Relationship between behavioural diversity and faecal glucocorticoid metabolites: a case study with cheetahs (Acinonyx jubatus)

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Abstract

The ability to monitor the welfare of animal collections in zoological institutions is critical to the mission of these facilities. Historically, zoos have utilised negative indicators of welfare, such as stereotypic behaviour to examine and monitor collection animals. However, absence of stereotypic behaviour or negative indicators of welfare does not indicate that an animal is thriving. The goal of the current study was to examine the relationship between behavioural diversity and faecal glucocorticoid metabolite data in cheetahs at the San Diego Safari Park. Over a period of three months, cheetahs were monitored to explore the relationship between behavioural diversity and adrenal hormones related to the stress response. Results suggest that behavioural diversity can be utilised as an indicator of animal welfare to monitor animal collections within zoological facilities. However, additional research with other species should be conducted to better understand behavioural diversity as a positive indicator of animal welfare. We hope this manuscript will increase discussion surrounding behavioural diversity as well as increase efforts to validate it as an indicator of welfare.

Keywords: A. jubatus, adrenal activity, animal welfare, behavioural diversity, cheetah, faecal glucocorticoid metabolites

Introduction

Historically, people have perceived zoological institutions as having poor levels of welfare for some of the animals under their care (Reade & Waran 1996). Most issues cited include species engaging in stereotypic or abnormal behaviours that are most easily identified as maladaptive (Clubb & Mason 2003). Great effort has been devoted to improving the welfare of animals in zoos as demonstrated by the large proportion of peer-reviewed manuscripts on the welfare of wildlife species in the past decade (Walker et al. 2014). Continuous improvement means always looking for new ways to ensure each individual animal within a zoo collection is thriving. Until recently, the study of animal welfare typically focused on negative indicators of welfare (Whitham & Wielebnowski 2013). One of the most commonly used indicators of animal welfare within zoological institutions was the presence or absence of pacing (Mason & Latham 2004). This was likely due to ease of study and also to prevalence among carnivores (Clubb & Mason 2003). However, zoological institutions strive not only to ensure adequate welfare but to make sure each individual animal is thriving. As a result of this, other measures of welfare are needed as absence of abnormal or stereotypic behaviour does not equate to high levels of animal welfare (Mason & Latham 2004).

Historically, behavioural diversity has been thought of as a potential positive indicator of animal welfare (e.g. Swaisgood & Shepherdson 2005; Miller et al. 2011). Behavioural diversity can be defined as a measure of behavioural richness (number of observed behaviours) and frequency (frequency of observed behaviours). The underlying theory is that if zoological institutions are meeting the behavioural needs of animals then high levels of behavioural diversity would be observed in the collection. In this case, animals would be engaged in behaviours that they are motivated to perform. Alternatively, animals that have low levels of behavioural diversity are likely stereotyping or completely lethargic, neither of which would suggest a positive state of welfare (Grandin 1980; Mason & Latham 2004). Yeates and Main (2008) suggest that positive welfare can be best assessed by behavioural responses to resources that are valued by an animal. This further suggests that having an animal in the correct environment would lead to higher behavioural diversity. In addition, a number of studies conducted within zoological institutions have shown an increase in behavioural diversity in situations thought to be stimulating or positive in nature (e.g. Swaisgood & Shepherdson 2005; Miller et al. 2011). The goal of the current study was to examine the relationship between faecal glucocorticoid metabolites and behavioural diversity.