Experiences with the First Online Monitoring Tool for Body Condition Scores in European Zoo Elephants

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Besides measuring body mass, visual body condition scoring (BCS) is an established method for the assessment of an animal's physical state. For many zoo and wildlife species, corresponding protocols have been developed and proven very useful (Schiffmann *et al*. 2017). Especially in long-lived species such as elephants, the documentation of BCS changes over time is considered of higher significance than a lone-standing score at a specific point in time (Meehan *et al*. 2019; Schiffmann *et al*. 2018, 2019 and Fig. 1). Thus, regular BCS recordings and continuous documentation are recommended to facilitate longitudinal monitoring. The latter may serve as basis for analysis on the individual as well as the population level (Meehan *et al*. 2019; Schiffmann *et al*. 2019).

Such data may have the power to enhance our knowledge of the physical condition and development of elephants. However, their collection and storage imposes an additional workload for elephant-keeping institutions. Moreover, the scoring of animals by one single external expert is considered to be more reliable than scoring by the daily care staff (Stringer *et al*. 2010; Schiffmann *et al*. 2017).

With the aim to overcome these challenges and compile a comprehensive database, I established an online archive for BCS monitoring in European zoo elephants. The latter represents an additional outcome of a population-wide research project on the physical condition of European zoo elephants conducted in 2016 and 2017 (Schiffmann *et al*. 2018, 2019). After receiving the endorsement of the persons in charge for the management of African (*Loxodonta africana*) and Asian elephants (*Elephas maximus*) living in Europe, the corresponding facilities were provided with individual access to their data stored in the online archive in June 2018. The website is built upon Joomla! (www.joomla.org), one of the most frequently used content management systems in the world. The system standards allow flexible adjustments of the functions according to the

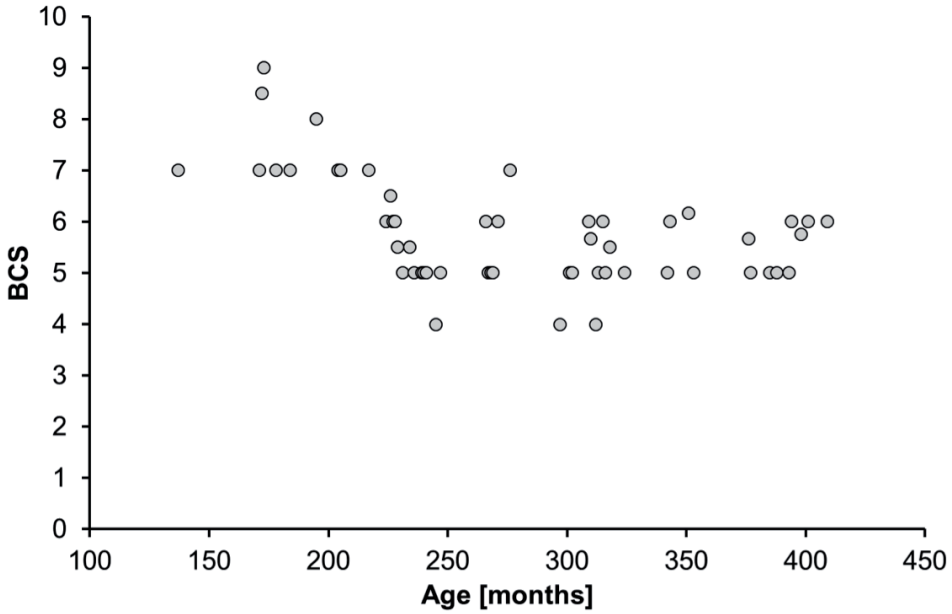

Figure 1. BCS changes over time for a female Asian elephant living in a European facility.

specific requirements of the database. Moreover, the site has some of the most commonly used extensions for security and further functionality.

With respect to copyright issues and potential misuse, data are available exclusively for elephant-keeping facilities. When putting the archive online in June 2018 it contained 146 zoos caring for 228 African and 351 Asian elephants (altogether 579 individuals) and in total 8486 datasheets consisting of a dated pictorial document with the ascertained score (Fig. 2). On individual basis, the number of datasheets ranged from one to 79 and covered a time span of up to 40 years. I applied a modified scoring protocol based on the method by Fernando *et al*. (2009), which has recently been confirmed as most capable system available today (Chusyd *et al*. 2019). Furthermore, the filing of the underlying photographs in the archive would provide the basis for re-scoring if a more reliable protocol should emerge in the future.

Encouragingly, I received exclusively positive feedback on the tool from elephant-keeping facilities during the months following its implementation. Several holders provide current photographs of their elephants to continuously update and further extend the archive. In June 2019, one year after its implementation, the archive contained 150 zoos, 230 African and 359 Asian individuals (altogether 589 elephants) and 9024 datasheets. This means a growth rate of 6.3% during the first year or slightly over 10 new datasheets per week.

With respect to this successful start and the positive feedback from elephant-keeping facilities, I started to investigate ways to ensure the maintenance and further development of the archive in the long-term. For this, covering the running costs and expenses for regular updating and extending the archive are the most critical challenges. Ideally, this could be managed by the collective support of elephant-keeping facilities in Europe. Encouragingly, several zoos have already taken up sponsorship for the archive and I am confident that a long-term solution will be found. Data collection over the coming years would show whether the average BCS of the European zoo elephant population reaches the ideal score range (considered 5–6 in a scoring range of 0–10) soon (Fig. 3).

An online archive for BCS monitoring is a helpful management tool for zoo elephants as well as other species. Thus, I strongly recommend developing and implementation of similar archives for other zoo animals (e.g. rhinos, tapirs, wild equids, big cats) and hope that our prototype for zoo elephants may facilitate such projects.

References

Chusyd DE, Brown JL, Golzarri-Arroyo L, Dickinson SL, Johnson MS, Allison DB & Nagy

Figure 2. Each datasheet consists of an entitled and dated photograph of the individual elephant and an ascertained BCS.

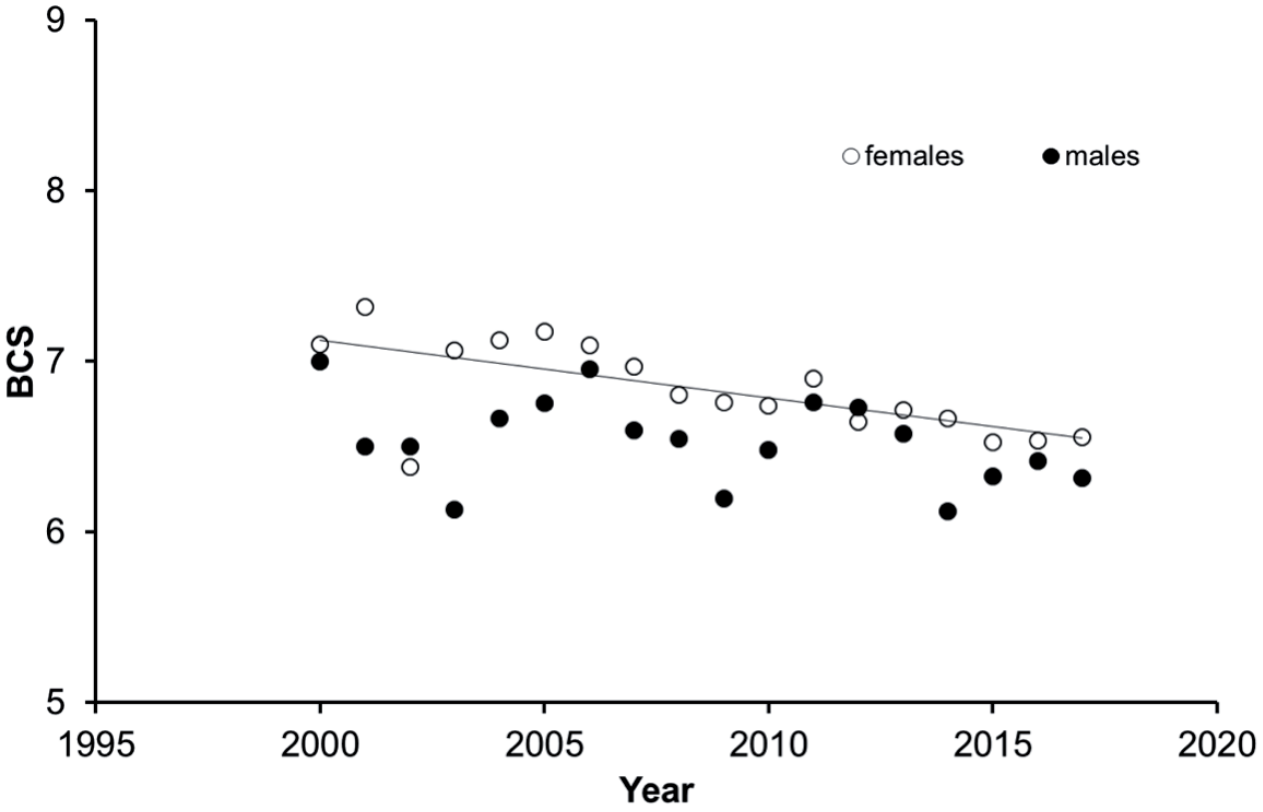

Figure 3. Archived BCSs for the European zoo elephant population enable the monitoring of the population-wide average score over years, which shows a trend towards the ideal scoring range (5-6/10) (modified from Schiffmann *et al*. 2019).

TR (2019) Fat mass compared to four body condition scoring systems in the Asian elephant (*Elephas maximus*). *Zoo Biology* **38:** 424-433.

Fernando P, Janaka HK, Ekanayaka SKK, Nishantha HG & Pastorini J (2009) A simple method for assessing elephant body condition. *Gajah* **31:** 29-31.

Meehan C, Greco B, Lynn B, Morfeld K, Vicino G, Orban D, Gorsuch C, Quick M, Ripple L, Fournier K & Moore D (2019) The elephant welfare initiative: A model for advancing evidence-based zoo animal welfare monitoring, assessment and enhancement. *International Zoo Yearbook* **53:** 45-61.

Schiffmann C, Clauss M, Fernando P, Pastorini J, Wendler P, Ertl N, Hoby S & Hatt J-M (2018) Body condition scores of European zoo elephants (*Elephas maximus* and *Loxodonta africana*): Status quo and influencing factors. *Journal of Zoo and Aquarium Research* **6:** 91-103.

Schiffmann C, Clauss M, Hoby S & Hatt J-M (2017) Visual body condition scoring in zoo animals – composite, algorithm and overview approaches in captive Asian and African elephants. *Journal of Zoo and Aquarium Research* **5:** 1-10.

Schiffmann C, Clauss M, Hoby S, Codron D & Hatt J-M (2019) Body condition scores (BCS) in European zoo elephants' (*Loxodonta africana* and *Elephas maximus*) lifetimes - a longitudinal analysis. *Journal of Zoo and Aquarium Research* **7:** 74-86.

Stringer EM, Stoskopf MK, Simons T, O'Connell AF & Waldstein A (2010) Ultrasonic measurement of body fat as a means of assessing body condition in free-ranging raccoons (*Procyon lotor*). *International Journal of Zoology* **2010:** e972380.