A survey of foot problems, stereotypic behaviour and floor type in Asian elephants (Elephas maximus) in European zoos

M Haspeslagh*†, JMG Stevens‡, E De Groot‡, J Dewulf§, ID Kalmar# and CPH Moons¶

† Faculty of Veterinary Medicine, Department of Surgery and Anaesthesiology of Domestic Animals, Ghent University, Salisburylaan 133, 9820 Merelbeke, Belgium
‡ Centre for Research and Conservation, Royal Zoological Society of Antwerp, Koningin Astridplein 26, 2018 Antwerp, Belgium
§ Faculty of Veterinary Medicine, Department of Obstetrics, Reproduction and Herd health, Ghent University, Salisburylaan 133, 9820 Merelbeke, Belgium
# Faculty of Bioscience Engineering, Department of Molecular Biotechnology, Ghent University, Coupure Links 653, 9000 Ghent, Belgium
¶ Faculty of Veterinary Medicine, Department of Nutrition, Genetics and Ethology, Ghent University, Heidestraat 19, 9820 Merelbeke, Belgium
* Contact for correspondence and requests for reprints: maarten.haspeslagh@ugent.be

Abstract

This study investigates whether foot problems in captive Asian elephants (Elephas maximus) can be linked to: i) enclosure floor type; and ii) the occurrence of repetitive behaviour. Using a questionnaire, we collected information about floor type(s) in the enclosure, occurrence of repetitive behaviour and occurrence of foot problems for 87 Asian elephants (≥ 12 years) in 32 European zoos. The majority of elephants were housed on sand or concrete. A substantial proportion of the study population displayed repetitive behaviour. Respondents observed foot problems in 59 elephants, of which 53 displayed repetitive behaviour. Data analysis showed that elephants with access to sand flooring had a significantly greater chance of displaying stereotypic behaviour. Displaying this behaviour was also age-dependent with older elephants being more likely to do so. Furthermore, elephants that displayed stereotypic behaviour or that were being kept in an environment with sand or concrete flooring were more likely to have foot problems than others. Further research is required to determine whether the relationships between substrate, stereotypic behaviour and foot problems are of a causal nature.

Keywords: animal welfare, elephant, floor type, foot problems, stereotypic behaviour, zoo

Introduction

Foot problems, eg nail splitting or arthritis, are some of the most common health issues seen in Asian elephants (Elephas maximus) in captivity in the western world (Fowler 2001a) and prevention of these problems is of great importance for maintaining elephant welfare. Currently, a curative approach is used most often to address foot issues (Fowler 2001a). Dimeo-Ediger (2001) used a questionnaire to collect data in 54 zoos in the United States about what factors zoo staff perceived to cause and cure foot problems in elephants, and hypothesised that insufficient exercise or standing on wet or hard surfaces, such as concrete, may contribute to the development of orthopaedic problems in elephants. In 2009, another survey conducted in American zoos revealed that the use of concrete flooring indeed predicted the occurrence of foot pathology (Lewis et al 2009). Overall, few studies have investigated the effect of flooring, or any other factor possibly affecting the occurrence of foot problems.

Stereotypic behaviours are traditionally described as “repetitive, non-variable and apparently functionless behavioural patterns” (Ödberg 1978). In Asian elephants, several factors have been shown to increase the occurrence of stereotypic behaviour, such as a low environmental temperature (Rees 2004), predictable routines (Rees 2009b), boredom (Rees 2009b), a small group size (Rees 2009a) and lack of space (Stroud 2007).

Meller et al (2007) compared behavioural patterns of elephants before and after introducing rubberised floors in the enclosure and found that both normal locomotive behaviour and locomotor stereotypies increased on rubber flooring. The authors attributed the rise in stereotypic behaviour to the stress that comes with a new environment. Furthermore, they hypothesised that increased display of locomotion and more specifically of locomotor stereotypies, could be attributable to the fact that rubber substrate is simply more comfortable to the elephants than concrete flooring (Meller et al 2007).

Stereotypic behaviour patterns of Asian elephants, such as weaving, often involve repetitive weight transfers from one leg to the other (Gruber et al 2000; Elzanowski & Sergiel 2006). With every weight transfer, the weight-bearing