Efficacy of an interactive apparatus as environmental enrichment for common bottlenose dolphins (Tursiops truncatus)

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Abstract

Environmental enrichment is a key component in improving the psychological and physiological well-being of animals under professional care. Environmental enrichment involves the addition of stimuli, including objects and cognitive challenges, into the environment in order to increase species-specific behaviour and provide opportunities for choice and control. The effectiveness of enrichment should be evaluated on a case-by-case basis to determine if the desired result has been achieved. Environmental enrichment devices (EEDs) can be utilised to present novel problems to animals under professional care. Here, a submerged interactive cognitive apparatus was presented to eight bottlenose dolphins (Tursiops truncatus) five days a week for 18 weeks and behavioural indicators of animal welfare assessed. As a group, dolphins spent more time in social swims compared to solitary swims and more time at the bottom of the habitat than the middle or top throughout the day, even when the apparatus was not immediately available. Individuals’ differences were apparent in the type and amount of engagement with the apparatus. Three dolphins engaged with the apparatus by solving it or consuming the reward. Two dolphins, D4 and D8, engaged simultaneously with the apparatus and participated in more social swimming with each other. D4 solved the interactive apparatus and engaged in more social active and solitary active behaviours. D1 and D4 increased their use of the bottom of the habitat. This study is the first report of underwater enrichment increasing dolphins time at depth throughout the day even when the enrichment device is not available. The interactive apparatus was an effective form of enrichment for dolphins participating in successful trials.

Keywords: animal welfare, bottlenose dolphin, enrichment, environmental enrichment device, habitat use, social enrichment

Introduction

Zoos and aquaria often implement environmental enrichment programmes to improve the welfare of animals under their care (Kuczaj et al 2002; Harley et al 2010). Environmental enrichment involves the addition of stimuli to the environment in order to increase species-specific behaviour and provide opportunities for choice and control (Chamove 1989; White et al 2003). Environmental enrichment can comprise a variety of different activities (for a review, see Hoy et al 2010), including the addition of objects to a habitat (eg television, balls, and underwater mazes; Newberry 1995; Swaisgood & Shepherdson 2005; Wells 2009; Clark et al 2013; Melfi 2013), novel scents (Fay & Miller 2015; Samuelson et al 2017), training (Brando 2012), and strategic social changes made with the goal of improving welfare (Hill et al 2015b).

Enrichment programmes focus on increasing positive indicators of welfare, such as increased behavioural diversity, affiliative behaviours, and habitat usage (Kuczaj et al 1998; Swaisgood & Shepherdson 2005; Wells 2009; Mason 2010; Miller et al 2016) and can result in decreased indicators of negative welfare, such as stereotypic and abnormal levels of aggressive behaviours (Carlstead 1998; Waples & Gales 2002; White et al 2003). Ethological and physiological studies examining the efficacy of environmental enrichment programmes should be conducted to determine the effectiveness of these enrichment devices in increasing positive welfare for the animals (Kuczaj et al 2002; Clegg et al 2015).

The enrichment value depends on the audience, as not all environmental enrichment devices (EEDs) are equally effective for bottlenose dolphins (Tursiops truncatus) of different ages and sexes (Eskelinen et al 2015; Neto et al 2016). Some dolphins exhibit strong preferences for specific objects while showing little interest in others (Mellen & MacPhee 2001; Delfour & Beyer 2012). Therefore, the effectiveness of enrichment initiatives should be evaluated to determine the type and quantity necessary to produce the desired result (Morgan et al 1998; Galef 1999). Successful cognitive enrichment tasks must: (i) require animals to engage their cognitive skills to solve problems or control the environment; and (ii) result in positive changes in validated measures of well-being (Clark 2011).