Bottlenose dolphins (*Tursiops truncatus*) in captivity: Advances in husbandry and an increased understanding of their psychological needs

Discusses recent findings indicating improvements in captive dolphin care, and potential sources of environmental enrichment, including "toys" and the human–animal bond.

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Introduction

Calls for the closure of dolphinaria and discontinuation of captive-dolphin research programs worldwide have grown stronger in the past few years (Marino & Frohoff, 2011; Rose *et al.*, 2009). Increasing insight into the sentience of dolphins raises questions as to whether we can ethically keep captive dolphins (Grimm, 2011). Individuals defending the practice argue that dolphins in captivity are "happy" by all scientific measures (i.e., displaying high reproductive success and low cortisol and aldosterone concentrations) (Menard, 2011), and dolphin welfare stands only to progress as we learn more about them (Reiss, 2011). This paper discusses a study that indicates some progress in the standard of care of captive dolphins and two other studies that investigate the efficacy of various forms of environmental enrichment in improving dolphin welfare.

Discussion

Advances in the husbandry of captive dolphins are reflected in the latest findings on the health status of captive populations. A study by Venn-Watson *et al.* (2011) looked at statistics from dolphins involved in the US Navy Marine Mammal Program. This study encompassed 167 individuals over a span of 20 years. It found that survival rates for calves in this captive population (>92%) were markedly higher than previously recorded rates (61-67%), indicating better calf husbandry procedures. Also, population survival rates were marginally, though not significantly, higher in this captive population (>97%) than in previously studied wild populations (91-96%). This indicates that there have been improvements in the standards of dolphin care, which is supported by statistics in recent literature finding survival rates in captive populations to be on par with those of wild populations (Mason, 2010; Marino & Frohoff, 2011). Captive dolphin welfare could only have improved with advancements in management procedures that led to better rates of survival.

Some of these management procedures may be further enhanced by more effective forms of environmental enrichment. Environmental enrichment is critical when improving the welfare of captive dolphins because it encourages the expression of the animal's full ethogram (Delfour & Beyer, 2011). It is also capable of alleviating some of the negative impacts that a relatively sterile environment has on captive dolphins (Marino & Frohoff, 2011; Grimm, 2011). A study by Delfour and Beyer (2011) assessed the effectiveness of various objects in providing enrichment to a group of six dolphins. These objects were introduced to the dolphins in 15-minute sessions, and any interest or interaction with the object was recorded. Objects that elicited visual interest were more likely to be manipulated, and these objects were found to be most enriching for the dolphins.

Delfour and Beyer (2011) also discussed the possible effects of social structure on a dolphin's responsiveness to stimuli and enrichment. They posited that the lone adult male (in a group of five females) in their study was less receptive to enrichment due to the absence of an appropriate partner figure (which in the wild would be another adult male). Along with previous findings that social stress can compromise physiological wellbeing (Waples & Gales, 2002), this emphasises the importance of appropriate social structuring in improving captive-dolphin welfare.

While Delfour and Beyer (2011) studied the efficacy of visual, tactile and to some extent social enrichment, another study by Miller *et al.* (2011) delved deeper into human–animal interactions as a source of environmental enrichment. This study involved the observation of 18 captive dolphins across six facilities for behavioural changes before and after human–dolphin interaction programs. It found a significant increase in indicators of wellbeing, such as socialisation, play behaviour and behavioural diversity following such interactions. This is consistent with findings in a previous study (Trone *et al.*, 2005), which took the increase in play behaviour following human interaction to indicate the dolphins' robust psychological wellbeing.

One very important observation in the study by Miller *et al.* (2011) was the prominence of spy-hopping behaviour in dolphins before and after human interaction programs. This suggests that dolphins actively look

for their trainers in anticipation of participating in such programs (Miller *et al.*, 2011). Coupled with the findings in Trone *et al.* (2005), where dolphins were observed to voluntarily interact with humans outside of the allocated time slots, some support is given to the hypothesis that humans can fulfill roles in dolphins' social lives that would otherwise be filled by other dolphins in the wild. This implies that dolphins do not continue to view humans as captors but, rather, in some cases as conspecifics (Trone *et al.*, 2005).

Dolphins participating in education programs typically have to learn to respond to a variety of visual cues given by their trainers. The activities involved in such programs introduce at least some degree of complexity, unpredictability and control into the dolphins' environment, which are hallmarks of enrichment (Miller *et al.*, 2011). This lends further support to the idea that human–animal relationships can be considered a major part of environmental enrichment for dolphins (Miller *et al.*, 2011; Claxton, 2011).

However, the findings in the studies by Delfour and Beyer (2011) and Miller *et al.* (2011) came with strong qualifiers. The individual personality of each dolphin means that not every dolphin will respond in the same way to similar forms of enrichment. Some more introverted or neophobic individuals may not respond to the same stimuli that more gregarious individuals do (Delfour & Beyer, 2011). Assessing individual dolphins for aberrant behaviour that results from novel stimuli is thus paramount to maintaining their welfare.

Conclusion

Both the studies on environmental enrichment contribute to an increasing pool of knowledge about how we can best meet the psychological needs of dolphins in captivity. On the other hand, the study by Venn-Watson *et al.* (2011) reflected improvements in the field of captive dolphin husbandry. However, some researchers maintain that the incidence of stress-related disorders is still higher in captive populations (Marino & Frohoff, 2011). More research should be conducted to ascertain if stress in a captive environment is continuing to compromise dolphin health. Continued refinements to husbandry programs must be undertaken to ensure upkeep of dolphin welfare.

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