C-Well: The development of a welfare assessment index for captive bottlenose dolphins (Tursiops truncatus)

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Abstract

The field of welfare science and public concern for animal welfare is growing, with the focus broadening from animals on farms to those in zoos and aquaria. Bottlenose dolphins (Tursiops truncatus) are the most common captive cetaceans, and relevant regulatory standards are principally resource-based and regarded as minimum requirements. In this study, the farm animal Welfare Quality® assessment was adapted to measure the welfare of bottlenose dolphins, with a similar proportion of animal-based measures (58.3%). The ‘C-Well®’ assessment included eleven criterion and 36 species-specific measures developed in situ at three marine mammal zoological facilities, tested for feasibility and accuracy, and substantiated by published literature on wild and captive dolphins and veterinary and professional expertise. C-Well® scores can be calculated for each measure or combined to achieve an overall score, which allows for the comparison of welfare among individuals, demographics, and facilities. This work represents a first step in quantifying and systematically measuring welfare among captive cetaceans and can be used as a model for future development in zoos and aquaria, as well as a means to support benchmarking, industry best practices, and certification.

Keywords: animal-based measures, animal welfare, bottlenose dolphins, C-Well® assessment, dolphin welfare, welfare assessment

Introduction

Animal welfare research is expanding globally, and welfare assessments are now applied in a variety of forms to improve welfare and management protocols in animal use industries (Webster 2005; Dawkins 2006; Blokhuis 2008). Although there are comprehensive, widely supported welfare frameworks employed in Europe’s farming industry (see Veissier et al 2008), including but not limited to the ‘Five Freedoms’ model (FAWC 1992) and the Welfare Quality® (WQ) effort (Welfare Quality® 2009a,b,c), non-farm animal welfare is under-reported, particularly within the zoological industry (Reade & Waran 1996; Jiang et al 2007; Barber 2009). Welfare assessments, by design, involve objective and quantitative measures of physical and mental well-being (Barnard & Hurst 1996; Hosey 2005; Dawkins 2006; Whitham & Wielbnowski 2013) and are, ideally, developed in situ (Dawkins 2006). Most welfare assessments strategically incorporate both resource-based (ie input measures, resources provided to animals) and animal-based (ie outcome-based, parameters of animals’ behaviour/physiology) measures (Veissier et al 2008; Whitham & Wielbnowski 2013), with animal-based measures regarded as a more direct indication of welfare, though often limited in practical applicability (Whitham & Wielbnowski 2009; Roe et al 2011).

More than 700 million people visit zoos and aquaria worldwide each year (Gusset & Dick 2011), contributing to increased public awareness regarding animal welfare, and concurrent with an increase in welfare studies of captive animals (Rushen et al 2011; Whitham & Wielbnowski 2013). The American Zoological Association (AZA 2013) recently initiated the development of welfare assessment tools (Barber 2009; Whitham & Wielbnowski 2009), and Kreger and Hutchins (2010) designated captive animal welfare assessments as a research priority. Additionally, Barber (2009) described the structure and functionality of most zoos and aquaria as being well-suited for welfare assessments, as there are sufficient opportunities to assess individuals (versus herd assessments typical on farms) using animal-based measures. Yet, to date, there are no comprehensive, practically applicable welfare efforts in place for zoological animals.

Initial efforts to measure zoo animal welfare identified keeper assessments as a potential, yet limited, tool (Whitham & Wielbnowski 2009), and most of the progress in zoo welfare science is focused on captive elephants (Elephantidae) (Maple 2007; Mason & Veasey 2010). Salivary cortisol was highlighted as a practical and useful welfare measure for elephants (Menargues et al 2008), and faecal corticosteroid levels were correlated with relevant