Measuring Animal Welfare

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Zoo Animal Welfare Science: An Emerging Field
Established in 2001

Formal inclusion and recognition of animal welfare as a central tenet of AZA’s animal programs
AZA AWC Welfare Definition

*Animal Welfare* refers to an animal’s collective physical, mental, and emotional states over a period of time and is measured on a continuum from poor to excellent.
Implicit Concepts

- Emotional & cognitive experiences
- “Cradle to Grave”
- Tradeoffs
- Measures of good welfare
Resource Based Assessments: AZA Accreditation

Enrichment + Enclosure Design + Nutrition + Research Programs + Veterinary Care + Husbandry Training + Population Management + Staff Training

Maximize the Welfare Potential
Beyond Great Care

Great care is a *prerequisite* for good welfare.

For animals *to thrive* we need to take into account psychological aspects of welfare such as mental, emotional, and social health.
Animal Based Welfare Assessment

- At individual animal level
- Relative, not absolute
- No single measure
Types of Welfare Assessments

- **Behavior**
  Time budgets, behavioral diversity, activity, species-appropriate behaviors

- **Physiology**
  Hormone levels, stress response, reproduction, nutrition

- **Physical Appearance & Health**
  Body condition, muscle tone, species-specific health parameters
Behavior Lab – Oregon Zoo

- Behavior Check sheets
- Data Collection Apps
- I-Pads
- Camera/Video Recording
- GPS/Accelerometers
- VAST Volunteers!!!
Behavioral Indicators

Positive:
Self maintenance, curiosity, play, high behavioral diversity

Negative:
Stereotypic behaviors, aggression, self-injury, low behavior diversity
Endocrine Lab – Oregon Zoo
Hormone Monitoring:
Feces, Urine, Saliva, Serum
Physiological Indicators

Measuring Hormones:

• Reproductive function
• Adrenal function/stress response
Investigation of individual and group variability in estrous cycle characteristics in female Asian elephants (Elephas maximus) at the Oregon Zoo


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Abstract
Estrous cycle activity through longitudinal progesterone monitoring is important for optimizing breeding management of captive elephants and understanding impact of life events (births, deaths, and transfers) on reproductive function. This study summarized serum progesterone profiles for eight Asian mounted elephants (Elephas maximus indicus) and one Bornean elephant (E. maximus borneensis) at the Oregon Zoo over a 20-yr interval, and represents the longest longitudinal dataset evaluated to date. Estrous cycle characteristics were more varied than previously reported for this species, with an overall duration of 12 to 19 wk, initial phase duration of 4 to 11 wk, and follicular phase duration of 2 to 12 wk. In general, there was more cycle variability across than within individual elephants. Compared with other elephants in the group, the Bornean female exhibited consistently longer cycle lengths, higher progesterone concentrations, and greater cycle variability; however, it is not known if this represents a subspecies or an individual difference. Cycle durations did not appear to change over time or with age, and the first pubertal cycle was similar to subsequent cycles. Variability in duration of the follicular phase was greater than that of the luteal phase. In addition, there was a significant negative relationship between luteal and follicular phase durations, suggesting a possible regulatory role of the follicular phase in maintaining a relatively consistent cycle duration within individuals. Overall, we found these elephants to be highly resistant to stressors, but deaths, and changes in herd structure had minimal effect on cycle dynamics over time. In conclusion, the higher range in cycle phase characteristics is likely because of the larger number of elephants studied and longer duration of longitudinal monitoring, and may be more representative of the captive population as a whole. Furthermore, identification of significant interanimal variability suggests that understanding the complexities of herd reproductive characteristics could facilitate development of more effective institution-specific breeding management strategies.

Keywords: Elephant; Reproduction; Estrous cycle; Follicular phase; Luteal phase; Progesterone

1. Introduction
The Asian elephant (Elephas maximus) is listed as endangered, with estimates of only 25,000 to 50,000 remaining in the wild, and approximately 16,000 managed under human care [1–4]. In North America, there are 269 (53 male, 216 female) individuals in the Asian Elephant Regional Studbook [5]. Currently, this population is not self-sustaining and historically has relied on supplemental imports from range countries to sustain numbers, an increasingly unrealistic option as...
The Stress Response
“Good” versus “Bad”

“Eustress”

“Distress”

Gorilla

Fecal Corticoids (ng/g)

Days of Study

Days of Study

Fecal glucocorticoids (ng/g)
Physical Indicators

• Good body condition and weight
• Fur, feather, skin condition
• Reproductive success
Combining Measures
Elephant Welfare Project 2010-14

70 AZA Zoos
255 Elephants
26 researchers

Goal: Provide objective baseline data and identify risk factors that may impact welfare
Combining Measures
Elephant Welfare Project 2010-14

- Body Condition & Health
- Physiology
- Behavior
- Personality
- Social Interactions
- Space Use/Activity
Family Matters!

- Multigenerational, matriarchal herds
- Males and females
- Calves
Social Complexity and Choices

- Variable groupings
- Time alone
Exercise - Motivation Is Key

<2 miles/day

>15 miles/day
Space

- Complexity of space
- Substrate
- Interaction and Choices
Foraging/Feeding

• Diversity
• Predictable/Unpredictable
Ongoing Data Collection

- Physiological data (fecal and serum samples)
- GPS/accelerometer data
- Behavior data (video tapes, cameras, observers)
- Body condition and other health parameters

New PhD Student, Sharon Glaeser
Borneo Forest Elephants