

Supplementary Table 1. Behaviour definitions.

No°	Domain	Factor	NA	Score	1	2	3
1	Domain	Food preparation	Not applicable	"Food is prepared in unhygienic conditions. Food is spoiled or rancid."	"Food is prepared in unhygienic conditions. Food is not spoiled or rancid."	"Food is prepared in hygienic conditions. Food is not spoiled or rancid but often damaged."	"Food is prepared in hygienic conditions. Food is not spoiled, rancid or damaged."
2		Ration	Not applicable	Ration is not nutritionally appropriate and threatens the animal's integrity.	Ration is not nutritionally appropriate but does not threaten the animal's integrity.	Ration is nutritionally appropriate but not varied.	Ration is nutritionally appropriate and varied.
3		Food distribution	Not applicable	"Food distribution does not take into account the needs of the taxon, i.e. does not meet any of the following criteria: - Encouraging foraging - Avoiding grabbing by dominant individuals - Distribution at fixed times, if possible twice a day"	"Food distribution somewhat takes into account the needs of the taxon, i.e. meets only one of the following criteria: - Encouraging foraging - Avoiding grabbing by dominant individuals - Distribution at fixed times, if possible twice a day"	"Food distribution mainly takes into account the needs of the taxon, i.e. meets two of the following criteria: - Encouraging foraging - Avoiding grabbing by dominant individuals - Distribution at fixed times, if possible twice a day"	"Food distribution does take into account the needs of the taxon, i.e. meets all of the following criteria: - Encouraging foraging - Avoiding grabbing by dominant individuals - Distribution at fixed times, if possible twice a day"
4		Water	Not applicable	Water is not available.	Water is available but dirty.	Water is available and clean but not replaced daily.	Water is available, clean and replaced daily.
5		"Body condition score(see BCS Appendix)"	Not applicable	Score of 1 or 5	Score of 1.5 or 4.5	Score of 2 or 4	Score between 2.5 and 3.5
6	Physical environment	Cleanliness and security	Not applicable	The living space is dangerous and threatens the animal's integrity.	The living space is not dangerous but very dirty and threatens the animal's integrity.	The living space is not dangerous and is clean but is not checked and cleaned as required on a daily basis.	The living space is not dangerous, is clean and is checked and cleaned as required on a daily basis.
7		Functional space	Not applicable	Functional space is unsatisfactory.	Functional space is satisfactory but neglects the vertical dimension.	Functional space is satisfactory and incorporates the vertical dimension.	Functional space is excellent and incorporates the vertical dimension.
8		Shelter	Not applicable	There is no shelter in the living space.	"There are shelters in the living space but they do not meet the following criteria : - Being large enough or spacious enough to accommodate all the animals at the same time - Protecting animals in wind, snow, hail, rain, sun and extreme temperatures"	"There are shelters in the living space but they meet only one of the following criteria : - Being large enough or spacious enough to accommodate all the animals at the same time - Protecting animals in wind, snow, hail, rain, sun and extreme temperatures"	"There are shelters in the living space and they meet all of the following criteria : - Being large enough or spacious enough to accommodate all the animals at the same time - Protecting animals in wind, snow, hail, rain, sun and extreme temperatures"
9		Temperature	Not applicable	"The temperature is inappropriate and threatens the animal's integrity. The animal is subjected to strong and rapid temperature fluctuations."	"The temperature is inappropriate and threatens the animal's integrity. Strong and rapid temperature fluctuations are avoided."	The temperature is adapted but the animal does not have access to a temperature gradient.	The temperature is adapted and the animal has access to a temperature gradient thanks to adapted structures (e.g. shelter, shaded areas).
10		Humidity	Not applicable	"The humidity is inappropriate and threatens the animal's integrity. For example, the animal suffers from nosebleeds."	The humidity is inappropriate but does not threaten the animal's integrity.	The humidity is adapted but the animal does not have access to a humidity gradient.	The humidity is adapted and the animal has access to a humidity gradient thanks to adapted structures (e.g. shelter, shaded areas, access to lodges).

Supplementary Table 1. Continued.

No°	Domain	Factor	NA	Score	0	1	2	3
11	Physical environment	Light	Not applicable	Light intensity and spectrum are inappropriate and threaten the animal's integrity.	Light intensity and spectrum are inappropriate but do not threaten the animal's integrity.	Light intensity and spectrum are appropriate but the animal cannot experience a variety of light conditions.	Light intensity and spectrum are appropriate and the animal can experience a variety of light conditions.	
12		Sound level and noise	Not applicable	The animal is continuously subjected to high noise levels.	The animal is regularly subjected to high noise levels.	The animal is sometimes subjected to high noise levels.	The animal is never subjected to high noise levels or has the opportunity to protect itself from them.	
13	Health	Animal monitoring	Not applicable	The animal is not visible to the caretakers for more than two consecutive days.	The animal is seen every day but its condition is not checked.	The animal's condition is checked once a day.	The animal's condition is checked several times a day.	
14		Veterinary exams	Not applicable	The animal is never subjected to veterinary examinations, even when they are necessary.	The animal is subjected to veterinary examinations only when necessary.	The animal undergoes routine examinations periodically but less than once a year.	The animal undergoes routine examinations at least once a year.	
15		Preventive medicine	Not applicable	The animal does not benefit from a preventive medicine programme, which threatens its health.	The animal benefits from a basic preventive medicine programme which does not necessarily meet the specific needs of the species.	The animal benefits from a partial preventive programme adapted to the specific needs of the species.	The animal benefits from a comprehensive preventive programme (quarantine procedures, vaccination, parasite control, contraception, disease screening) adapted to the specific needs of the species.	
16		Diseases	Not applicable	The animal shows alarming signs of disease (e.g. diarrhoea, vomiting, bloating, discharge from orifices, excessive scratching, laboured breathing) and is not monitored/treated.	The animal shows alarming signs of disease (e.g. diarrhoea, vomiting, bloating, discharge from orifices, excessive scratching, laboured breathing) but is monitored/treated.	The animal shows some signs of disease (e.g. diarrhoea, vomiting, bloating, discharge from orifices, excessive scratching, laboured breathing) but is monitored/treated.	The animal shows no signs of disease.	
17		Injuries	Not applicable	The animal has significant injuries and is not monitored/treated.	The animal has significant injuries but is monitored/treated.	The animal has some secondary injuries and is monitored/treated.	The animal has no injuries, except possibly minor injuries related to social interactions.	
18		"Coat condition (see Coat Condition Appendix)"	Not applicable	Score of 4	Score of 3	Score of 2	Score of 1	
19		Ease of movement	Not applicable	The animal cannot move.	The animal moves with great difficulty and/or with a severe limp.	The animal moves with some difficulty and/or with a slight limp.	The animal moves smoothly and flexibly.	



















Supplementary Table 1. Continued.

No°	Domain	Factor	NA	Score	1	2	3
20	Behaviours and behavioural interactions	Behavioural interactions with environment Enclosure design	Not applicable	0	"The enclosure is not designed to allow the behaviours of the species, i.e.: - does not allow the animal to express the following natural behaviours: walking, running, climbing, turning, reaching, stretching, bending, pushing, pulling, swinging, jumping - does not allow the animal to make choices (e.g. where and with whom to spend its time)"	"The enclosure is designed to allow the behaviours of the species, i.e.: - allows the animal to express some of the following natural behaviours: walking, running, climbing, turning, reaching, bending, pushing, pulling, swinging, jumping - allows the animal to make choices (e.g. where and with whom to spend its time)"	"The enclosure is designed to particularly allow the behaviours of the species, i.e.: - allows the animal to express the vast majority of the following natural behaviours: walking, running, climbing, turning, reaching, stretching, bending, pushing, pulling, swinging, jumping - allows the animal to make choices (e.g. where and with whom to spend its time)"
21		Enrichments	Not applicable	No enrichment items are offered to the animal.	Enrichment items (e.g. branches, stumps, buckets, boxes) are offered to the animal but are not effective.	Enrichment objects (e.g. branches, stumps, buckets, boxes) are offered to the animal and are quite effective.	Enrichment objects (e.g. branches, stumps, buckets, boxes) are offered to the animal, are effective and are introduced regularly to avoid habituation.
22		Substrate	Not applicable	Substrate is dangerous for the animal.	Substrate is not dangerous but is not suitable for foraging.	Substrate is suitable for foraging (e.g. natural vegetation, wood chips, straw, shredded paper) but is completely uniform.	Substrate is suitable for foraging (e.g. natural vegetation, wood chips, straw, shredded paper) and has a diversity of materials.
23	Behavioural interactions with other non-human animals	Social structure	Not applicable	The animal is housed continually alone or periodically alone without any visual, auditory or olfactory contact with conspecifics.	"The animal is housed periodically alone but with visual, auditory or olfactory contact with conspecifics. OR The animal is housed with conspecifics but the group is inadequate in terms of numbers of animals, reproductive and social structure or compatibility among individuals."	The animal is housed in a stable group, in which individuals are compatible, even if it is different from that observed in the wild in terms of numbers of animals or reproductive and social structure.	The animal is housed in a stable group, in which individuals are compatible, and fully appropriate in terms of numbers of animals or reproductive and social structure.
24		Social behaviours	Not applicable	"The animal: - shows no positive social behaviour (e.g. allogrooming, sexual activity, sharing food, social play) - regularly shows negative social behaviour (e.g. aggression, vocal threats)"	"The animal: - is restricted to a small repertoire of positive social behaviour (e.g. allogrooming, sexual activity, sharing food, social play) - regularly shows negative social behaviour (e.g. aggression, vocal threats)"	"The animal: - shows a good variety of positive social behaviour (e.g. allogrooming, sexual activity, sharing food, social play) - regularly shows negative social behaviour (e.g. aggression, vocal threats)"	"The animal: - shows a good variety of positive social behaviour (e.g. allogrooming, sexual activity, sharing food, social play) - shows little or no negative social behaviour (e.g. aggression, vocal threats)"

Supplementary Table 1. Continued.

No°	Domain	Factor	NA	Score	1	2	3
25	Behavioural interactions with humans	Relationship with zoo keepers	Not applicable	0	The animal shows moderate signs of aggression, fear or flight when approached by a caretaker.	The animal is quite indifferent when approached by a caretaker.	The animal generally shows positive behaviour (e.g. curiosity, involvement) when approached by a caretaker.
26		Relationship with visitors	Not applicable		The animal shows moderate signs of aggression, fear or flight when approached by visitors.	The animal is quite indifferent when approached by visitors.	The animal generally shows positive behaviour (e.g. curiosity, involvement) when approached by visitors.
27	Individual behaviours	Isolation possibility	Not applicable		The animal has no possibility to isolate itself from humans.	"The animal has possibilities to isolate itself from humans, but the following criteria are not met: - The place is accessible at any time - The place is large enough to accommodate all animals at the same time"	"The animal has possibilities to isolate itself from humans, and all the following criteria are met: - The place is accessible at any time - The place is large enough to accommodate all animals at the same time"
28		Non-stereotypical individual behaviours	Not applicable		"The animal: - shows no positive individual behaviours (e.g. playing, exploring, foraging, grooming, resting) - regularly shows negative individual behaviours (e.g. agitation, apathetic behaviours)"	"The animal: - shows a good variety of positive individual behaviours (e.g. playing, exploring, foraging, grooming, resting) - regularly shows negative individual behaviours (e.g. agitation, apathetic behaviours)"	"The animal: - shows a good variety of positive individual behaviours (e.g. playing, exploring, foraging, grooming, resting) - shows little or no negative individual behaviours (e.g. agitation, apathetic behaviours)"
29		Stereotypical behaviours	Not applicable		The animal shows stereotypies (e.g. pacing, rocking, somersaulting, twirling, eye-poking, overgrooming, self-sucking, regurgitation/reigestion, coprophagy, urophagy, hair-pulling, self-injuring) and these replace normal species behaviours.	The animal shows occasional stereotypies (e.g. pacing, rocking, somersaulting, twirling, eye-poking, overgrooming, self-sucking, regurgitation/reigestion, coprophagy, urophagy, hair-pulling, self-injuring), but these do not reduce the normal behaviours of the species.	The animal shows no stereotypies.

Supplementary Table 2. Body Condition Score (adapted from Clingerman and Summers 2012; Millette et al. 2015 et Wolfensohn and Honess 2005).

Score	Body condition	Description	<i>Macaca mulatta</i>		<i>Lemur catta</i>
1	Emaciated	Underlying skeletal structure is clearly visible. The body is very angular, with no subcutaneous fat layer to soften the prominences. The hip bones and spinous processes are very prominent, the head bones and ribs are prominent.			
1.5	Very lean	The body is very angular, without a layer of subcutaneous fat to soften the prominences. The hip bones, head bones and spinous processes are sometimes prominent.			
2	Lean	The body has very little fat reserves and is covered by a very thin layer of muscle: the hip bones, the spinous processes and the ribs are palpable.			
2.5	Thin	The body has a thin layer of subcutaneous fat. The hip bones and spinous processes are easily palpable but not prominent.			
3	Optimal	There is a well-developed muscle mass and a layer of subcutaneous fat, giving the spine a smooth and tight appearance. The hip bones and the spinous processes are invisible but palpable with slight pressure.			
3.5	Slightly overweight	The hip bones and spinous processes are invisible and palpable with firm pressure. A small abdominal fat pad may be seen.			
4	Overweight	The bone contours are smooth and less defined. The hip bones and spinous processes are difficult to palpate due to a heavy layer of fatty tissue. Fat deposits may accumulate in the axilla, inguinal and abdominal regions.			
4.5	Fat	The bone contours are smooth and ill-defined. The hip bones and spinous processes are very difficult to palpate. Prominent fat deposits are present in the axilla, inguinal and abdominal regions.			
5	Very fat	Very prominent fat deposits are present in the axilla, inguinal and abdominal regions. The hip bones and spinous processes are not palpable. Adipose deposits may alter posture and movement.			

Supplementary Table 3. Coat condition (adapted from Bellanca et al. 2014; Wolfensohn and Honess 2005).

Score	Hair condition	Description	<i>Macaca mulatta</i>	
1	Normal	Very good condition of the coat, complete cover		
2	Diffuse clearing to small patches	"Sparse or patchy hair Small patches of alopecia (2-5 cm ²)"		
3	Moderate to extensive plaques	"Areas of bare skin surrounded by intact hair Large patches of alopecia (>5cm ²)"		
4	"Very extensive patches to total absence of hairs"	"More skin than visible hair Generalized alopecia (more than 50% of the coat)"		

Supplementary Table 4. Behaviour definitions.

Behaviour	Definition	References
Social behaviours		
Positive behaviours		
Allogrooming	Cleaning another animal's body with the upper extremities or the mouth	Bezerra et al. (2011)
Sexual activity	Interacting or seeking sexual interaction with another animal (e.g. mating, attempted mating, genital display)	Cheyssac (2015); Ferreira et al. (2016)
Feed sharing	Taking all or part of the food from the hands of a conspecific without provoking a threatening response (and vice versa)	Bezerra et al. (2011)
Social playing	Non-aggressive pursuit, bouncing, grabbing, wrestling, soliciting and simulating bites, often with a 'playful expression' (relaxed expression, slack jaw, open mouth, without exposing teeth)	Ferreira et al. (2016); Řeháková-Petrů et al. (2009)
Negative behaviours		
Aggression	Showing attacking or threatening behaviours towards one or more individuals, including grabbing, biting, pushing, charging, punching the ground, lunging and chasing Being attacked and responding with avoidance, flight or immobilisation	Bret (2004); Deag (1977); National Center for the Replacement, Refinement and Reduction of Animals in Research (n.d.)
Vocal threats	Repeatedly making a loud, low-pitched sound at a conspecific	Bret (2014)
Individual behaviours		
Positive behaviours		
Playing	Manipulating an object, pushing and hanging from a rope or branch, often with a 'playful expression' (relaxed expression, slack jaw, open mouth, without exposing teeth)	Řeháková-Petrů et al. (2009)
Investigating	Inspecting a place or object by various means: e.g. examination, observation, sniffing, touching, light biting, licking	Bezerra et al. (2011)
Foraging	Moving intermittently and searching the substrate for food	Bezerra et al. (2011)
Autogrooming	Cleaning the body with the upper extremities or with the mouth	Ferreira et al. (2016)
Resting	Resting, sunbathing or sleeping (sitting, standing or lying down)	Hennessy et al. (2014)
Non-stereotypical negative behaviours		
Apathetic behaviours	Showing a lack of interest in the environment and conspecifics, sometimes accompanied by a withdrawn position and a fixed gaze	Hennessy et al. (2014)
Stereotypical negative behaviours		
Pacing	Moving repeatedly along the same route without an identified goal (walking or brachiation)	Birkett and Newton-Fisher (2011); Canadian Council on Animal Care (2019); Ferreira et al. (2016); Jacobson et al. (2016); Lutz (2014); Novak (2003); Pomerantz et al. (2013); Walsh et al. (1982)
Rocking	Swinging repeatedly and steadily in a bipedal, quadrupedal or sitting position	
Somersaulting	Performing a forward or backward jump with head or hand support, throwing the legs in the air	
Twirling	Turning around a fixed point, often on one foot	
Eye-poking	Applying intense pressure with the fingertips on the side of one or both eyeballs	
Overgrooming	Removing traces of dirt from the body by repeated and sustained licking or combing	
Self-sucking	Sucking on a part of the body	
Regurgitation/reingestion	Voluntarily regurgitating food for later consumption	
Coprophagy	Ingesting faeces	
Urophagy	Ingesting urine	
Hair-pulling	Repeatedly pulling out body hair with the hand	
Self-injuring	Biting, hitting or scratching oneself in a sustained manner to injure oneself	

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