



ASSESSING WELFARE IN ZOO ANIMALS: ANIMAL-BASED INDICATORS

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Animal welfare has become a priority for modern zoos. Animal welfare assessment protocols must be based on the principle that welfare includes the physical and the emotional health of the animals as well as their behaviour.

WELFARE INDICATORS

Welfare indicators can be conveniently divided into “resource-based” and “animal-based” indicators. The “resource-based” indicators are variables that are not measured in the animals but in their environment. Examples of “resource-based” indicators are the size and design of the enclosures where animals are kept, water provision or environmental enrichment. “Animal-based” indicators include all those variables that are measured directly in animals, such as changes in behaviour, appearance, health and physiological parameters.

INDICATORS RELATED TO THE BEHAVIOUR OF ANIMALS

Behavioural changes are particularly useful to assess welfare and they include both “abnormal” behaviours (i.e. behaviours that are never or rarely seen in the wild and that are indicative of poor welfare) and changes in the frequency, duration or intensity of normal behaviours. Stereotypies and apathy are examples of “abnormal” behaviours. Stereotypies have been described as repetitive behaviours which are caused by frustration or repeated attempts to adapt to the environment or which are due to a dysfunction of the central nervous system. In general, repetitive behaviours are considered to be indicators of poor welfare.

Apathy is defined as an abnormal state of inactivity accompanied by a lack of response to environmental stimuli. Apathy can occur in animals that are in barren and/or stressful environments, particularly when animals cannot perform any form of control over their environment.

The second type of behavioural changes that are particularly useful to assess welfare is the appearance of changes in the frequency, duration or intensity of normal behaviours. Some examples are changes in feed intake and in play, aggressive, affiliative and maternal behaviour.

INDICATORS RELATING TO THE APPEARANCE OF ANIMALS

Body condition, hair and feather condition, the posture and the facial expression of the animals are also useful to assess welfare. For example, both poor and excessive body condition might be indicative of a welfare problem. Poor body condition or weight loss may indicate an inadequate nutrition, the existence of a disease or chronic hunger. On the other hand, excessive body condition or

obesity may increase the risk of lameness and have other negative effects on animal health. Usually, obesity results from an inadequate diet or lack of physical exercise, either because the animal does not have enough space or because the environment does not stimulate the animal’s normal behaviour and activity level. Temperament is also important when you want to form stable groups of animals: the temperament of gorillas (*Gorilla gorilla*), for example, predicts aggressive and affiliative behaviour.

INDICATORS OBTAINED FROM RECORDS

The prevalence and incidence of disease and also life span are indicators obtained from records. Health is a very important aspect of welfare and any disease can be considered a negative indicator of welfare. Some of the diseases that are especially important when assessing animal welfare are:

- Diseases that cause pain (especially if it is severe and/or prolonged).
- Diseases that cause discomfort.
- Diseases that weaken the animal and prevent it from getting access to resources and make it more vulnerable to aggressions.
- Diseases that interfere with the expression of normal behaviour and reduce the possibility that the animal might experience positive emotions.
- Multifactorial diseases whose prevalence or incidence increases as a result of stress or environmental conditions.

Life span can also be used as an indicator of welfare. There are several factors that could explain the negative effect of captivity on the life expectancy of some species, such as prolonged stress or anxiety, the higher prevalence of diseases in captive conditions, inbreeding, impaired maternal behaviour and aggression between animals.

PHYSIOLOGICAL INDICATORS

Physiological measures can also provide useful information on the welfare of animals. The most commonly used physiological indicators are those that measure the hypothalamic-pituitary-adrenal (HPA) axis activity, because the stress response involves the activa-

tion of the HPA axis, which in turn results in an increased secretion of glucocorticoids. Concentration of cortisol, corticosterone or its metabolites is used to measure the stress response and, therefore, to assess animal welfare. The concentration of glucocorticoids can be measured in various biological samples, plasma, saliva, faeces and hair or feather being the most commonly samples used in zoo animals.

Other physiological measures such as oxytocin concentration, telomere length, heterophil:lymphocyte ratio and acute phase proteins are also used as welfare indicators.

CONCLUSION

As it has been previously stated, welfare includes the physical and the emotional health and also the behaviour of the animals, and there is no single indicator that can provide enough information to thoroughly assess animal welfare. For this reason, animal welfare can only be properly assessed using a combination of several indicators. Additionally, all the indicators described in this paper have methodological limitations that should be taken into account before reaching conclusions on the welfare status of zoo animals.

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