Elephant reproduction: Improvement of breeding efficiency and development of a breeding strategy

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Abstract
The efficiency of reproduction of the Asian elephant (Elephas maximus) has become of major concern. Captive breeding programs worldwide have met with limited success and few ex situ elephant populations are self-sustaining. The low birth rate and high mortality cause the captive population to decline rapidly. Self-sustaining populations in tourist elephant camps, timber elephant camps, circus or zoos would be essential to prevent a drain of wild populations and to reduce illegal wild capture to replace the captive population. To improve captive breeding management, we need to understand the reproductive physiology and, in particular, the estrous cycle of the Asian elephant. We investigated the female reproductive physiology in semi-captive elephants in Thailand, where the climate, ecology and nutrition are close to those of the wild population. For efficient breeding, adequate timing of copulation and insemination is essential. Hence, reproductive behaviors would be evaluated to identify the estrous period and to pinpoint the period of receptivity. This resulted in the development of an estrus detection method to improve the breeding efficiency. In addition, a GnRH-agonist administration protocol to induce a predictably timed ovulatory LH surge, which induced ovulation, was investigated to increase the success of both artificial and natural mating. Evaluation of the genetic relationship between breeding animals has been studied in order to maintain the genetic diversity. To this end, microsatellite markers were evaluated, which led to an optimal panel of markers for individual identification, paternal and maternal analysis and genetic diversity assessment. This panel has been proposed as the standard for studying genetic diversity across regions in Asia. Furthermore, genetic data of Asian elephants in Thailand and Dutch zoos were assessed. This information is most relevant for conservation programs and management. Pairing the right partners at the right time is one of the strategies to improve breeding efficiency. Reliable and informative pedigree data, generally available in zoo elephants but not in tourist and logging elephants, preferably combined with individual genetic analysis, is required to obtain insight in the genetic relatedness and to establish an effective breeding program. Breeding with least genetic relatedness partners, paired at the receptivity period of the female, would increase conception rate and prevent inbreeding. Furthermore, the proven bull with sufficient physical comfort for quality of life and female during the optimal reproductive stage of life (15-30 years) are recommended to achieve successful breeding. The results of these studies can be implemented in the captive breeding program in elephant camps and zoos to protect the sustainability of the Asian elephants. It is beneficial for both owners and conservationists to increase elephant numbers and maintain a viable captive population. Efficient breeding strategies, considering both the reproductive process and a broad genetic basis, will serve to increase and maintain the Asian elephant population for the future.

Links
http://www.academia.edu/7964443/Elephant_reproduction_improvement_of_breeding_efficiency_and_development_of_a_breeding_strategy
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