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The Management of Asian Elephants in Non-range Regions

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Introduction

Approximately 25% of the global Asian elephant population is currently in captivity (Desai 2008). While most captive Asian elephants are found in Asia, several non-range regions manage small populations of Asian elephants. Regional studbooks indicate that Australia and New Zealand manage approximately 30 Asian elephants, Europe counts about 330, and there are approximately 360 Asian elephants in the Americas (North, Central, and South). There are less than 100 captive Asian elephants in various other non-range Asian countries, i.e. Japan, South Korea.

The large number of Asian elephants in captivity leads to a need for structured, consistent management to provide the best care possible. In non-range regions, standards of elephant husbandry and management are addressed by guidelines suggesting more opportunities for socialization, larger spaces with natural substrates, and better handling techniques (Olson 2004). Overall there is a need to recognize concerns about captive elephant care and welfare, and to implement improved standards of husbandry, handling, and management allowing captive elephants to achieve a maximum of their natural behaviours and social interactions.

It is important to better leverage opportunities in these small non-range elephant populations for study, public awareness, advocacy, and fundraising programs in support of the conservation of wild Asian elephants and their habitats. The impact of such programs should be constantly evaluated and improved to ensure successful public education and awareness, as well as effective support of conservation actions.

Management

Captive Asian elephants have been displayed in menageries, zoos, and circuses since antiquity. Historical records indicate that a Syrian king kept some of the earliest zoo elephants in the 9th century B.C. (Sillar & Meyler 1968). The first documentation of elephants in circus occurred in Rome around 250 B.C., when these animals were not only used in combat spectacles involving gladiators and wild animals, but also participated in circus (Sillar & Meyler 1968). Single or small numbers of elephants were reported in European menageries for centuries, and the first Asian elephant to be displayed at a modern European zoo was in 1772 in Vienna, Austria. In contrast, the first Asian elephant to arrive on the American continent was a single animal brought to New York in the late 1700s from India (Goodwin 1951). In Australia, the first Asian elephant arrived in 1883 at the "Acclimatisation Society of Victoria" which later became the Melbourne Zoo; this young animal, about 6 years old at the time, came from Calcutta, India.

In non-range regions, captive Asian elephants are primarily used for exhibition, performance, and education in zoological institutions, commercial organizations (circus), and private facilities. In the past decade, improvements in animal welfare and management systems have been the focus for these elephants. As welfare and management concepts go hand in hand, there is a need to address these systems which originate from two basic ideas: "free contact" management where

staff and elephants share the same space, and "protected contact" management where staff and elephants are separated by some form of barrier (Olson 2004). Variables such as gender, age, and disposition of the exhibited elephants, staff expertise, and enclosure design and size all contribute to the management style used by a facility. Every management system has innate pros and cons for the exhibited elephants and staff; these need to be carefully considered when developing captive elephant programs. Currently most non-range facilities manage their elephants using a combination of these two basic systems; however in the majority of these facilities adult male elephants are generally managed in a "protected contact" system, in contrast to the "free contact" system used with captive adult male elephants in Asian range countries.

Successful captive elephant management relies on a clear strategy, as well as outlining proper protocols, and standards. Practical elephant standards have been developed by professional zoological organizations in non-range regions (AZA 2003; ARAZPA 2004; Olson 2004; EMA 2006; EAZA 2007) to address the physical and social environment of these animals. Written protocols are important for success as these tools aid the consistency of elephant management programs; periodic review of the policies ensures that standards are met and even improved where needed.

Veterinary medicine and science

Most captive elephant facilities in non-range regions have preventative veterinary programs in place that include issues such as regular vaccinations, blood and fecal testing, TB trunk wash, vitamin and mineral supplementation. In addition to these various medical issues, the needs for pest control and dung removal are also addressed (Olson 2004). Due to the availability of plentiful and rich fodder, some of these facilities manage overweight elephants which can contribute to various problems, e.g. birth problems, joint and foot problems, as well as arthritis (Fowler & Mikota 2006; Lewis *et al*. 2010). It is interesting to note that one disease, elephant pox, identified in Asia and in several European facilities (Baxby & Ghaboosi 1977), has not been diagnosed in captive elephants housed in other non-range regions such as North America. The cause for this region specificity is not known.

One of the challenging veterinary issues for facilities managing captive Asian elephants in non-range countries is the elephant endotheliotropic herpes virus (EEHV), which seems to mainly affect young animals and often results in fatalities. EEHV is a particular concern in facilities with reproduction programs, as it can affect captive born elephant calves, in particular those of the Asian species. EEHV was originally identified in zoo elephants in Europe, and has now been found in multiple wild and captive elephant populations in various regions (Ossent *et al*. 1990; Wiedner & Schmitt 2009). Diagnosis is only achieved via blood testing of an elephant with an active case (Latimer *et al*. 2007; Richman 2007), and very few animals have survived treatment. Intensive study continues in order to determine transmission, and improve prevention and treatment options.

Another recent focus of captive elephant veterinary research, particularly in the U.S., is tuberculosis (*Mycobacterium tuberculosis*) (TB). Currently the best TB diagnostic tool is a trunk wash culture (Olson 2004). Studies into alternative methods of diagnosis continue, as techniques used in other species are either not possible or dependable with regards to elephants (Wiedner & Schmitt 2009). Further studies on the treatment of TB in elephants are critical as several of the drugs normally used to treat TB in humans are very toxic for elephants (Wiedner & Schmitt 2007). It is important to consider that TB is not only a potential hazard for humans working closely with elephants, but that elephants could also be infected by exposure to TB positive humans, so effective diagnostic and education protocols are essential for staff responsible for captive elephant management.

Captive elephants in non-range regions have contributed greatly to the knowledge about Asian elephant physiology, biology, and communication. Detailed monitoring of elephants in these regions

has led to interesting biological discoveries; for example, the observation of liquid originating from elephant ears was first documented and studied in elephants in a North American facility (Riddle *et al*. 2000).

Modern instrumentation and technology also contributes to a better understanding of the species: the first recordings of infrasound produced by Asian elephants were done at a zoo in the U.S. (Payne *et al*. 1996); the use of ultrasound in elephants, allowing scientists to visualize internal organs, was developed in Germany (Hildebrandt *et al*. 1998, 2000) and first trialed at many zoological institutions; highly sensitive instrumentation providing detailed chemical analyses of biological samples was first used in the U.S. elephant population (Rasmussen 1999); and thermal imaging to measure from a distance the external temperature of elephants was initiated and developed in zoos in Europe and North America (Weissenboeck 2006). Much of this technology is now helping further studies of wild Asian elephants, such as the use of auditory recordings to provide a quantitative description of vocal communication in de Silva (2010).

Scientists studying captive Asian elephants in North America, Europe, and Australasia identified connections linking chemical signals and specific behaviours between females, males, mother-to-offspring, female-to-male and vice-versa (Rasmussen & Schulte 1998; Rasmussen & Krishnamurthy 2000). Elephant breath has also been closely studied in the captive environment. Over several years, numerous breath samples from captive male elephants (African and Asian) in the U.S. were analyzed (Rasmussen & Riddle 2004), and compared to endocrine data, confirming overall health and musth status. Data collected from captive male Asian elephants in non-range countries has contributed many details about musth physiology (Rasmussen *et al*. 2002; Greenwood *et al*. 2005), complementing studies of wild musth male Asian elephant behaviour (Desai & Johnsingh 1995).

Most captive Asian elephants in facilities outside of range countries were born in wild populations. Currently, Asian elephants are rarely exported outside of range countries, so the role of reproduction is vital to sustain these small captive populations, and regional breeding programs have been established (Olson 2004). In non-range countries, captive elephant breeding programs rely on low numbers of reproductively viable animals, and require studbooks and science to ensure the genetic diversity and health of these small populations (Olson 2004). In these regions, scientific study has supplemented the knowledge of female and male reproductive physiology (Hildebrandt *et al*. 2006), enabling successful and repeatable assisted reproduction, i.e. artificial insemination. Facilities in North America and Europe with a focus on reproduction have already produced second-generation (F2) offspring with both parents also born in captivity in these regions (Riddle 2002).

Education and awareness

Every facility managing Asian elephants outside of their natural range shares the responsibility to further public education and awareness about elephant conservation. This is best accomplished by supporting education and fundraising programs, promoting awareness of problems and issues facing wild Asian elephants, and sharing information (Riddle *et al*. 2003). Every facility managing captive elephants reaches members of the public and should promote important educational concepts about wildlife and the environment. Such public awareness helps motivate support for conservation and habitat protection policies (Nagendran & Riddle 2009).

It is also important to continually enhance the capacity of staff directly responsible for captive elephants (i.e. elephant managers, zoo veterinarians, keepers) via ongoing education and support of professional opportunities. Building networks is an important tool for creating better communication and improving professional awareness. Such captive elephant manager groups now exist. In 1988, elephant keepers in North America created the Elephant Managers Association (EMA), which has grown to an international membership of approximately 500 individuals and institutions, hosting annual elephant management conferences. The EMA

promotes the need for inter-professional dialogues to benefit captive elephant management. The association has developed guidelines for care and husbandry (EMA 2006), and is active in legislative issues addressing elephant welfare. The EMA served as a model for the development of other regional elephant manager groups, such as the European Elephant Keepers and Managers Association (EEKMA), established in 1997 in Vienna, Austria.

Conclusion

Discussions and efforts to identify and address concerns regarding captive elephant populations in non-range regions should continue. This will ensure that high standards of welfare and husbandry are implemented in every management system. Compliance with these standards is also an important consideration for improved management strategies.

The importance of communication and exchange of information between captive elephant managers in non-range regions and field conservationists in Asia should not be underestimated. Captive Asian elephants in facilities outside of their natural range contribute to conservation via biological information, public awareness of the threats facing wild elephants, and support of conservation actions. The many opportunities presented by captive Asian elephants in non-range regions must be acted upon to benefit all Asian elephant populations, now and in the future.

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