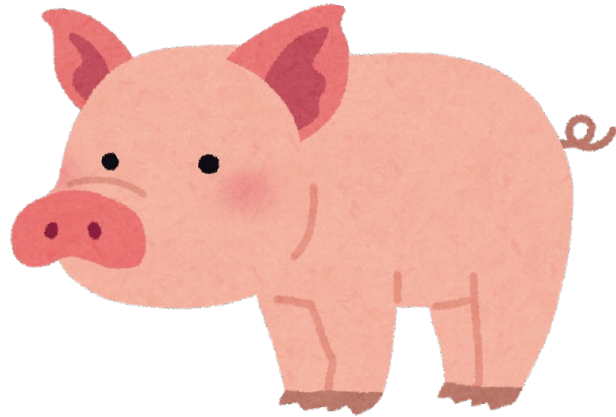
- Freedom from hunger, malnutrition and thirst
- Freedom from pain, injury and disease
- Freedom from heat stress or physical discomfort
- Freedom to express normal patterns of behaviour
- Freedom from fear and distress

Confusing concepts for animals

- **Welfare** (福祉) : Animal's physical/mental state
- **Rights** (権利) : Animal's right
- **Ethics** (倫理) : Human's ethics toward animals
- **Aigo** (愛護) : Human's love toward animals

What is the matter for an animal?

Gene modified pig for supplying a heart to humans



nature

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NEWS | 14 January 2022

First pig-to-human heart transplant: what can scientists learn?

Researchers hope that a person who has so far lived for a week with a genetically modified pig heart will provide a trove of data on the possibilities of xenotransplantation.

[Sara Reardon](#)



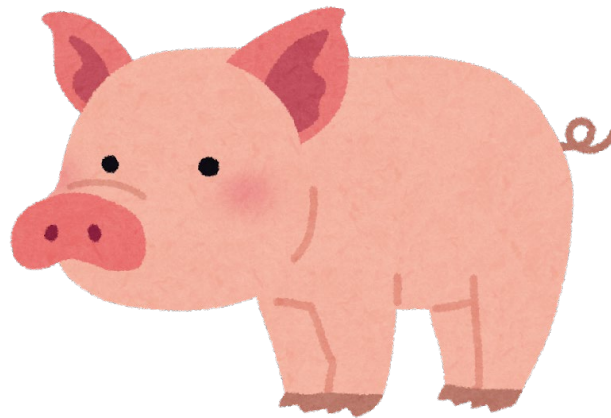
Viewpoint of Welfare, Rights, Ethics, and Aigo

Welfare

Ethics

Rights

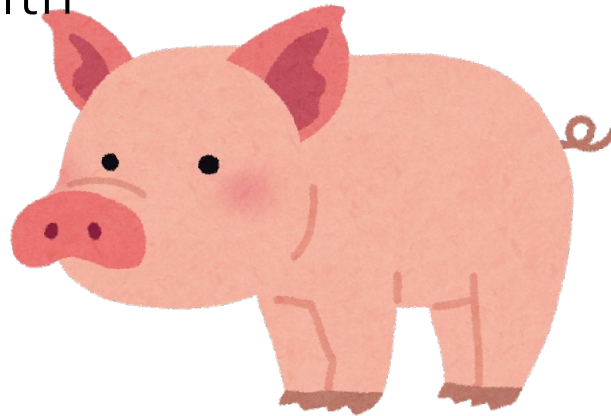
Aigo



Viewpoint of Welfare, Rights, Ethics, and Aigo

Welfare

- Effect on pig's physical health (disease, pain)
- Effect on pig's mental health (frustration, boredom, fear)
- Environment, handlings



Rights

- Using animals is not allowed

Ethics

- Using animals for humans
- Xenotransplant (異種移植)
- Why pigs?

Aigo

- Whether we can love the pig
- Whether we can keep the pig safe and physically healthy

Animals must be given:

- Freedom from hunger, malnutrition and thirst
- Freedom from pain, injury and disease
- Freedom from heat stress or physical discomfort
- Freedom to express normal patterns of behaviour
- Freedom from fear and distress

Animal Welfare Science

To **measure** and improve welfare of animals
physical/mental state

Animal welfare measures

- **Resource-based: What animals are given**

- house, floor, bedding, enrichment, food

- **Management-based: How animals are managed**

- feeding schedule, veterinary treatment, group/single-housed

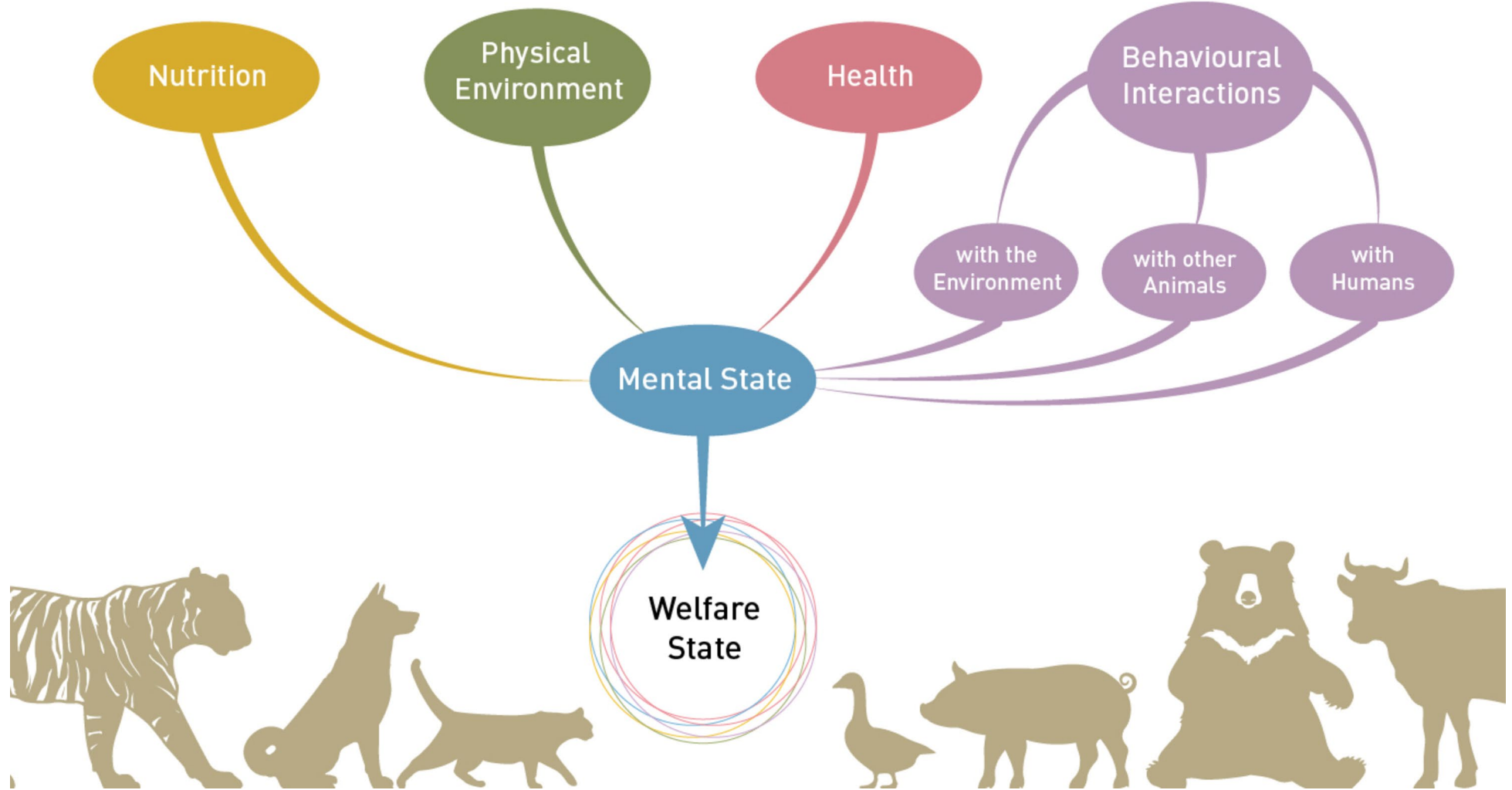
- **Animal-based: What/How animals experience**

- physical health, facial expression, body language, glucocorticoid

New model to measure animal welfare

FOUR PAWS in Europe

Five Domains Model (1994)



New model to measure animal welfare

Five Domains Model (Mellor et al., *Animals* 2020)

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

Physical Environmental Conditions and their Associated Affects

Negative Conditions		Positive Conditions	
Unavoidable physical conditions:	Negative affects - forms of discomfort:	Enhanced physical conditions:	Positive affects - forms of comfort:
Close confinement; overcrowding	→ <i>Physical</i> : general stiffness, muscle tension	Space for spontaneous locomotion	→ <i>Physical</i> comfort
Unsuitable substrate, wet/soiled ground	→ <i>Physical</i> : musculoskeletal pain, skin irritation	Suitable substrate, well-drained ground	→ <i>Physical</i> comfort
Air pollutants: NH ₃ , CO ₂ , dust, smoke	→ <i>Respiratory</i> : breathlessness, air passage irritation/pain	Fresh air dissipates contaminants	→ <i>Respiratory</i> comfort
Aversive odours	→ <i>Olfactory</i> : revulsion at foul or repellent odours	Foul smells dissipated by fresh air & good hygiene	→ <i>Olfactory</i> comfort
Thermal extremes	→ <i>Thermal</i> : chilling, dampness, overheating	Effective shelter and shade available	→ <i>Thermal</i> comfort
Loud or otherwise unpleasant noise	→ <i>Auditory</i> : impaired hearing or ear pain	Effective noise control measures are in place	→ <i>Auditory</i> comfort
Light: inappropriate intensity	→ <i>Visual</i> : eye strain due to flashing, glare or darkness	Light intensity kept at tolerable levels	→ <i>Visual</i> 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

New model to measure animal welfare

Five Domains Model (Mellor et al., *Animals* 2020)

Health Conditions and their Associated Affects

Negative Conditions		Positive Conditions	
<p>Presence of:</p> <p><i>Injury:</i> acute, chronic, husbandry mutilations</p> <p><i>Disease:</i> acute, chronic</p> <p><i>Functional impairment:</i> due to limb amputation, other therapies; genetic, lung, heart, vascular, kidney, gut, neural, or other problems</p> <p><i>Obesity or leanness:</i> physical and metabolic consequences</p> <p>Poisons</p> <p>Poor physical fitness, muscle de-conditioning</p>	<p>Negative affects:</p> <p>➔ Pain (many types), breathlessness, debility, weakness, sickness, malaise, nausea, dizziness</p>	<p>Minimal or no:</p> <p>Injury</p> <p>Disease</p> <p>Functional impairment</p> <p>Extreme body condition scores</p> <p>Poisoning</p> <p>Poor fitness (fitness level good)</p>	<p>Positive affects:</p> <p>➔ <i>Comfort</i> of good health and functional capacity</p> <p>➔ <i>Comfort</i> of good health and functional capacity</p> <p>➔ <i>Comfort</i> of good health and functional capacity</p> <p>➔ <i>Comfort</i> of good health and functional capacity</p> <p>➔ <i>Comfort</i> of good health and functional capacity</p> <p>➔ <i>Vitality</i> of fitness and pleausurably vigorous exercise</p>

Behavioural Interactions and their Associated Affects

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

Welfare measurement

@Hokkaido Uni

How is her welfare ?



Welfare measurement

Criteria ①: 3 measures

How is her welfare ?

Resource-based: 何を与えられているか

Management-based: どう管理されているか

Animal-based: 動物自身の状態

Welfare measurement

Criteria ②: Five Freedoms/Domains

How is her welfare ?

Freedom from hunger, malnutrition and thirst

Freedom from pain, injury and disease

Freedom from heat stress or physical discomfort

Freedom to express normal patterns of behaviour

Freedom from fear and distress

Welfare measurement

Criteria ②: Five Freedoms/Domains

How is her welfare ?

NUTRITION

HEALTH

ENVIRONMENT

BEHAVIOUR

MENTAL STATE = WELFARE



Welfare measurement

NUTRITION

How is her welfare ?

Roughage, concentrated feed (twice/day)

BCS

water

Welfare measurement

ENVIRONMENT

How is her welfare ?

Light, heat, humidity, sound, wind....

Space for moving, hiding, foraging.....

Welfare measurement

HEALTH

How is her welfare ?

Dehorn, neutering, vaccination....

Disease, injury, cleanliness, lameness....

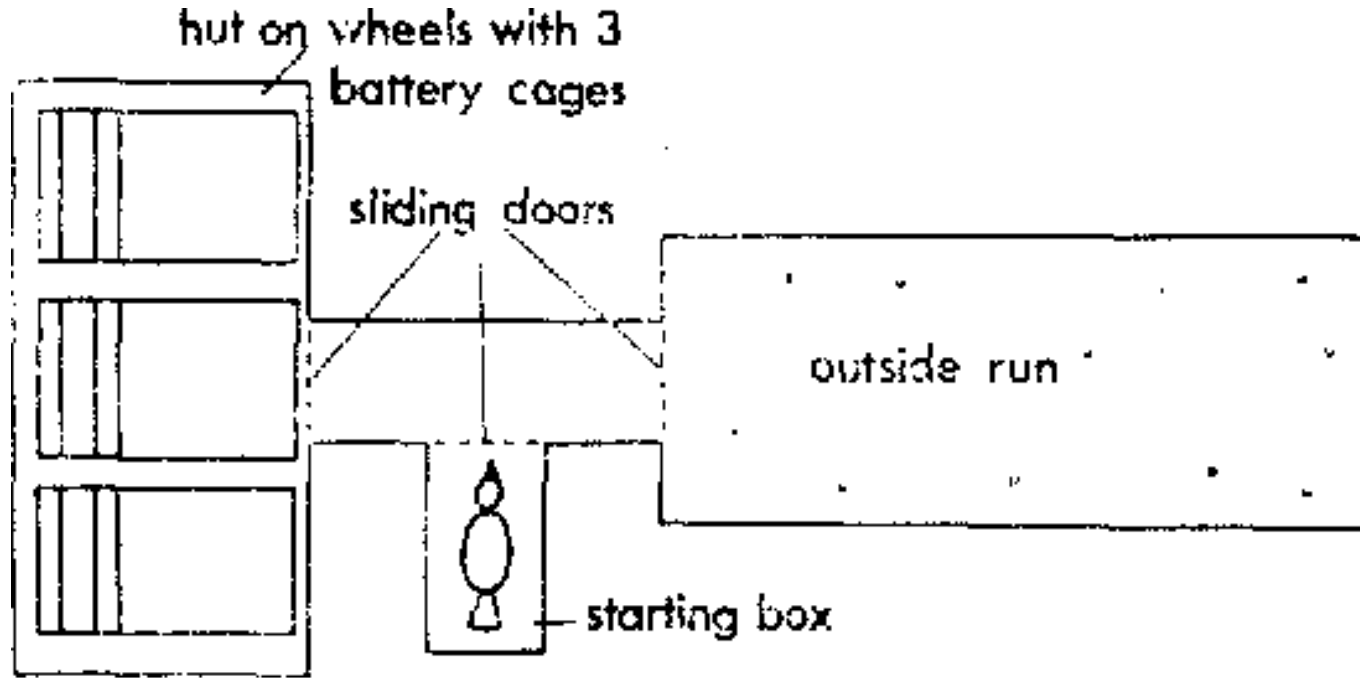
Welfare measurement

BEHAVIOUR

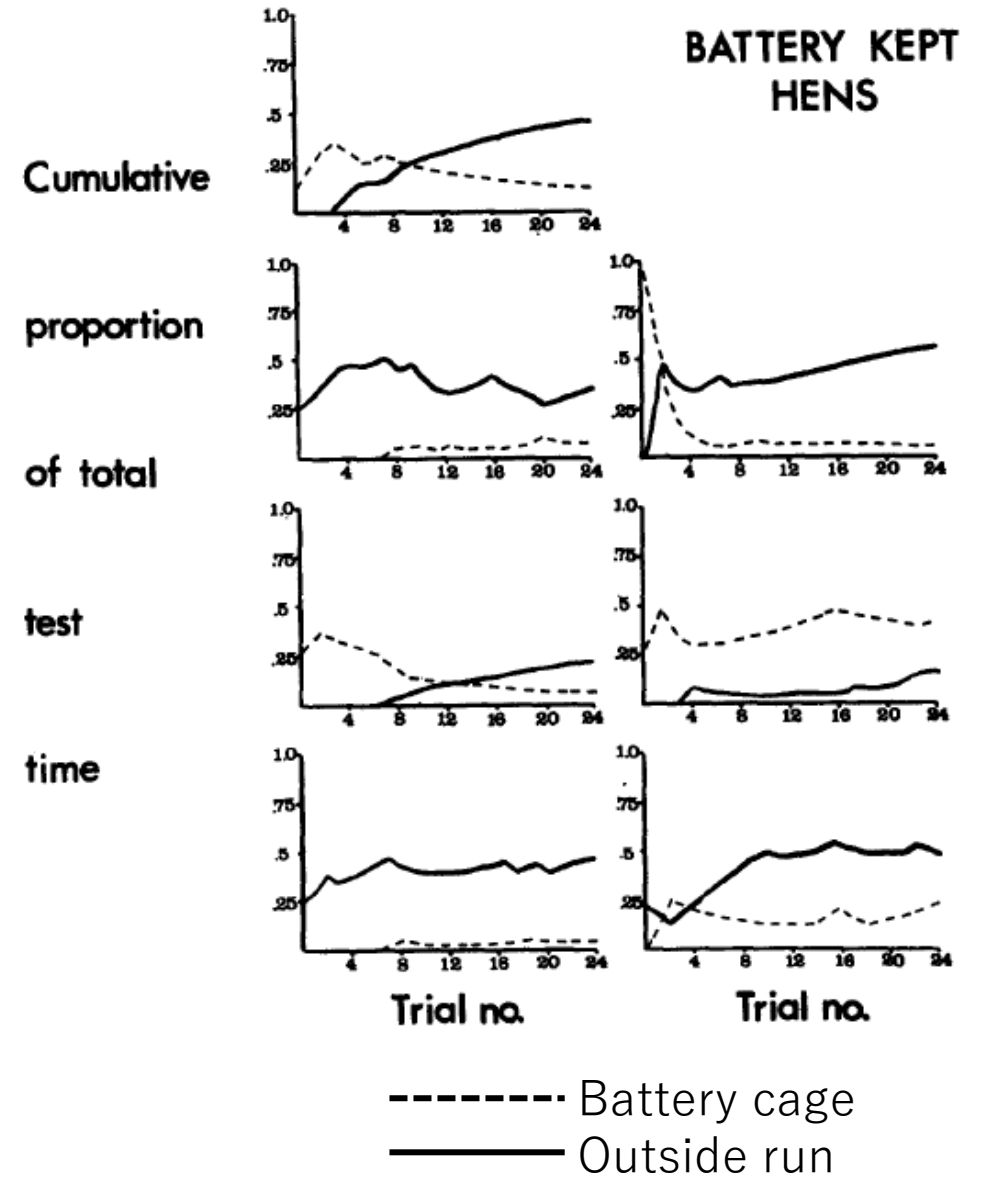
How is her welfare ?

Moving, lying down, rumination,
social play, stereotypies....

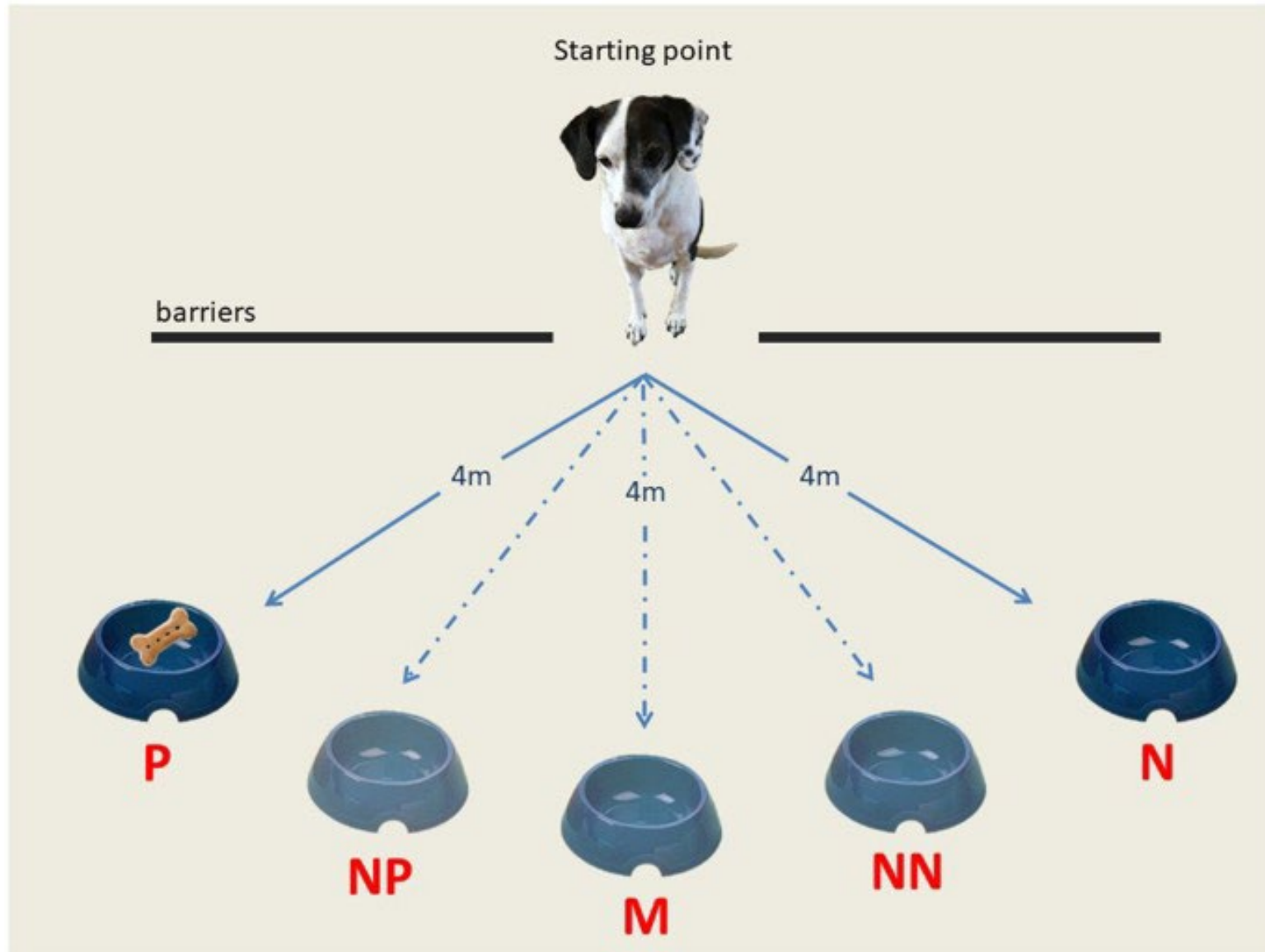
Motivation - Preference test



Dawkins, Do hens suffer in battery cages? environmental preferences and welfare? *Animal Behaviour* 1977



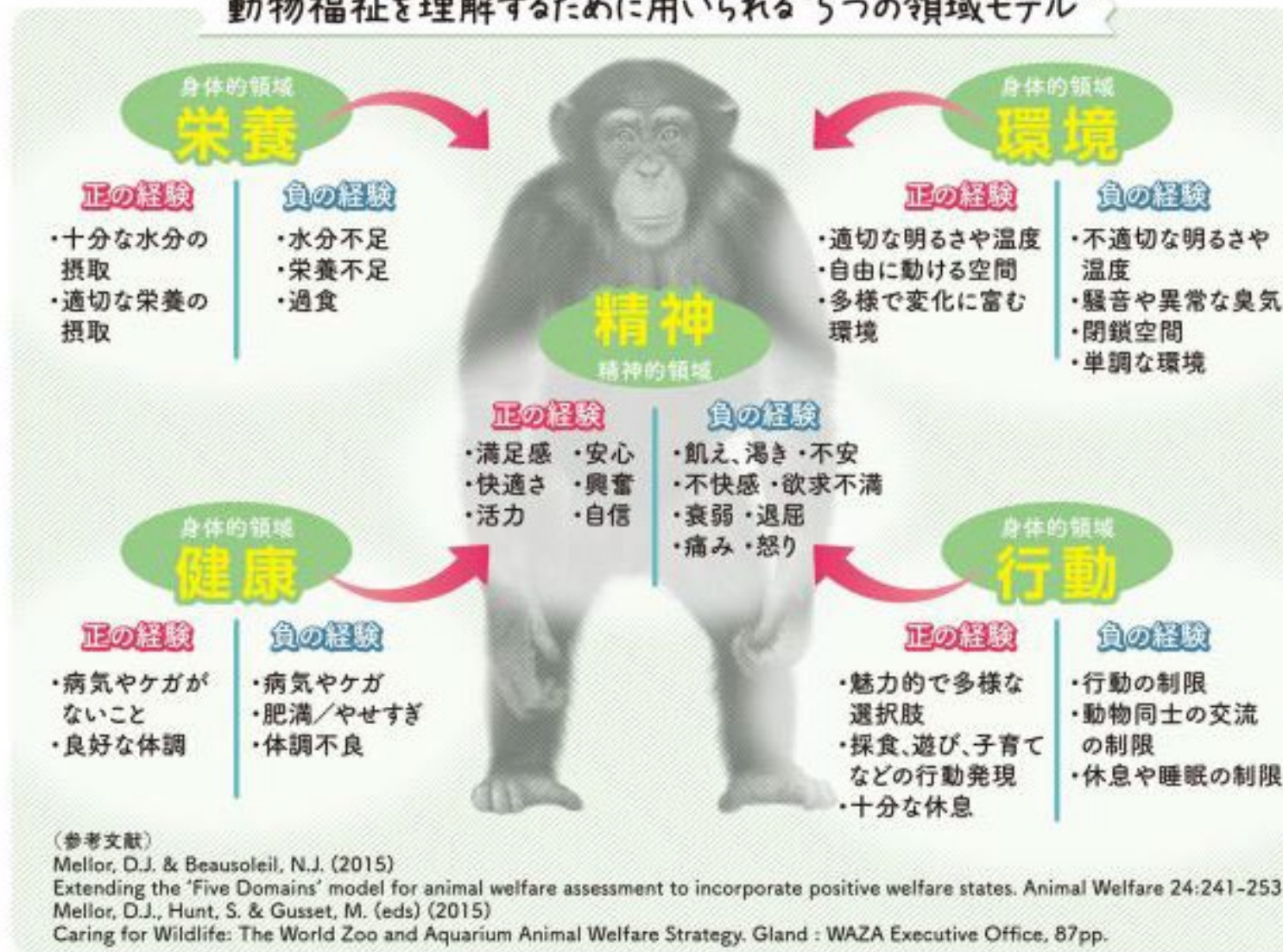
Mood - Cognitive bias test



Barnard et al, Personality traits affecting judgement bias task performance in dogs (*Canis familiaris*) *Scientific Reports* 2018

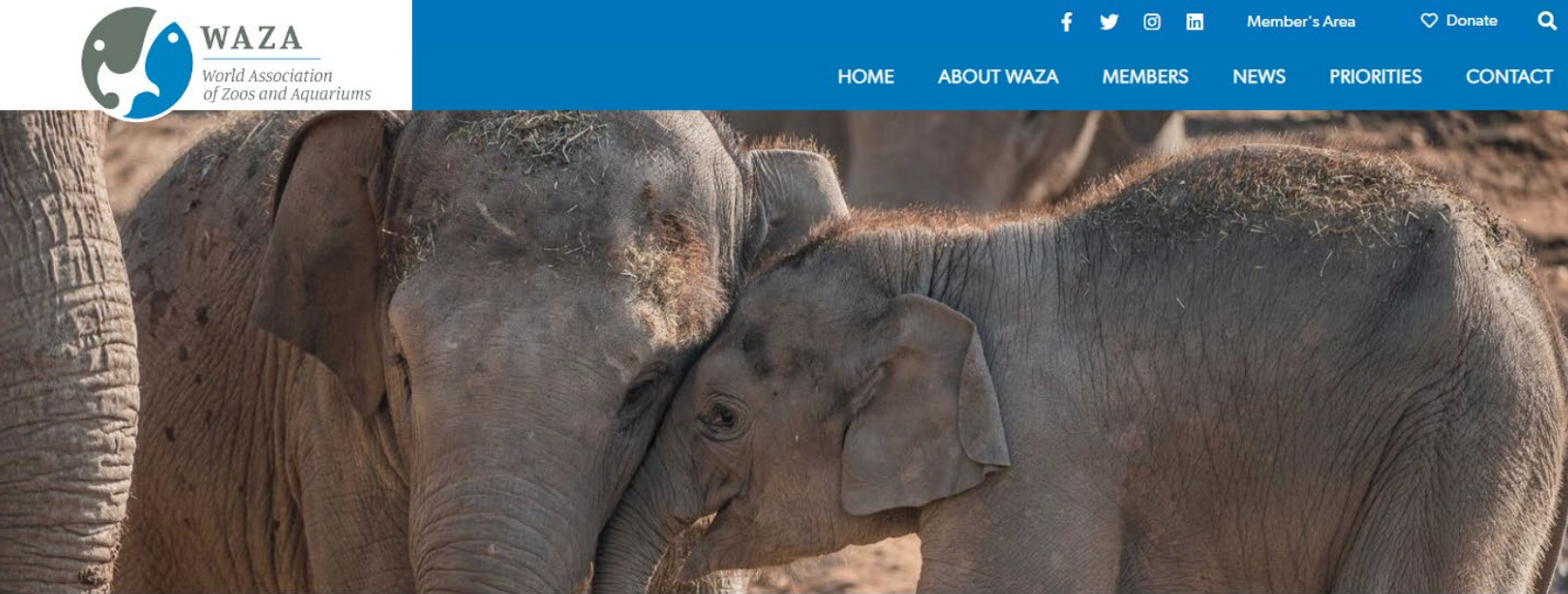
Zoo Animal Welfare

動物福祉を理解するために用いられる“5つの領域モデル”



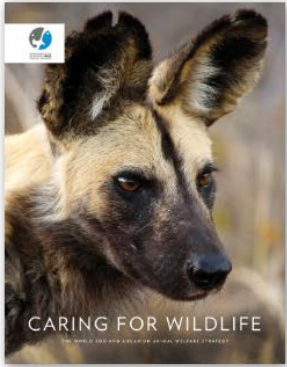
Maruyama zoo

Zoo Animal Welfare



**Animal Welfare
is
a global priority**

Animal Welfare Strategies




Caring For Wildlife
The World Zoo and Aquarium Animal Welfare
Strategy

Published in 2015

- English (landscape format) (7 MB)
- English (portrait format) (7 MB)
- Bahasa Indonesia (13MB)
- German (5 MB)
- Spanish (5 MB)
- Portuguese (7 MB)
- Simplified Chinese (13 MB)

Zoo Animal Welfare



THE UNIVERSITY OF LEEDS
The Royal (Dick) School
of Veterinary Studies
The Jeannet Marchig International Centre
for Animal Welfare Education

WILD ABOUT WELFARE

ANIMAL HUSBANDRY DIGITAL EDUCATION PROGRAMME

*Online learning modules that explore how to
optimise animal welfare for captive wild animals*

**HELP ALL ANIMALS THRIVE IN
CAPTIVITY**

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MODULE OUTLINE



ANIMAL WELFARE CONCEPTS

Understanding the principles of animal welfare for best practice.



CAPTIVE ANIMAL FACILITIES IN THE 21ST CENTURY

The role wild animal care facilities play in animal welfare, education and conservation.



ANIMAL BEHAVIOUR

Captive animal husbandry and welfare practice related to animal behaviour.



ENRICHMENT PROVISION

Captive animal husbandry and welfare practice related to enrichment provision.



THE CAPTIVE ENVIRONMENT

Enclosure design, management and maintenance for captive animal welfare.



ANIMAL HEALTH CARE

Specifics in captive animal husbandry and welfare practice related to animal health.



NUTRITION AND FEEDING

Captive animal feeding practices to promote good animal welfare.



RECORDS, PLANNING AND PROTOCOLS.

Animal management and record keeping to promote good animal welfare.



Enrichment



Hay feeder on ceiling

Access to outside

Family management

Sand substrates

Toys

Water

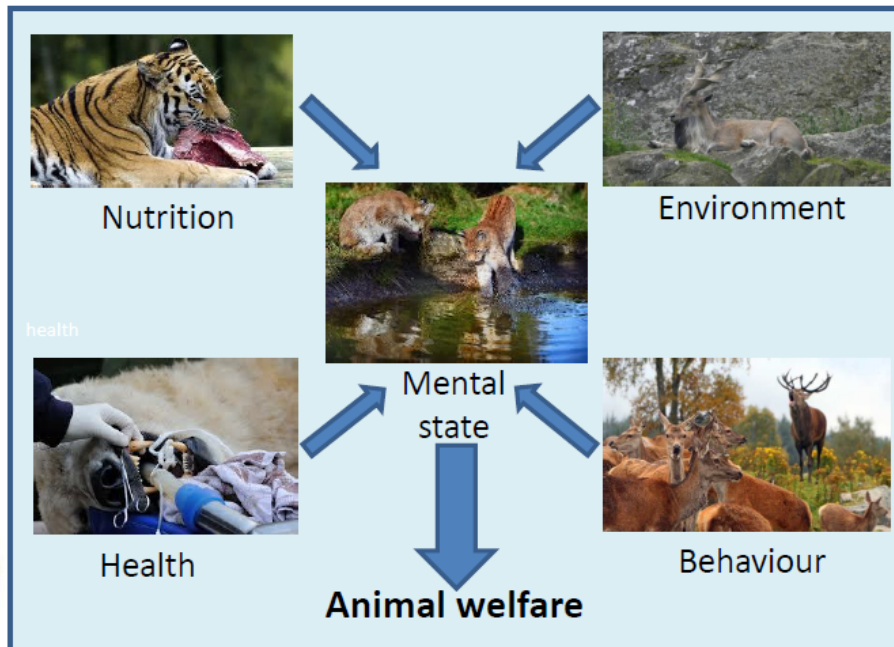
Asian Elephant @Maruyama zoo

Animal Welfare Exercise

To understand what constitutes good welfare in captive animals, we must find a way to successfully assess and measure welfare. This is not always an easy task due to different species and their varying needs, as well as the consideration of their individual needs. However, in more recent years, science-based assessment of animal welfare in captive animals has benefited from increased interest in and research into consciousness, emotions, stress and pain.

In the past, the Five Freedoms of Animal Welfare have successfully acted as a foundation, defining and underpinning fundamental animal welfare standards and considerations. Yet whilst past focuses have been on negative experiences and minimising distress, recent concepts have led to the consideration of positive factors and the development of various positive welfare measures. This encourages the management of animals to promote positive experiences and mental states.

The model of the **Five Domains of Potential Welfare Compromise** has evolved since its original development and illustrates how compromises in an animal's nutrition, environment, health and behaviour can all impact upon its mental state. These five domains may overlap and have combined effects on the overall welfare status of an individual animal and thus The 'Five Domains' concept can serve to offer a useful framework for the broad assessment of animal welfare.



In the Five Domains model, the four physical or functional domains (nutrition, environment, health and behaviour) are concerned with biological function, or physical wellbeing, and the fifth domain, the mental state, considers the 'affective state' or psychological wellbeing.

The four functional (physical) domains feed into the fifth domain (mental) domain. This affective state represents the animal's overall subjective feelings and experiences and hence this fifth domain is a key element of animal welfare.

An animal may have positive or negative emotional states and it is the balance between these subjective experiences that can influence an individual animal's 'Quality of Life'.

Activity

RZSS
Welfare assessment instructions
 For further activities
rzss.org.uk/education

How to complete the exercise.

This is a worked example below. Please observe the animals for 10-15 mins per species. If there is no noticeable behaviour i.e. laying down the agile category will score 1, if they are moving around they will score 3, 4, or 5

Date: 12/10/2016

Weather and Temp: Cold, wet overcast 15°C

If observing a group please give an overall score with notes indicating individuals of concern.

See Welfare assessment; Definitions in order to grade the different categories

Grade the Categories: by a score rating (1-5): Full compliance = 5, least compliance / no behaviour recorded = 1

Species:	Environment					Diet			Health / Body condition						Behaviour										Score											
Capercaillie	Utilised	Safe	Separation	Challenging	Permanent	Enriching	Suitability	Hydration	Well fed	Agile	Lean	Toned - body	Healthy coat	Healthy	Fitness	Strong	Active	Relaxed	Bright	Playful	Sociable	Purposeful	Communicative	Engaged	Alert	No stereotypical behaviour	Normal breathing	Painlessness	Steady	Calm	Content	Comfort	Total welfare score			
Group or Individual (Please circle) Nº: 2																																				
Score	5	4	5	4	5	4	4	5	4	5	1	5	5	5	4	4	4	4	3	5	5	1	5	5	5	5	4	4	5	4	4	4	4	136		
Observation notes. (Code)																																				
Start time:																																				
Finish time:																																				
11.am		1																																		
11.30am																																				

Notes:

- Capercaillie
- 1) Large loops in netting a head height
 - 2) Could add more natural foraging material
 - 3) Could add more natural foraging material and reduce pellet
 - 4) Unable to see body due to feathers
 - 5) Possible anxiety due to people, generally calm
 - 6) Possible discharge from eye
 - 7) Interacted well with female

Notes

This area is for you to add notes, particularly for low scored sections. Please record the species and use a numerical key to relate to the worksheet.
You can also include diagrams if required or take pictures / film to act as an aid.

Total welfare score: 134

Percentage:

$$(Total\ score / 160 \times 100 = \%)$$

$$136 / 160 \times 100 = 85\%$$

Scoring

Add all the scores together and convert to a %.
If observing a group please give an overall score with notes indicating individuals of concern.

Group or individual

Circle if the animal is kept in a group or as an individual. If they are kept as a group please record the group size.

Activity – measure the welfare of...



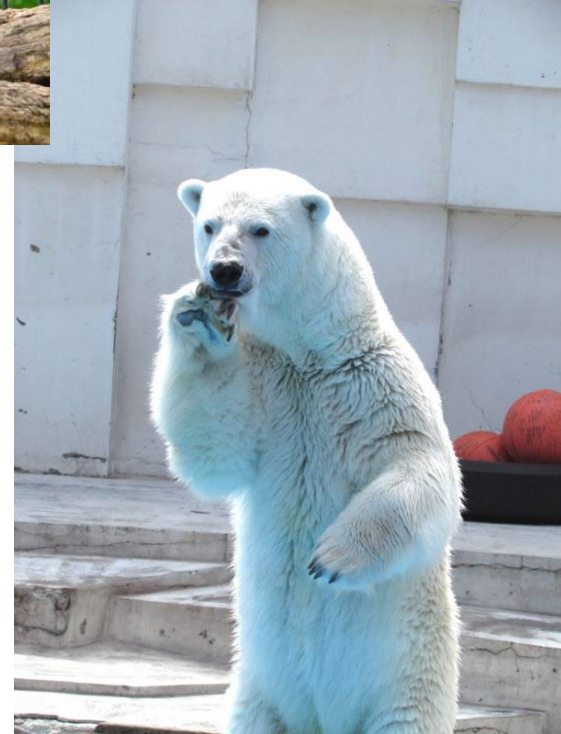
Asian elephant
(*Elephas maximus*)



Tufted capuchin
(*Cebus apella*)

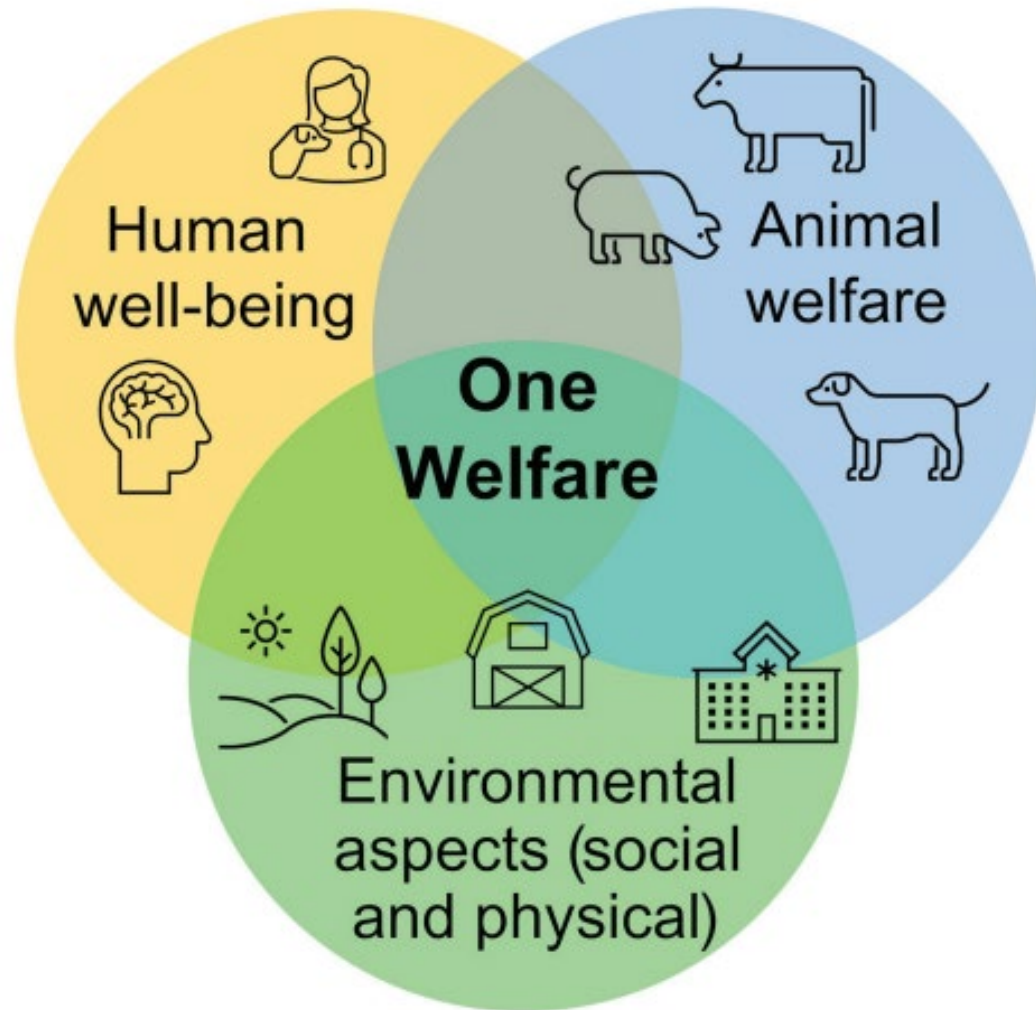


Amur Tiger (*Panthera tigris altaica*)



Polar Bear
(*Ursus maritimus*)

One Health, One Welfare



**Not only physical health,
but also our mental health
is connected**

Take Home Message

- Animal Welfare is about ‘what an animal experience’
- Five Freedoms concept is a principal of animal welfare
- Five Domains model is helpful to measure an animal’s welfare
- Think about not only physical but mental health for animals
- How can we implement good welfare in diverse culture?

Thank you! Any question?

