The Journal of the American Association of Zoo Keepers, Inc.

Animal Keeper Forum

AKF

August 2018, Volume 45, No. 8

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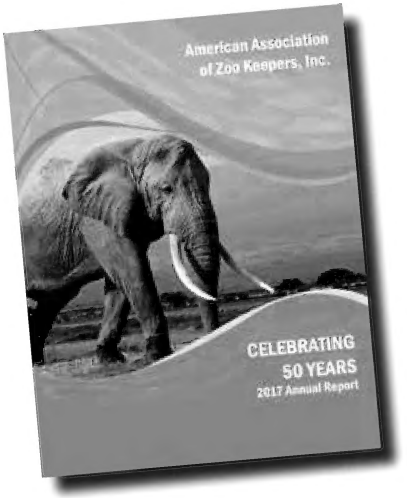

AAZK 2017 Annual Report
Pages 223-226

Wake Up

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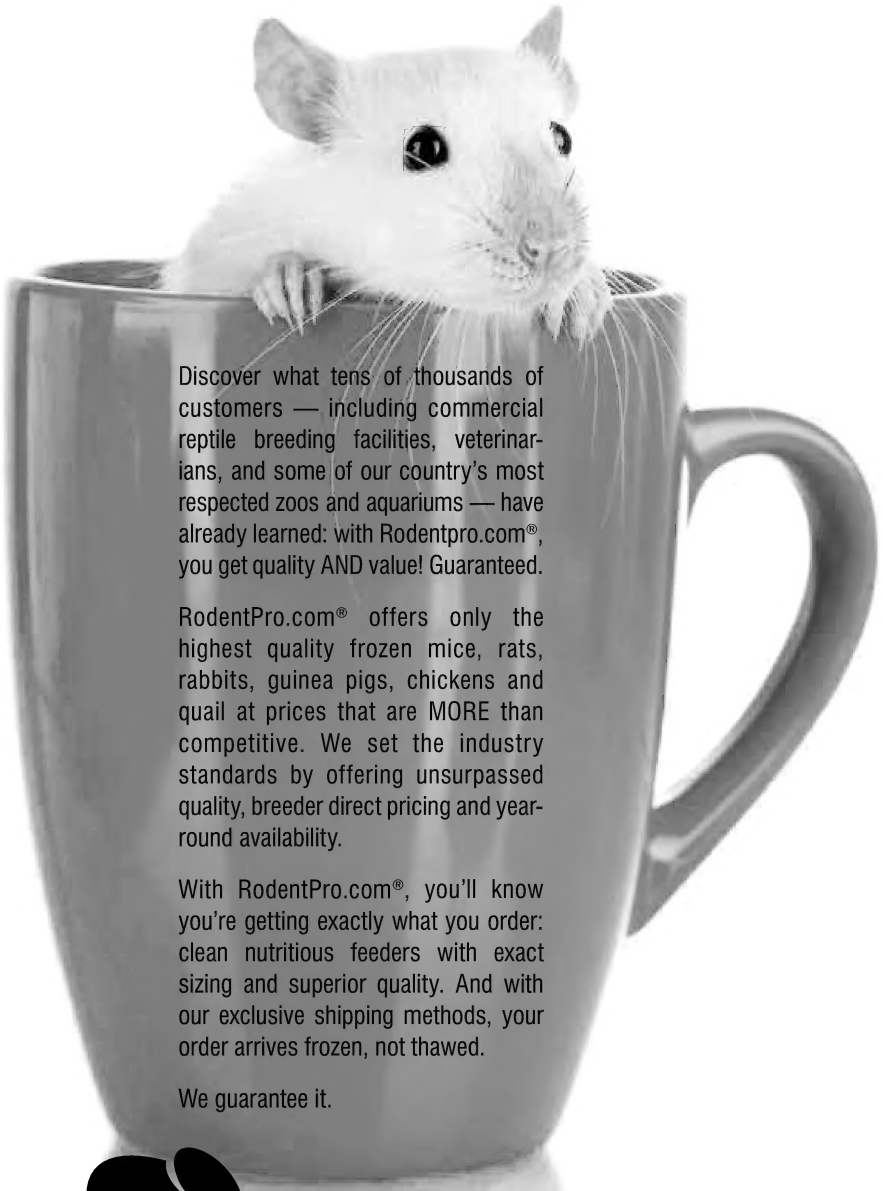

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The American Association of Zoo Keepers, Inc. exists to advance excellence in the animal keeping profession, foster effective communication beneficial to animal care, support deserving conservation projects, and promote the preservation of our natural resources and animal life.

ABOUT THE COVER

This month's cover photo comes to us from Ashley Arimborgo of Cheyenne Mountain Zoo and features "Nesher", a Eurasian Griffon Vulture (*Gyps fulvus*). Nesher was hatched and hand-raised in Israel 27 years ago. She is one of only two Eurasian griffon vultures in the U.S. Her name means "eagle" in Hebrew which is quite fitting as zoo guests often mistake her for a bald eagle with her beautiful white feather ruff around her neck!

Nesher was at Columbus Zoo before she came to Cheyenne Mountain Zoo in 2001 and former keepers remember their time with her fondly! She is full of personality, "spunk" and wins the hearts of keepers, vet staff and zoo guests wherever she goes. Eurasian griffon vultures are found in southern Europe and Asia and northern Africa. Currently their numbers are not threatened, unlike over half of the world's vulture species. Vultures are vital to ecosystems around the world. They are "Nature's Clean Up Crew" and serve an important purpose of cleaning up carcasses and helping prevent the spread of disease. International Vulture Awareness Day (IVAD) was started in 2009 to educate people about the plight of vultures and what we can do to help protect them. The IVAD is being celebrated around the world on September 1st this year. Come join us!

Articles sent to ***Animal Keepers' Forum*** will be reviewed by the editorial staff for publication. Articles of a research or technical nature will be submitted to one or more of the zoo professionals who serve as referees for ***AKF***. No commitment is made to the author, but an effort will be made to publish articles as soon as possible. Lengthy articles may be separated into monthly installments at the discretion of the Editor. The Editor reserves the right to edit material without consultation unless approval is requested in writing by the author. Materials submitted will not be returned unless accompanied by a stamped, self-addressed, appropriately-sized envelope. Telephone, fax or e-mail contributions of late-breaking news or last-minute insertions are accepted as space allows. Phone (330) 483-1104; FAX (330) 483-1444; e-mail is shane.good@aazk.org. If you have questions about submission guidelines, please contact the Editor. Submission guidelines are also found at: aazk.org/akf-submission-guidelines/.

Deadline for each regular issue is the 3rd of the preceding month. Dedicated issues may have separate deadline dates and will be noted by the Editor.

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ANIMAL KEEPERS' FORUM

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The American Association of Zoo Keepers (AAZK) seeks to be ahead of the curve for industry changes and the AAZK Regulation Team envisions keepers at the forefront of knowledge related to the safety and welfare of animals, staff, and visitors.

Summer is often a time of the year when zoos and aquariums reexamine their regulations. Whether this is a response to new animals being acquired or born in the spring, seasonal staff being brought on for the busiest season of the year, or an upcoming facility inspection, this time of the year can bring on major revisions that require animal care professionals to understand and adapt. The American Association of Zoo Keepers (AAZK) seeks to be ahead of the curve for industry changes and the AAZK Regulation Team envisions keepers at the forefront of knowledge related to the safety and welfare of animals, staff, and visitors.

Since joining the Board of Directors at the 2017 AAZK National Conference, I have served as the Board Oversight for the Regulations Team which consists of the Safety Committee and the Behavioral Husbandry Committee (BHC). It is amazing for me to think that less than one year ago I started my work alongside these committees and jumped on board with them as they both had presentations and major ongoing projects during the Conference.

I attended the Safety Committee's topical workshop "Crisis Management for Zoos and Aquariums" to get a feel for what sort of the work the Committee does and came away extremely impressed with the knowledge presented by the members. A review of their previous conference presentations, AKF articles, and Job Hazard Analyses (JHA) made it clear to me that I would be working with a group of subject matter experts. The passion of this group has continued to be on display since the 2017 Conference in their production of thought-provoking social media posts and AKF articles, while planning for their next great presentation, a Professional Certificate Course (PCC) on the topic of Safety at the 2019 AAZK Conference in Indianapolis.

The BHC presented a unique opportunity as I transitioned into the Oversight role of a group that was putting the finishing touches on a major pre-existing project, an updated AAZK Enrichment Notebook. Reviewing the draft of the Notebook for the first time was spectacular, as it was clear that the Committee members had quite a depth of understanding for all parts of animal enrichment. The AAZK Enrichment Notebook was published early in 2018 and is now available in the AAZK Shop. I could not be more proud to have assisted the BHC with the production of such an amazing resource. The year 2018 has seen the great work continue as task forces work toward projects such as paper and poster presentations, member resources, and engaging social media posts.

This past year has required me to challenge myself in new ways in service to the Regulations Team, the Board, AAZK, and the membership, but the rewards of supporting such a great organization are unparalleled. I'm privileged to work alongside the Safety and Behavioral Husbandry Committees and look forward to their continued development and growth in support of the professionals in the ever-evolving field of animal husbandry.

Paul Brandenburger
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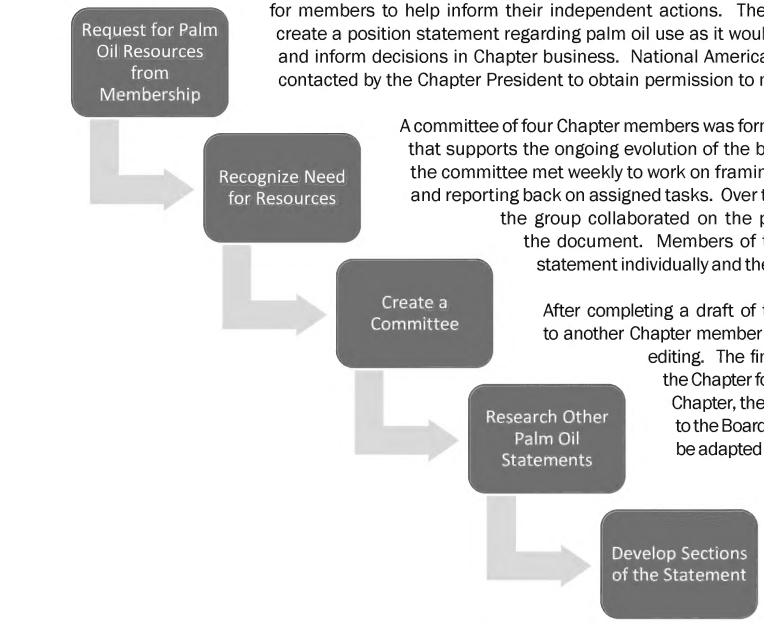
Where Do We Stand?

Crafting a Position Statement for Sustainable Palm Oil

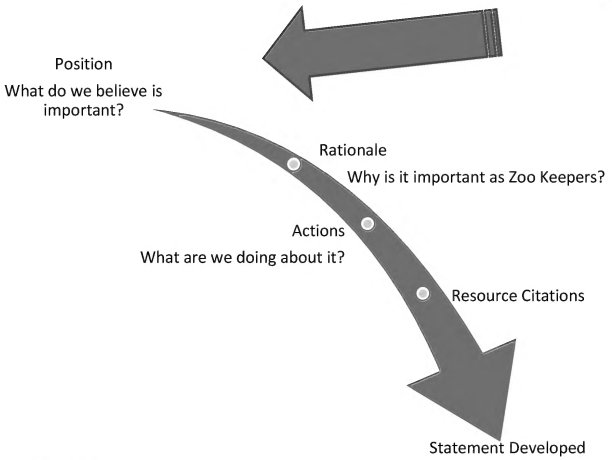
Christine Anne -Lead Animal Keeper, Julie Boberg -PSAAZK member,
Joanna Klass-Animal Keeper and Stephanie Miller- Lead Animal Keeper
Puget Sound Chapter of AAZK
Woodland Park Zoo
Seattle, WA

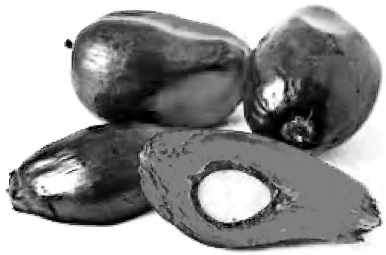
In the summer of 2017, a member reached out to the Chapter for help on how to address the newly included use of palm oil in the main line of a popular grocer. The Chapter wanted to create a non-advocacy resource for members to help inform their independent actions. The Chapter decided the best option was to create a position statement regarding palm oil use as it would provide resources for Chapter members and inform decisions in Chapter business. National American Association of Zoo Keepers (AAZK) was contacted by the Chapter President to obtain permission to move forward with creating the statement.



A committee of four Chapter members was formed to craft an adaptive position statement that supports the ongoing evolution of the best practices in palm oil farming. Initially, the committee met weekly to work on framing the statement, sharing topical research, and reporting back on assigned tasks. Over the course of about four and a half months, the group collaborated on the process, the research, and the writing of the document. Members of the committee worked on sections of the statement individually and then it was edited during committee meetings.

After completing a draft of the statement, the committee submitted it to another Chapter member and the zoo's Conservation Coordinator for editing. The final draft of the statement was submitted to the Chapter for review and approval. Once approved by the Chapter, the Chapter President submitted the statement to the Board of Directors of National AAZK to see if it could be adapted for National's use. The document was edited to make it applicable for National AAZK and was submitted and adopted by the Board of Directors. The flowchart represents the process that was used in crafting the position statement.





Palm Oil Position Statement Developed for the National American Association of Zoo Keepers

By the Puget Sound Chapter, Woodland Park Zoo, Seattle, WA
2018

Position
The National American Association of Zoo Keepers (NAAZK) supports the advancement of best practices within a sustainable palm oil industry.

The NAAZK members include zookeepers and zoo staff and are well-positioned to encourage change through purchasing decisions, zoo visitor education, engagement that exemplifies a dedication to the animals in their care and advancing conservation initiatives that impact wild animals.

Rationale
NAAZK members are dedicated professionals that understand the compassion, motivation, and initiative that is required to care for captive wildlife while also understanding the impacts that choices have on their wild counterparts. There is an inherent duty to ensure the survival of animals in captivity and in the wild, demonstrated by participation in *ex-situ* and *in-situ* wildlife conservation globally. NAAZK members also support environmentally accountable and sustainable practices which allow people and animals to thrive. There is a deep understanding of the socioeconomic barriers to wildlife conservation and the need to acknowledge the palm oil industry as a whole.

Many of the species impacted by the palm oil industry are cared for in zoos. The palm oil industry is well-studied and has long-impacted the wildlife of Southeast Asia. It has been found that Southeast Asian bird species abundance was 200 times lower in palm oil monocultures than in intact forested areas.[1] Overall, palm oil plantations only contain 15% of plant and animal species found in undisturbed forest which is a cause for concern as the palm oil industry expands.[2] Koh & Wilcove showed that palm oil monocultures decreased the biodiversity of birds by 77%, and butterflies by 83% in Malaysia.[3] The impacts on these smaller species are indications of impacts on other species that share these habitats including the large megafauna like tigers, orangutans, and Asian elephants.[4]

With the ongoing expansion of the palm oil industry, many species from other regions will soon experience the impacts of palm oil monoculture. This impact and potential loss comes from the fact that most of the world's species diversity is concentrated in humid tropical forests, which is ideal habitat for oil-palm fruit production.[5] One of these regions is South America, which has seen a rapid increase in its palm oil industry. The majority of land that is most suitable for palm oil growth is still under forest cover.[6] Preliminary analyses in Brazilian Amazonia shows that almost half of the forested area has ideal temperature, rainfall, and soil variables suitable for oil palm cultivation.[7] These ideal conditions for potential future palm oil production can also be found in Africa and Central America, where there is historical palm oil cultivation.[4]

As countries move to increase palm oil production, there is an opportunity to use historical palm oil industry impacts as key factors in improving sustainability. This sustainability covers how land is converted over to palm oil use, where these farms are developed, and how the palm oil is processed at the factories.[8] The impacts of palm oil are experienced at both a landscape level and an industry level. Palm Oil Consumers Action outlines key factors in ensuring sustainable palm oil, and they include growing palm oil with respect for wildlife and biodiversity, respecting native land owners, ensuring care for water quality, and factoring in greenhouse gas emissions in palm oil production practices.[9]

In order to promote the best outcome for biodiversity without ignoring the complexities of the issue, NAAZK supports using best practices for palm oil production instead of boycotting palm oil altogether. The Roundtable on Sustainable Palm Oil (RSPO) has developed a set of standards for and certifies the sustainable production of palm oil. Their standards ban planting new palm oil in primary forests or areas of high conservation value, require the informed consent of local people before they plant on their land with good working conditions and wages, prohibit the burning of forest to clear land, requires safe pesticide use and erosion control, and grower compliance with all local and international laws.[10] The RSPO is working towards future goals in certification which would include eliminating the destruction of primary forest for palm oil production altogether and a ban on planting on peat.[10] Additionally, Gaveau et al. (2009) suggest paying land owners for lost opportunity costs for not growing palm oil on new land and halting the construction of new roads that historically promote deforestation.

NAAZK supports the RSPO as a leader in sustainable palm oil and recognizes that the work that the RSPO conducts is in alignment with the actions of members to support that mission.

Actions

- Uphold the highest standards in sustainable palm oil through the choices we make as consumers and conservationists.
- Integrate palm oil education for zoo professionals by staying up-to-date on relevant scientific research.
- Educate the public about the wonders of the animal kingdom and the complicated issues facing biodiversity, serving as storytellers for the natural world.
- Demonstrate our compassion for animals by participating in *in-situ* conservation projects impacted by palm oil.
- Spearhead vital fundraisers for wildlife and associated palm oil communities, promoting coexistence between humans and nature.
- Provide resources to the public about companies that use RSPO-approved plantations.
- Support the enforcement of strict higher standards by sustainability certification bodies.
- Encourage immediate establishment of sustainable practices in regions where oil-palm plantations are just beginning to develop.

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Post upcoming events here!
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September 17-28, 2018
Smithsonian-Mason School of Conservation. Ecology and Conservation of Migrating Birds
Front Royal, VA
For more information go to:
smconservation.gmu.edu

September 23-27, 2018
AZA Annual Conference
Seattle, WA
Hosted by Seattle Aquarium and Woodland Park Zoo
For more information go to:
aza.org/conferences-meetings#mym

October 8-12, 2018
From Good Care to Great Welfare
Detroit, MI
Hosted by The Detroit Zoological Society's Center for Zoo and Aquarium Animal Welfare and Ethics
For more information go to:
www.czaw.org/events

October 9-12, 2018
39th Annual Elephant Managers Association Conference
Miami, FL
Hosted by Zoo Miami
For more information go to:
elephantmanagers.com/testimonials/ema-annual-conference-2018/

October 14-18, 2018
International Congress on Zookeeping
Buenos Aires, Argentina
Hosted by Fundacion Temaiken and the International Congress of Zookeepers
For more information go to:
iczoo.org/congress

October 15-20, 2018
Otter Keeper Workshop
Portland, OR
Hosted by Oregon Zoo
For more information go to:
otterkeeperworkshop.org/

October 23-24, 2018
The Working Bird Husbandry Workshop
Atlanta, GA
Hosted by Zoo Atlanta
Contact Rebecca Young for details and a registration form:
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Waterfowl Conservation Workshop
Greenville, NC
Hosted by International Wild Waterfowl Association and Sylvan Heights Bird Park
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November 5-7, 2018
Canid and Hyenid Husbandry Course
St. Louis, MO
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For more information go to:
stlzoo.org/canidtag

AMERICAN ASSOCIATION of ZOO KEEPERS

October 4-8, 2018
AAZK National Conference
Denver, CO

Hosted by the Rocky Mountain AAZK Chapter and Denver Zoo

rmaazk.org/2018-national-aazk-conference/

November 7-8, 2018
Bat Husbandry Course
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We've done it, we've finally gone to the BIRDS!

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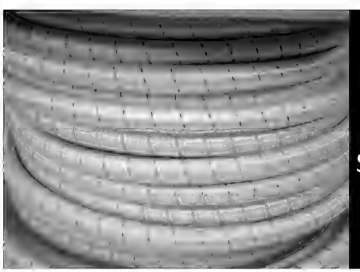

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In 2013, the San Diego Chapter was the second leading fundraiser in the American Association of Zoo Keepers' annual Bowling for Rhinos campaign. As the top individual fundraiser for the Chapter, I was awarded the opportunity to travel to Lewa Wildlife Conservancy in northern Kenya the following February to see firsthand how the money raised through BFR was benefitting rhinos in the wild. As February approached, my excitement grew but I never anticipated the impact that the trip would have on my career and life.

Although I was looking forward to seeing rhinos and all of the wildlife around Lewa, as a bird keeper I was especially excited about the diversity of bird life in the area. One of my main goals was to see vultures in the wild.

Vultures are important to ecosystems as clean-up crews which stop deadly bacteria and viruses from spreading, which is why I was excited to see vultures in the wild. In Asia, where they had lost 99% of their vulture population, feral dog populations began to sky-rocket when there were no vultures to clean-up carcasses. This lead to a rabies epidemic in feral dogs, and in turn humans, which cost tens of millions of dollars in medical expenses and many human lives. Progress has been made toward recovering vulture populations in Asia, but the African populations are threatened by multiple sources, land-use changes, and electrical infrastructure development. However, the biggest threat is poisonings. Poisoning is often a result of human-predator conflict, with vultures being the unintended victims. Poachers also specifically target vultures, because they are the first to locate a carcass and circle, which alerts authorities that a crime has occurred. Vulture populations in Africa have crashed by 80% or more over three generations (Ogada et al., 2016, Birdlife International 2016). Lewa is one of the most pristine and protected areas in Africa. One would think that it would not be touched by this trend.

During our first week on Lewa we saw many different animals, including rarely-seen species like klipspringers and hartebeests but did not see a single vulture. I began to ask around. I started asking rangers, researchers, and everyone else who worked at the conservancy if they had seen vultures recently. Nobody had.

On our last day at Lewa, a call went out over the radios that vultures had been spotted. We raced to find them, and finally located 11 white-backed vultures perched up in a tree after cleaning up a lion kill! They were so magnificent and I felt so fortunate to have been able to see them. The rest of the group was relieved to see the vultures as well, thinking that I would then stop talking about them, but the sight of those 11 vultures sparked my desire to work more directly to support vulture conservation.

Upon returning home, I began researching vulture researchers working in Northern Kenya because I knew that the San Diego Zoo has a long and extensive history of conservation work in the region. After an extensive search, I found Dr. Darcy Ogada who works with the Peregrine Fund in Kenya. After meeting with the Zoo's Curator of Birds, Dave Rimlinger, to update him on my experience in Lewa and Dr. Ogada's work, the San Diego Zoo began to help fund her research.

With the San Diego Zoo helping to fund Dr. Ogada's research, I still wanted to do more. I suggested we apply to grants. In 2016, we were awarded $11,379 through AAZK's BFR Conservation Resource Grant. The AAZK funding allowed Dr. Ogada to purchase seven transponders to track the movements of vultures in and around Kenya. Four Ruppell's and one white-backed vultures - both critically endangered species - were fit with transponders. One of the vultures tagged traveled to four different countries (Uganda, South Sudan, Ethiopia, Kenya) in 20 days, covering over 2000 km! Dr. Ogada uses this information to show vulture movement, highlight poisoning hotspots, and help with the placement of wind farms.

The author on safari at Lewa Wildlife Conservancy.

Vultures at Lewa Wildlife Conservancy.

Ruppells's Vulture takes flight.*Photo by D. Ogada.*

The 2016 BFR Conservation Grant supported in-situ conservation work with vultures.

Vultures and jackal fighting at carcass.
Photo by D. Ogada.

In-situ vulture conservation involves working with local communities.

During her research, Dr. Ogada found that most wildlife poisoning events are left for days to a week allowing more and more scavengers to eat from the infected carcasses and die. This was a new and shocking view of wildlife poisoning. In November 2016, with funding from the San Diego Zoo, she helped organize and complete a rapid response workshop for local communities to help reduce the impacts of a poisoning event on wildlife. At these workshops community leaders learn the importance of scavengers to the ecosystem, how to clean up after a poisoning event, and how to collect evidence that can be used to prosecute the perpetrator, and who to contact during poisoning events.

This initial workshop was the baseline for developing The Peregrine Fund's Stop Poisoning Now campaign. In 2017, Dr. Ogada's team trained over 200 rangers and community members representing 23 organizations within Northern Kenya. Within this time, the trainings helped to mitigate at least one poisoning event and saved one person's life after they had ingested poison. The campaign has hired a Community Liaison Officer who is based in a poisoning hotspot and who will provide support to trainees to help prevent poisonings and measure the impact of the trainings. Recently, The Peregrine Fund recently teamed up with Living with Lions an NGO working to conserve lions in Laikipia in north-central Kenya. Together the team is training livestock farmers how to build better bomas (livestock corrals) to keep their livestock safe from predators, especially at night. By working with farmers, the team aims to prevent the root cause of wildlife poisoning.

All these different facets of Dr. Ogada's work have one goal, to create a safe environment for vultures to coexist with humans in Africa.

When we started working together our main goal was to get transponders. Now we have been able to do even more, and are making a significant difference in the conservation of Africa's vultures. As keepers, we tend to focus on contributing to conservation through our physical abilities and being hands-on with helping, but we have many more skills and talents that we can use to help conservation from afar.

Want to get involved in Vulture Conservation?

For more info on Dr. Ogada's work follow the link below:

https://www.peregrinefund.org/projects/east-africa-project

or contact her directly at ogada.darcy@peregrinefund.org

Find information about the AZA SAFE African Vultures program at: https://www.raptortag.com/african-vulture-safe-program.html

or contact Corrine Kendall, Chair of African Vulture SAFE corinne.kendall@nczoo.org

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Thursday, October 4
Pre-Conference Trip
Icebreaker at Downtown Aquarium

Friday, October 5
Keynote Speaker: Temple Grandin
Paper Sessions
Workshops/Professional Certificate Courses
Town Hall Meeting
Conservation Rally

Saturday, October 6
Paper Sessions
Themed Papers
Workshops/Professional Certificate Courses
Poster Session
Awards Ceremony

Sunday, October 7
Zoo Day
Silent Auction

Monday, October 8
Paper Sessions
Workshops/Professional Certificate Courses
Closing Banquet

Tuesday, October 9
Post-Conference Trips

KEYNOTE SPEAKER - TEMPLE GRANDIN

Temple Grandin is a professor of Animal Science at CSU and a prominent author and speaker on both autism and animal behavior.

Don't forget to bring your favorite Temple Grandin book for a special book signing after the keynote address!

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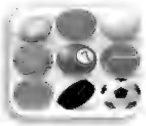
Pack your leg warmers, prom attire, and Member's Only jackets for our 80s themed awards ceremony!

SPORTS BANQUET

Bring your favorite team jersey or sports gear for games and activities to end an awesome week together!



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SILENT AUCTION

Do your animal's paint? Do you create unique art? Do you know of an item zookeepers would love? Donate something for the conference silent auction! Mail items ahead of time or bring them with you! Email us at aazkdenver2018@gmail.com for more information on how you can support us!

CHAPTER CHALLENGE

It's not too late for your AAZK Chapter to contribute to the conference through the chapter challenge! Donate between $100 and $1,000 to earn Yak, Binturong, Aye-Aye, or Tiger Salamander honors!

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Georgia Chapter
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Indianapolis Chapter
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New Orleans Chapter
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Greater Baltimore Chapter
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Greater Kansas City Chapter
Ozarks Chapter
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Roger Williams Park Zoo Chapter
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Dallas Zoo Chapter
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San Antonio Chapter
Tidewater Chapter
Point Defiance Chapter
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Calgary Zoo Chapter (Dissolved)

Bronze *(Up to $499.99)*
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Tucson Chapter
America's Teaching Zoo Student Chapter
EFBC Chapter (Inactive)
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Redwood Coast Chapter
Safari West Chapter
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Brandywine Zoo Chapter
Brevard Chapter
Greater Orlando Chapter
South Florida Chapter
Lion Country Safari Chapter
Tampa Bay Chapter
Naples Chapter
Iowa Chapter
Heart of Illinois Chapter
Scovill Zoo Chapter
Central Illinois Chapter
Little Turtle Chapter
Mesker Park Zoo Chapter
Louisville Zoo Chapter
Baton Rouge Zoo Chapter
Chesapeake Chapter
Potter Park Chapter
Battle Creek Chapter
Minnesota Zoo Chapter
Lake Superior Chapter
Jackson Zoo Chapter
New York City Chapter
Oklahoma City Zoo Chapter
Delaware Valley University Student Chapter
Cameron Park Chapter
Red River Chapter
El Paso del Norte Chapter
Utah Chapter
Roanoke Valley Chapter
Rainier Chapter
Green Bay Chapter
Assiniboine Park Zoo Chapter

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Wildlife World Zoo Chapter
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Omaha Chapter
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Ozarks Chapter
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Milwaukee Chapter
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Lion Country Safari Chapter
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Greater Kansas City Chapter
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Mesker Park Chapter
Potawatomi Zoo Chapter
North Carolina Chapter
ABQ Chapter
Seneca Park Chapter
Columbus Chapter
Oklahoma City Zoo Chapter
Tulsa Chapter
Roger Williams Park Zoo Chapter
Memphis Chapter
Dallas Zoo Chapter
Point Defiance Chapter

Conservation
California Desert Chapter
Bay Area Chapter
Connecticut's Chapter
South Florida Chapter
New Orleans Chapter
Greater New Jersey Alliance Chapter
New York City Chapter
Toledo Chapter
Riverbanks Chapter
Galveston Chapter
San Antonio Chapter

International Outreach Committee
Phoenix Chapter
San Diego Zoo Chapter
Fresno Chaffee Zoo Chapter
National Capital Chapter
Greater Baltimore Chapter
Potter Park Chapter

Professional Development
Cheyenne Mountain Zoo Chapter
Zoo New England Chapter
Minnesota Zoo Chapter
Greater Philadelphia Chapter

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Midnight Sun Chapter
Greater Sacramento Chapter
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AAZK Resource (ARC)
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Akron Zoo Chapter
Pittsburgh AAZK Chapter

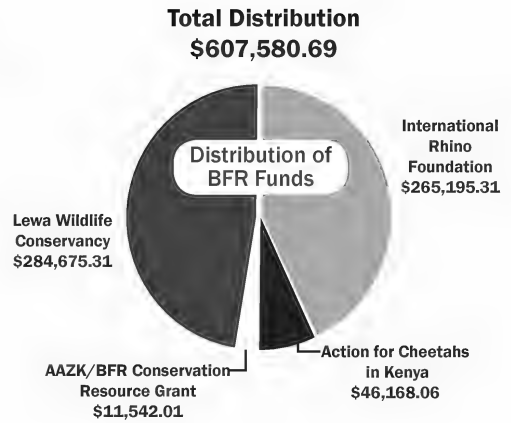
President's Message

AAZK is looking towards a bright future that includes expanding our relations with animal keepers in Latin America. The AAZK International Outreach Committee (IOC) has been cultivating relationships with animal keepers and facilities in Latin America, most notably in Mexico, and partnering with them to develop learning objectives and course material for presentation during annual Teaching Programs.

The first AAZK IOC Teaching Program was held in Guadalajara, Mexico in November 2017. This coincided with the first ever Mexico Zoo Keepers Conference and was attended by 80 keepers from 26 facilities. The presentations and workshops offered as part of the Teaching Program gave the participants the opportunity to learn skills that they could utilize to improve the care of the animals in their facilities, as well as enhance their professional development. Members of the AAZK IOC are currently preparing material for two Teaching Programs to be held in Mexico in 2018.

This year, AAZK also introduced the pilot program for International Keeper Sponsorship by AAZK Chapters (or individuals) for a Professional Membership with AAZK. This sponsorship program and membership opportunity offers continuing education in animal welfare for individuals in need of monetary assistance. International keepers chosen to participate in this program will receive an electronic subscription to the *Animal Keepers' Forum* as part of their membership. A total of 10 international keepers were chosen for the pilot program and are being sponsored by AAZK Chapters from San Diego, Columbus and Dallas, just to name a few. We hope to expand this program in the future with memberships being renewed annually and an ongoing communication dialog between international keepers and AAZK Chapter members.

Bethany Bingham
AAZK President



Conservation

The year 2017 was another rewarding year in regards to AAZK's conservation program grants, The Bowling for Rhinos Conservation Resource Grant (BFR CRG) and the Trees for You and Me Grant (TFYMG). AAZK's two conservation program grants aim to protect and preserve animals in the wild and the habitat in which they reside. Both program grants continue to do just that.

In 2017 the BFR CRG was awarded to Save the Rhino International. Black rhinos in Namibia were protected with the $11,392.31 that was raised due to BFR events. The entire 100% of the grant was used for vehicle maintenance and running costs for Save the Rhino Trust's Proactive Patrol Sections' Land Cruiser, which is imperative to their anti-poaching activities.

The year 2017 was big for TFYM due to it awarding its second grant and for surpassing last year's funds by close to $4,000! The recipients of the TFYMG were Lisa Simms, for her project "Cadwalader Park Reforestation," and Dr. Rebecca Swab, for her project "Healthy Forest, Healthy Wildlife." Each received $9,182.22 to help support their projects. All of the AAZK Chapters who participated in TFYM helped further AAZK and Polar Bears International's quest to fight climate change through reforestation and habitat revitalization!

These grants protect and preserve animals in the wild and the habitat in which they reside. They do this year after year with our AAZK members' support. Thank you!

Mary Ann Cisneros
AAZK Vice-President

Animal Keepers' Forum

The *Animal Keepers' Forum* continues to be the main communication tool for members, sponsors and advertisers. The monthly journal shares quality articles submitted by our members and supporters through features such as Training Tales, Enrichment Options and Conservation Station. This year we were excited to offer our members a special issue dedicated to Waterfowl, and recently an entire issue focused on Aquatics. The *AKF* highlights best practices and innovations in animal care, conservation success stories, plus training and enrichment ideas. Animal care professionals share and learn from experiences shared by their colleagues, and we are always interested in hearing from you. If you have comments for the Editor or would like to submit an article or cover photo— please e-mail Shane.Good@aazk.org.

AKF TEAM:

- Editor, Shane Good
- Graphic Designer, Elizabeth Thibodeaux
- *Enrichment Options Coordinators*
  Julie Hartell-DeNardo, Stephanie Miner, Beth Stark-Posta, Beth Ament-Briggs
- *Training Tales Coordinators*
  Kim Kezer, Jay Pratte, Angela Binney
- *Conservation Station Coordinator*
  Philip Fensterer
- *Animal Welfare Coordinators*
  Julie Hartell-DeNardo, Stephanie Miner, Beth Stark-Posta, Beth Ament-Briggs

Thank You!

List of contributors to the preservation of all species in Asia and Africa

Bowling for Rhinos 2017

Sondaicus
$50,000 and Up

Los Angeles AAZK Chapter

Sumatrensis
$20,000 to $49,999

Greater Cincinnati AAZK Chapter
Jacksonville AAZK Chapter
San Diego AAZK Chapter
Toronto AAZK Chapter

Unicornis
$5,000 – $19,999

ABQ AAZK Chapter
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Buffalo Zoo
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Georgia AAZK Chapter
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Lincoln Park AAZK Chapter
Little Rock AAZK Chapter
Little Turtle AAZK Chapter
Milwaukee AAZK Chapter
Nashville Zoo/Nashville AAZK Chapter
North Carolina AAZK Chapter
Oklahoma City AAZK Chapter
Ozarks AAZK Chapter
Pittsburgh AAZK Chapter
Portland AAZK Chapter Event
Potter Park AAZK Chapter
Puget Sound AAZK Chapter
Reno Bowls for Rhinos/
Sierra Safari Zoo
Riverbanks AAZK Chapter
Saint Louis AAZK Chapter
San Antonio AAZK Chapter
San Francisco Zoo AAZK Chapter**
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The STEFI Fund
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Bicornis
$1000 - $4999

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Roger Williams Park Zoo
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Santa Fe Teaching College
Student Chapter
Seneca Park AAZK Chapter
Woodland Park Zoological Society

Simum
Up to $999

Assiniboine Park Zoo AAZK Chapter
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Novus International
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Margaret Roncolato
Scovill Zoo AAZK Chapter
Susan Sindlinger
Alice Stelzer
Dale and Catesby Suter
Pete and Sue Vindigni
Waggers Pet Sitting/Allison Smith
Seth Weldy
Nina Wilson
Amy Young

**Funds received after 2016 Deadline – credited to 2017 BFR Season*
*** Combined 2016 and 2017 Totals*

Finances

EXPENSES 2017

Association Memberships (AZA)	$	475.00
BFR Dedicated Program Expense		
BFR Product Sales	$	103.00
BFR Trip Winner Payout	$	6,750.00
Board Travel/Lodging	$	11,932.92
CEO Expenses/Travel/Lodging	$	2,557.64
Committee	$	6,556.66
Conference	$	15,201.65
Board-ratified Donation Out	$	12,727.50
Grants	$	35,658.02
Membership Refund	$	155.71
Office	$	3,048.24
Office Rent	$	8,567.30
Payroll Fee	$	2,177.90
Payroll Taxes	$	22,838.16
Pension Contribution	$	3,930.00
Pension Management Fee	$	1,091.50
Postage and Delivery	$	5,310.66
Print and Production	$	3,967.12
Product Expense	$	9,806.51
Program Expense	$	1,500.00
Salaries and Wages	$	59,389.75
AKF Postage and Delivery	$	16,015.72
AKF Printing	$	46,908.63
Insurance	$	1,133.00
Professional and Legal Fees	$	3,143.00
Taxes (business)	$	67.00
Utilities	$	1,623.24
Web Revision and Management	$	2,944.38
Zoo Keeping Textbook Purchase and Distribution	$	541.10
Total Expenses	**$**	**290,170.28**

INCOME 2017

BFR Registration Fee	$	2008.42
BFR Dedicated Program Income		
BFR CRG	$	22,934.32
BFR Trip Retention	$	13,500.00
Conference Income	$	28,952.74
Donation	$	40,278.99
Non-member Job Posting	$	2,800.00
Membership	$	126,170.06
Product Sales	$	7,784.40
Re-charter Fee & Duty Obligation	$	62,188.49
Advertising	$	25,978.67
Tax/Utility Refunds	$	124.89
Total Income	**$**	**332,720.98**

MEMBERSHIP

Category	January 1, 2018
Affiliate	452
Commercial	18
Conservation Partner	29
Contributing	17
Exchange	17
Institutional	139
International	26
Library	16
Lifetime	22
Professional	1,624
Student	204
Total	**2,564**

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The mission of The American Association of Zoo Keepers is to advance excellence in the animal keeping profession, foster effective communication beneficial to animal care, support deserving conservation projects, and promote the preservation of our natural resources and animal life.

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Monitoring Awake Blood Pressures in Chimpanzees (*Pan troglodytes*) through the PetMAP Graphic+ II™ Finger Cuff System: Training Methodologies and Welfare Implications

Christina Cloutier Barbour, PhD—Primate Curator
Elizabeth Hammond, DVM, DACZM
Anne Meyer, DVM
Lion Country Safari
Loxahatchee, Florida

The Problem

Cardiovascular disease [CVD] is a growing concern for all institutions that house chimpanzees, as it is the most common cause of death in captivity [Schmidt 1978; Munson & Montali 1990; Hubbard et al. 1991; Doane et al. 2006; Lammey et al. 2008a; Lammey et al. 2008b; Varki et al. 2009; Ely et al. 2013]. Overall, an alarming 35-38% of common chimpanzee (*Pan troglodytes*) deaths are directly related to cardiovascular disease [Backues & Gamble 2008; Varki et al. 2009], with higher-than-expected mortality rates in the other great apes as well. As a result, there is a growing trend toward preventative heart care in all four great ape taxa managed in captivity—chimpanzees, bonobos, gorillas, and orangutans.

Many institutions are therefore implementing positive reinforcement training regimens in hopes of addressing the issue. Such zoos will often monitor heart function through voluntary blood pressures, electrocardiograms [ECG], and/or blood draws. Here, we will focus on blood pressure [BP] training and how it has proven to be an invaluable tool for monitoring the welfare of our chimpanzees.

Blood pressure monitoring device.

Monitoring Blood Pressure

Chronically high blood pressure [hypertension] necessitates that the heart beats harder on average, which leads to damage over time. In humans, this cumulative damage to the heart increases the risk of heart failure 2 to 3-fold [Kannel & Stokes 1985; Kenchaiah et al. 2004]. In fact, for every 20/10mm increase in blood pressure, the risk of CVD-related death doubles [Lewington et al. 2002]. While further research into the dangers of hypertension in chimpanzees is required [Kannel & Stokes 1985; Lewington et al. 2002; Kenchaiah et al. 2004], there is a correlation between increased BP and elevated CVD risk in the species [Ely et al. 2013], with BP above the 90th percentile resulting in a 3.6-fold increased risk of sudden cardiac death [Ely et al. 2011]. However, these data are derived from animals that were anesthetized at the time of BP data collection. Sedative drugs notoriously affect blood pressure readings, with various drugs impacting BP differently. Perhaps then, the foremost problem in monitoring healthy chimpanzee blood pressures is that we lack an understanding of what constitutes a "normal" blood pressure in the species.

Positive Reinforcement Training as a Welfare Tool

In humans, the normative range for BP has been well-defined. However, we cannot accurately deduce whether a chimpanzee suffers from hypertension until we compile a detailed longitudinal database of healthy great ape blood pressures. This requires the systematic collection of blood pressures across the lifespan of the individual, taken in controlled circumstances on calm and willing

Chimpanzee "Melody" at Lion Country Safari.

animals. These measures must then be recorded systematically and statistically assessed for patterns. Simply assuming that normative chimpanzee BP must fall within the same range as humans is no longer adequate, given the degree of divergence between us and the other great apes.

Therefore, our first step should be to collect baseline blood pressure values on the chimpanzees in our collections. These data will not only improve our understanding of CVD in the species, they will also inform individual welfare decisions. This will also allow us to establish a baseline BP value for an individual so that trends can be monitored over time.

The PetMAP ™ [http://www.petmap.com/petmapgII.html; 4920 West Cypress Street, Ste 110, Tampa, Florida 33607 U.S.A.] blood pressure monitoring system has proven to be an effective and efficient system by which to evaluate awake BP in bonobos. It is user-friendly and relatively inexpensive, considering how much use you can get from a single device. We therefore implemented the updated version of this monitoring system—the PetMAP Graphic+ II™—with our common chimpanzees in hopes of achieving similar results. This newest version of the device costs approximately $1300. The cuff system, which is designed for the limbs of small animals, is instead wrapped on the distal portion of the ape's finger. These finger blood pressure measurements in our apes have correlated well to arm blood pressures simultaneously taken under anesthesia, which demonstrates that our awake BP measures collected through positive reinforcement training are accurate.

The PetMAP Graphic+ II system has a number of very useful functions that make data collection simple: an SD memory card stores trend data and screen shots at your request, and there are selectable automatic BP cycle times. The device comes standard with heart rate readings throughout the session, as well as additional availability of ECG, temperature, and SpO2 probes/modules. Our favorite feature, however, is the real-time display of the BP waveform, which allows the trainer to clearly visualize the success of individual readings.

Training for Voluntary BP Measures in Chimpanzees

There are some general guidelines that must be adhered to in order to obtain an accurate finger cuff reading on a chimpanzee. The animal must hold its finger (the Great Ape Heart Project recommends the middle or ring finger of either hand) very still during the entirety of the measurement, it must remain relaxed, it must hold its arm at heart level without too much bend in the elbow, and it must refrain from putting pressure on the digit by resting it on the mesh. The cuff should fit snugly during the process—you will need to measure your animal's finger at some point to determine the correct size cuff to use. If all of these conditions are met, the reading's waveform will reflect a nice bell curve shape. To ensure safety, we recommend two trainers for this behavior—a primary who cues the animal, reinforces them and bridges as appropriate, and a secondary who is responsible for placement and operation of the device.

The shaping plan for voluntary BP monitoring involves quite a few steps, as it is a complex behavior. However, we have found that enough trust between animal and trainer, in addition to the right rewards and plenty of flexibility, will result in collection of blood pressure measures rather rapidly. For instance, our first chimpanzee subject required only nine training sessions—spread out over a few weeks—before we were able to achieve a successful BP reading.

1) First, the animal must station as requested. 2) Then, it must present its finger(s) through the protective mesh of the holding rooms. 3) Next, the animal must acclimate to squeeze pressure on the distal end of the digit, which simulates the pressure felt during BP measurements. We simply squeeze the fingertip with ours, which has worked well. It is important that the finger remain relaxed and that the animal des not rest it on the mesh for fear of impacting the reading. 4) Following this, we progressed to wrapping the finger with a "pseudo-cuff" in order to get the animal used to having the trainer manipulate the digit. We recommend a paper towel for this step, as the chimpanzee will generally attempt to steal it from you during the first few trials—paper towels are not costly to lose, and the animal will tire quickly of the item. 5) The next step is to acclimate the chimpanzee to the combination of a wrap and pressure on the digit. Simply wrap the finger and then squeeze manually; bridge and reward when successful. 6) Then, we recommend that you work toward the animal calmly holding this behavior for longer periods of time, eventually working up to ~1 minute. 7) The next step is to wrap the finger with a "training cuff." This is simply a cheaper version of the "critter cuff" that comes with the PetMAP Graphic+ II™ (these cost $26 each to replace). Soft disposable neonatal or small animal veterinary cuffs work well for us. 8) Simulate cuff pressure while wearing the finger cuff. Our hospital staff assisted us with the development of a training tool that manually inflates the cuff through a hand-held pump system using a bit of tubing and part of a sphygmomanometer. We enjoy this approach, as it allows the animals to acclimate to pressure from something other than the trainer's fingers. The PetMAP Graphic+ II™ system unfortunately does not permit short inflations of the cuff, so it can be initially jarring to the chimpanzee unless you spend quite a bit of time on this step. 9) And finally, proceed to connecting the PetMAP Graphic+ II™ system to a cuff and collecting BP measures.

Lessons Learned

Ask for help. We highly recommend that you reach out to various individuals who are happy to provide advice and guidance along the way. For instance, the Great Ape Heart Project is a fantastic resource for all questions related to ape blood pressure training and data collection. In addition, attendance of the Cameron Park Zoo's annual Great Ape Cardio Health Workshop is invaluable. The staff is incredibly knowledgeable, and they perform fantastic demonstrations on their resident orangutans—all of which can be modified for chimpanzee data collection.

During the training and collection process, go as slowly as your animal requires and be flexible! This is a complex behavior to request of your animal, so be patient. You risk taking ten steps backward if you push too hard.

Data Collection

The Great Ape Heart Project has been working in conjunction with various zoos for many years to establish normative bonobo BP values. We feel that there is no need to reinvent the wheel or fix what isn't broken—they very generously provide a blood pressure data collection form [https://greatapeheartproject.org/projects/blood-pressure-monitoring/bonobobp/] that we have mirrored to collect chimpanzee BP measures. Standardization across institutions is crucial to successfully compile normative values for the species in the future, so we recommend that all zoos consider using the same form.

Individual Welfare Implications

The collection of BP measures in chimpanzees is clearly a useful welfare tool for the species overall. Here, we will discuss how it is also an immensely valuable welfare tool for individual apes.

0.1 chimpanzee, Melody (49 y/o), has a number of health-related issues and has been successfully trained for BP collection. She has been diagnosed as diabetic since 2004 and is well-controlled with oral hypoglycemic medication and diet modification. She also has renal disease. Melody was first suspected to be hypertensive under anesthesia in February of 2015. However, as we were unable to rule out anesthesia-induced hypertension, we elected to monitor her behavior and refrain from drug intervention at the time. A subsequent immobilization in March of 2016 led us to further suspect hypertension, after which we began a daily dose of BP medication. Hospital staff recommended training her for awake BP monitoring, and steps were taken to purchase the PetMAP Graphic+ II™.

By January of 2017, Melody was trained for BP collection. In the meantime, keeper staff had been reporting weight loss, lethargy and intermittent vomiting episodes. It was clear upon her initial blood pressure readings that the low-dose prescription of ACE inhibitor was not enough to counteract the effects of her extreme hypertension. Due to her tremendously elevated BP readings, hospital staff immediately altered her prescription to include daily aspirin to mitigate the likelihood of stroke, as well as a calcium channel blocker and beta blocker. Melody's overall health improved almost immediately—she resumed normal activity levels, ceased vomiting and began gaining weight. Further, her BP readings started to reflect values closer to what we would expect to see in a well-regulated human.

Without voluntary training, we would have had to resort to multiple immobilizations on an ill chimpanzee to attempt further diagnoses. Further, anesthesia was significantly impacting her BP measures, so we had no way to know that her hypertension was so severe. We fully credit her positive reinforcement welfare training regimen with her substantial recovery.

Conclusions

Voluntary blood pressure training can have enormous welfare implications on chimpanzees, both at the individual and species level. Collection of BP data across institutions would benefit the species as a whole, and may lead to individual health improvements along the way. We still know very little about the impacts of hypertension in these great apes, as all currently published normative values for chimpanzees were collected under anesthesia. We do, however, know that the first sign of CVD in great apes is often sudden death. We can do better than that for the animals under our care.

We encourage all institutions housing chimpanzees to carefully consider the welfare implications of establishing a positive

reinforcement training regimen designed to collect BP values and monitor heart health in the species.

Acknowledgements

We would like to thank Lion Country Safari and the chimp keeper staff for their tireless dedication to the animals under their care. We also wholeheartedly thank the Cameron Park Zoo and their primate keeper staff for so generously welcoming animal care professionals from all over to their annual Great Ape Cardio Health Workshop, as well as for their patient guidance as we converted their lessons for use in our chimpanzees. We would also like to acknowledge Dr. Marietta Danforth and the rest of the Great Ape Heart Project team for their assistance in our efforts to make Melody well. We also thank Ashleigh Kandrac and Kimberly Wuenstel, for providing valuable feedback on this manuscript. And finally, we thank our chimpanzees for trusting us with their health and happiness.

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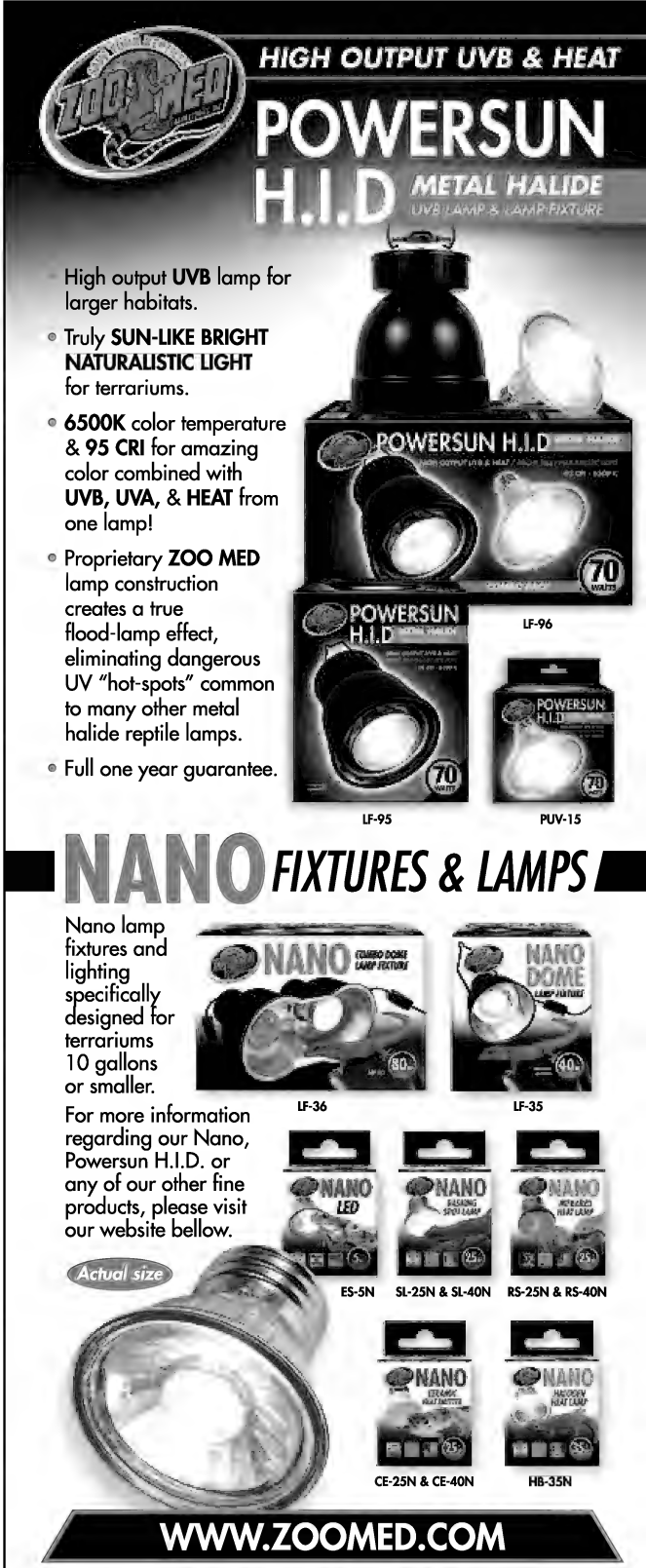

Welfare in Zoo-housed Giraffes: A simple approach

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Abstract

Two behavioral assessments were conducted on 0.3 reticulated giraffe (*Giraffa reticulata*) at the Saint Louis Zoo in the winters of 2015 and 2016. The most-often reported stereotypies in zoo-housed giraffes were measured: tongue rolling, wall licking, and pacing. We recorded whether enrichment was available when these behaviors were seen, and we also examined species-specific rumination, locomotion, interaction with environmental enrichment items, eating/drinking, grooming, and inactivity. Acting on the results of the first assessment, we created an initiative to address the stereotypic behaviors observed in our giraffes by tailoring husbandry practices to provide species-specific opportunities and enhance overall welfare. Although this article focuses on the effectiveness of food and non-food enrichment items, the management changes were primarily related to feeding strategies, i.e., browsing opportunities, pellet and hay presentation, and feeding frequency. In the following year, we performed the assessment a second time to see if there were any significant changes. Between the three giraffes there was an 18% decrease in the prevalence of stereotypic behaviors and a 20% increase in feeding behaviors. These overall results were reflected in the behaviors of each individual.

Introduction

Most zoo professionals deal with stereotypic behaviors of their animals on a daily basis. The prevalence of stereotypies in zoo-housed giraffes (*Giraffa sp.*) has been documented over three decades, and up to 80% of giraffes in zoos have been shown to perform at least one stereotypic behavior (Bashaw et al., 2001). Many studies have come to the conclusion that oral stereotypies are the most common; these behaviors are directly and indirectly related to the type of diet provided, how it is presented, and the availability of food items (Fernandez et al., 2008).

The question we can ask now is "what natural behaviors are being replaced by stereotypic behaviors and how can we provide more opportunities to fulfill those natural instincts?"

Individual giraffes perform stereotypies at different rates, but the most prevalent are excessive licking of unnatural objects (wall licking) and excessive tongue manipulation (tongue rolling) (Bashaw et al., 2001). Stereotypies have often been considered a sign of poor welfare (Fernandez et al., 2008, Mason and Latham, 2004), but the complexities of these behaviors are now better understood. For instance, tongue rolling can be considered a stereotypic behavior, but it also produces saliva, which may aid with maintaining optimal pH level in their gut (Mason and Latham, 2004). This consideration can be important for zoo animals that are fed high quality concentrated diets (Bashaw et al., 2001; Fernandez et al., 2008). The question we can ask now is "what natural behaviors are being replaced by stereotypic behaviors and how can we provide more opportunities to fulfill those natural instincts?"

The Saint Louis Zoo is home to three female reticulated giraffes (*Giraffa reticulata*). From March to November, they typically have access to outdoor habitats all day and night, but like all other four-season zoos, we manage our giraffes with limited outdoor access for the winter. From November through February, we focus our attention on providing natural experiences in an unnatural indoor environment; not only is there a decreased amount of space for these animals to move through and explore,

but there is a decrease in environmental stimuli. This lack of stimuli could be one potential cause of the stereotypic behaviors performed by our giraffes. We decided to create and implement a program that addressed these stereotypies and to tailor our husbandry practices to provide species-specific opportunities and increase overall welfare. We developed a program specific to our giraffes because "well-being" can vary between individuals (Bashaw et al., 2001). This effort to customize management and enrichment to the needs of our giraffes is called the 'Saint Louis Zoo Giraffe Welfare Initiative'.

In order to better understand the overall welfare of our giraffes, we first assessed their baseline behaviors. The information from the initial assessment was used to make informed changes to the giraffes' management, and then we followed up with another period of observations to determine if our new strategies had the desired outcomes.

Methods

The behaviors of three female giraffes, ages 11, 4, and 3-years-old at the beginning of this study, were first observed from 12 February through 20 March 2015 to document their activity levels and any stereotypic behaviors. Due to weather and the construction of a new Giraffe TAMER™ (Fauna Research, Inc. 8 Bard Ave, Red Hook, NY 12571, www.faunaresearch.com, faunaresearch@gmail.com), they were housed indoors for all but three days of this assessment period. Data were collected three times per day from two-minute live observation sessions, using an ethogram based on keeper observations (Figure 1). There were a total of ten antelope department keepers who recorded these observations throughout both assessments. At 30-second intervals, keepers recorded the behavior and any stereotypies observed for each animal. Each session, keepers also recorded date, time, observer ID, visitor crowd size, browse availability, and type of enrichment (food or novel/non-food) available, if any. The three daily observation sessions occurred in the morning, early afternoon, and late afternoon, starting any time between 0800 and 1100, 1100-1400, and 1400-1700 respectively. Five scans were collected during these two-minute sessions, for a total of 15 scans per day.

Each day, the giraffes were provisioned with free choice alfalfa hay and water. They

DATE: GIRAFFE ACTIVITY BUDGET OBSERVATION

		Behavior							Stereotypy						Other (comments)
		Ruminating	Interacting EE	Locomotion	Eat/Drink	Inactive - Lying	Grooming	Inactive - Stand	None	Wall licking	Head Tossing	Tongue rolling	Pacing	Bar gnawing	
Initial Scan Time:	ELLA														
	LILY														
	SUKARI														
+30 sec Time:	ELLA														
	LILY														
	SUKARI														
+60 sec Time:	ELLA														
	LILY														
	SUKARI														
+90 sec Time:	ELLA														
	LILY														
	SUKARI														
+120 sec Time:	ELLA														
	LILY														
	SUKARI														
8 - 11 Scan	Keeper Initials:	CROWD SIZE?							BROWSE?						ENRICHMENT?

Figure 1.

GIRAFFE ACTIVITY BUDGET OBSERVATION

DATE:		Activity			Behavior						Stereotypy							Other (comments)
Morning Scan 8-11am		Locomoting	Inactive - Lying	Inactive - Stand	None	Interacting EE	Ruminating	Eat from EE	Eating	Drinking	None	Wall licking	Tongue Rolling	Cat Shavings	Head Tossing	Pacing	Head Toss + Pace	
Initial Scan Time:	ELLA																	
	LILY																	
	SUKARI																	
+30 sec Time:	ELLA																	
	LILY																	
	SUKARI																	
+60 sec Time:	ELLA																	
	LILY																	
	SUKARI																	
+90 sec Time:	ELLA																	
	LILY																	
	SUKARI																	
+120 sec Time:	ELLA																	
	LILY																	
	SUKARI																	
Keeper Initials:	BROWSE?	ENRICHMENT (FB or NFB)?															Food?	

Figure 2.

were given access to all three indoor stalls (total area 865 ft^2) at all times unless the stalls were being cleaned. They were never separated unless a behavioral training session was being conducted. As per our department protocol, they were required to receive enrichment a minimum of two times per week. Browse was provided when available and Mazuri™ Browser Maintenance pellets were presented once or twice a day.

After this initial assessment, a number of management changes were implemented. We were required to supply their pelleted diet a minimum of two times per day. For their afternoon feeding we were required to present their pelleted diet in a different puzzle feeder. We maintained the requirement to provide enrichment two times per week, but this did not include any browse provided or their afternoon puzzle feeder. Lastly, we were required to provide them with browse (or living branches/sticks) at least two times per week.

A second assessment period occurred concurrently and after these changes from 3 February through 22 March 2016. In this second year, the giraffes had access to an outdoor runway for multiple days. Observation sessions remained the same

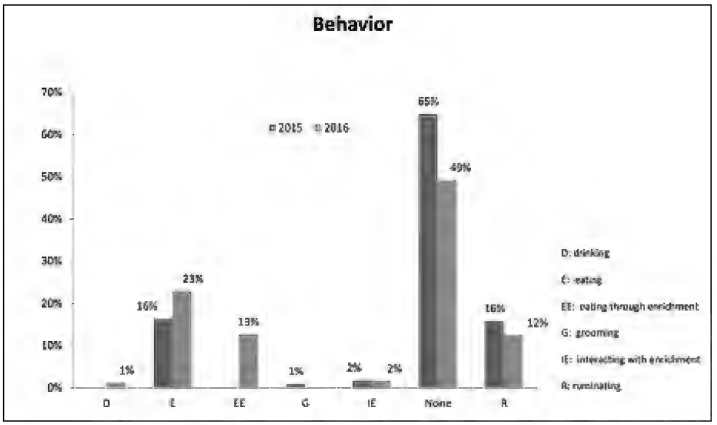

Chart 2. Shows the percentage of behaviors seen in 2015 vs 2016

length and time as in the first assessment period, but the changes that were made to our management strategies after the first assessment required us to modify some of the definitions in our ethogram (Figure 2). We kept our definitions as similar as possible so we could compare results from both years, but it is important to note that those changes in definitions could have caused small changes in the results. These changes could therefore have caused a small margin of error in our comparisons.

Results

At the end of the first assessment period, 933 scans had been recorded. At the end of the second period, 1110 scans had been recorded. Throughout both assessments, we observed six stereotypic behaviors, each of which had been observed prior to this study. From most frequently observed to least, these were: wall licking, tongue rolling, head tossing while pacing, pacing, head tossing, and stargazing, though the latter four were rarely seen.

The results from the first assessment showed that as a herd, our giraffes were performing stereotypic behaviors 39% of the observed time. Our 11-year-old giraffe performed stereotypic behaviors 13% more than our 4-year-old individual and 18% more than our 3-year-old individual. Enrichment was present during scans 52% of the time, but there was almost no difference in observed amount of stereotypies when novel non-food enrichment was available. When food-based enrichment—devices with food in or on them—was available, a 28% decrease in stereotypic behaviors was observed when compared to those scans when no enrichment or non-food enrichment was present. There was a 34% decrease in the frequency of stereotypic behaviors when leafy browse and/or branches stripped of leaves were available compared to when they were not present, but these items were only available 4% of the time. When food-based enrichment was available, eating behaviors increased by 26% and ruminating increased by 8%. Eating behaviors included actively ingesting pellets, hay, browse, bark, water, or mineral blocks.

Hanging bucket feeder.

PVC cap feeder.

Water jug feeder.

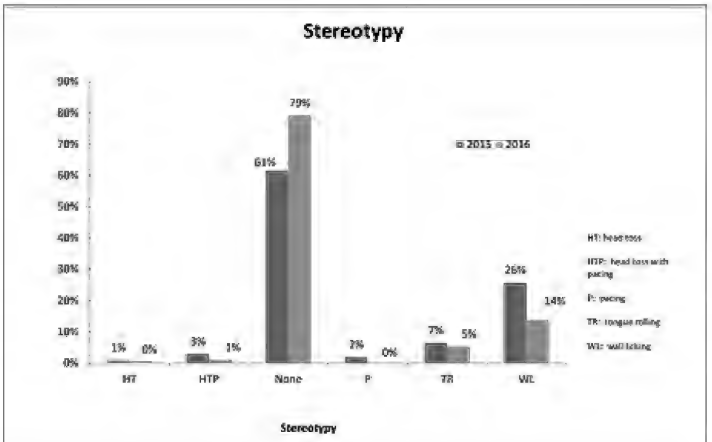

Chart 1. Shows the percentage of stereotypies seen in 2015 vs 2016

After implementing the use of additional enrichment items and a new husbandry strategy, the results from the second assessment period showed a number of positive changes in each giraffe. Overall as a herd, we saw an 18% decrease in the prevalence of stereotypic behaviors (see Chart1). Our oldest individual still performed stereotypic behaviors at the highest rate, but each individual showed at least a 14% drop in frequency. We also saw a 20% increase in eating behaviors and a 4% decrease in ruminating, both of which are desired natural behaviors (see Chart 2).

Animals during the second assessment period were observed with enrichment present 66% of the time, and the frequency of stereotypic behaviors decreased by 16% when it was available. When food-based enrichment was available, there was an 11% decrease in the frequency of stereotypic behaviors. When non-food enrichment was available the frequency of stereotypic behaviors increased by 1%. Browse was made available 34% of the time, and the frequency of stereotypic behaviors decreased by 11% when it was available.

Discussion

Oral stereotypies were the most prevalent type of stereotype in our giraffes, and a study conducted in 2001 that surveyed 71 AZA institutions reported similar results (Bashaw et al., 2001). Our oldest giraffe performed the most stereotypic behaviors, an observation that concurred with previous studies which found that stereotypic behaviors are commonly seen at higher levels in animals that have resided at the same location for longer periods of time (Baxter and Plowman, 2001; Mason G J, 1991). These behaviors are thought to become more difficult to disrupt with age, possibly due to prolonged lack of stimulating environments or the inability to perform natural behaviors (Baxter and Plowman, 2001).

Oral stereotypies in herbivores are commonly attributed to the inability to perform natural foraging and digestive behavior patterns (Baxter and Plowman, 2001). This includes the ingestion of leaves and the subsequent ruminating behaviors in ruminants. When determining management practices to change, we assumed that any solution would have to take into account a combination of these two factors.

The main goal for the project was reducing time spent performing stereotypic behaviors by eliciting natural and species-specific behaviors. By focusing on natural behaviors, especially feeding/eating, we were able to increase the amount of time the giraffes spent feeding and foraging by 20%. The data suggested that stereotypic behaviors were practically non-existent when the giraffes were performing desired behaviors, such as eating/foraging, ruminating, interacting with environmental enrichment, and locomotion.

Some of the positive effects that our enrichment was shown to have in the first assessment did not seem to have the same effectiveness during the second assessment. For example, there was a 34% decrease in stereotypic behaviors when food-based enrichment was available during the first assessment, but only an 11% decrease during the second assessment. This difference was most likely due to the fact that there was a large difference in the frequency of stereotypic behaviors for our control data from instances when no enrichment was available. In 2016, the frequency of stereotypic behaviors when no enrichment was available was 25% lower than in 2015, which suggests that our management changes had an effect on behavior even when no enrichment was present.

A 4% decrease in ruminating behavior could be due to the fact that there was a sufficient amount of stimuli in their holding to keep them more occupied with eating and feeding rather than ruminating. The giraffes received browse 30% more of the time in 2016 compared to 2015. That increase would have provided more fiber and opportunity to ruminate. The timeframe for this study only included the hours of 0800-1700. It is possible that additional ruminating behaviors were done during other hours of the day, especially considering that they received all of their enrichment and food during the daytime hours.

The lack of any changes in behavior in the presence of novel, non-food enrichment during both assessments suggests that those types of devices were not stimulating to our giraffes. We have found that ungulate enrichment can be challenging, especially when considering safety precautions for our animals, which have been known to easily get entangled and ingest unnatural items. Many zoos have come up with efficient, effective, and safe solutions to provide dynamic enrichment opportunities. Reaching out to other zoos has been one of the most effective strategies we have used to add to our ungulate enrichment options. It is my hope that this article will inspire you to do the same.

Based on the first assessment's results and this study's findings, we identified changes that we could make to our feeding and enrichment strategies to offer our giraffes increased opportunities to perform natural behaviors. We chose to categorize our management changes in terms of the desired behaviors we were trying to elicit: eating/foraging, interactions with environmental enrichment, ruminating, locomotion.

Eating/Foraging

Increasing the number of feedings throughout the day increases foraging opportunities, a condition closer to what giraffes would experience in the wild. Additional feedings also give us an opportunity to present the giraffes pellets in multiple, different, and challenging ways, increasing the total amount of time spent eating pellets. The presence of pellets could also elicit other feeding behaviors and stimulate rumination. When these daily patterns of feeding and ruminating are normalized, it has been shown to reduce oral stereotypy (Baxter and Plowman, 2001). Similarly, putting tops on all of the hay feeders has been shown in other studies to decrease the prevalence of stereotypies without affecting feeding or ruminating behaviors (Fernandez et al., 2008).

We provided daily variation in evening pellet presentation and made the pellets more challenging and time-consuming to obtain. We also committed to creating enough feeder devices to have one for each day of the week. It is important to note that each of these devices can be manipulated in multiple ways and objects can be added to them to make them more challenging (sticks, PVC, boomer balls®, etc.), and the location of the devices can be changed.

Based on information from a study comparing wild giraffes and zoo-housed giraffes (Veasey et al., 1996), maximizing the amount of browse we provide our giraffes may be the most important management change we can make to elicit natural behavior. Giraffes spend upwards of 50-70% a day foraging in the wild. When those opportunities are severely limited, it can cause an instinctual need to replace them via stereotypies (Baxter and Plowman, 2001). We have committed to providing leafy browse and branches that can be browsed naturally and stripped of any bark on a more consistent basis: a minimum of two times per week, even during the winter. The following are steps we have taken or will be taking to accomplish this.

1. Map out areas of the zoo that have approved browse available, making it simpler to find available browse.
2. Utilize outside sources for browse, such as off-site zoo property, surrounding park, the city forestry department, and local botanical gardens.
3. Create a browse freezing program. This browse will be used during the winter months when there is none available. Our goal is to freeze enough browse to have one container per week during the winter months.
4. Work closely with the zoo's horticulture department to utilize any harvesting opportunities.

Interacting with environmental enrichment

Our assessments showed that food-based enrichment was more effective, so increasing the opportunities to interact with this kind of enrichment should decrease stereotypic behaviors. Our study also showed that non-food-based enrichment was not providing stimulating experiences. Because of this finding, those enrichment items will no longer be presented to the giraffes for more than one day at a time. We have committed to creating one new item every two months to increase enrichment item diversity and manipulate existing items in ways that will make them more stimulating. These new enrichment items will be geared specifically toward giraffes, and their use will be evaluated for effectiveness.

Ruminating

Rumination can play a vital role in the overall welfare of our giraffes. It can be directly correlated to the presence of oral stereotypy and even be related to the disruption of sleep patterns. This behavior is therefore important for both mental and physiological reasons (Baxter and Plowman, 2001). By ensuring that the giraffes are receiving an adequate amount of dietary fiber, we can provide for this biological need through the following strategies:

1. Providing feeding opportunities outside (including hay).
2. Providing consistent browsing opportunities on a regular basis (including winter time).
3. Providing fresh branches on a regular basis (for stripping bark).
4. Increasing the number of feedings throughout the day.
5. Locomotion

Out of the four desired behaviors, this one is the most difficult and complex to elicit. We have not yet developed any management strategies to specifically target locomotion. By increasing the amount of stimuli within their indoor holding, we could potentially increase the desire for them to explore and move around their space. Locomotion, though recorded, was not analyzed in our assessment, nor were any publications found that directly address the motivation and physiological need to walk and run. It is our hope that by providing a dynamic living space, we are fulfilling their instinct to explore.

Conclusion

We learned a lot about our giraffes and have been able to make positive changes to their management based on the results of these simple assessments. Keepers are tasked on a daily basis to "listen" to their animals, which can be a daunting responsibility. By conducting this keeper-driven behavioral assessment, we were able to get a clearer picture of what our giraffes were doing and what they might need. By using the results from this study, other publications, and, more importantly, other zoos, we were able to create and implement a program that addressed the stereotypic behaviors we were seeing in our giraffes and tailor our husbandry practices to provide for species-specific opportunities and enhance overall welfare. Our peers can be our most valuable resources, and it is my hope that this article inspires you to utilize them.

Acknowledgements

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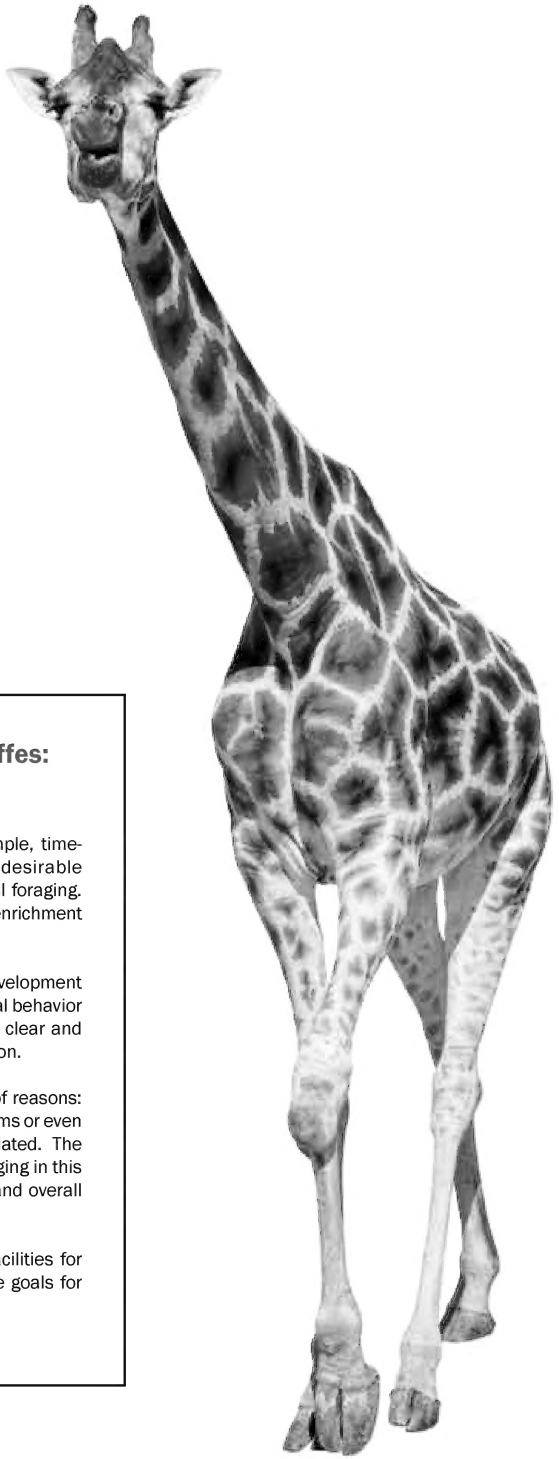

REVIEW: Welfare in Zoo-housed giraffes: A simple approach

This article presents a concise overview of some simple, time-effective techniques to diminish or extinguish undesirable stereotypic behaviors in giraffe with the use of natural foraging. Measurig the effectiveness of food and non-food-based enrichment through an ethogram reveals some interesting results.

The detail in the ethogram provided allows for the development of a solid baseline of information on giraffe stereotypical behavior at the Saint Louis Zoo. The information gained was a clear and concise description while highlighting its implementation.

Often institutions avoid food enrichment for a variety of reasons: possible weight gain, maintaining public feeding programs or even potential shifting issues should an animal become satiated. The paper accurately described the benefits of natural foraging in this species and how it decreased stereotypical behavior and overall welfare of the giraffe collection.

This article also encouraged networking with other facilities for enrichment ideas, along with establishing measurable goals for the keepers to accomplish new enrichment ideas.

AthruZ

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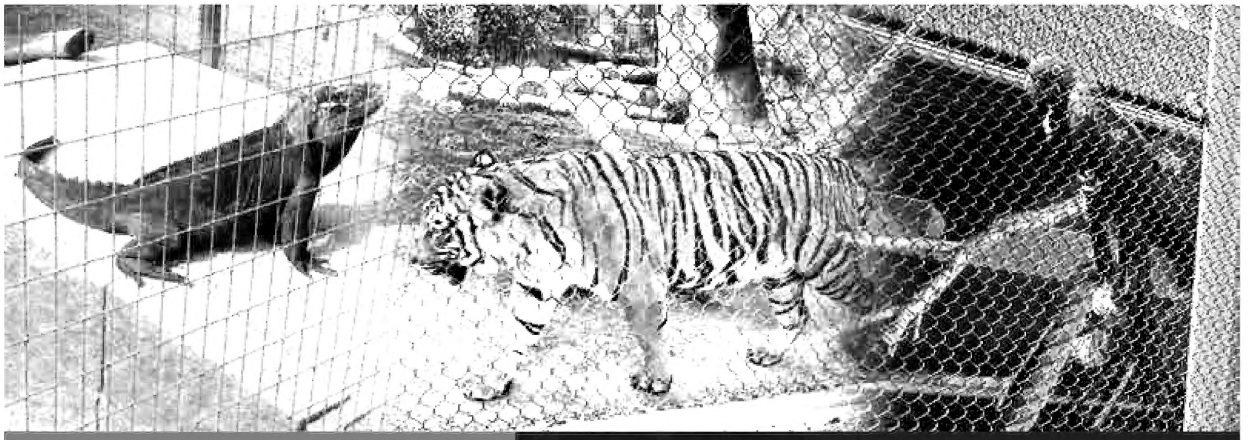

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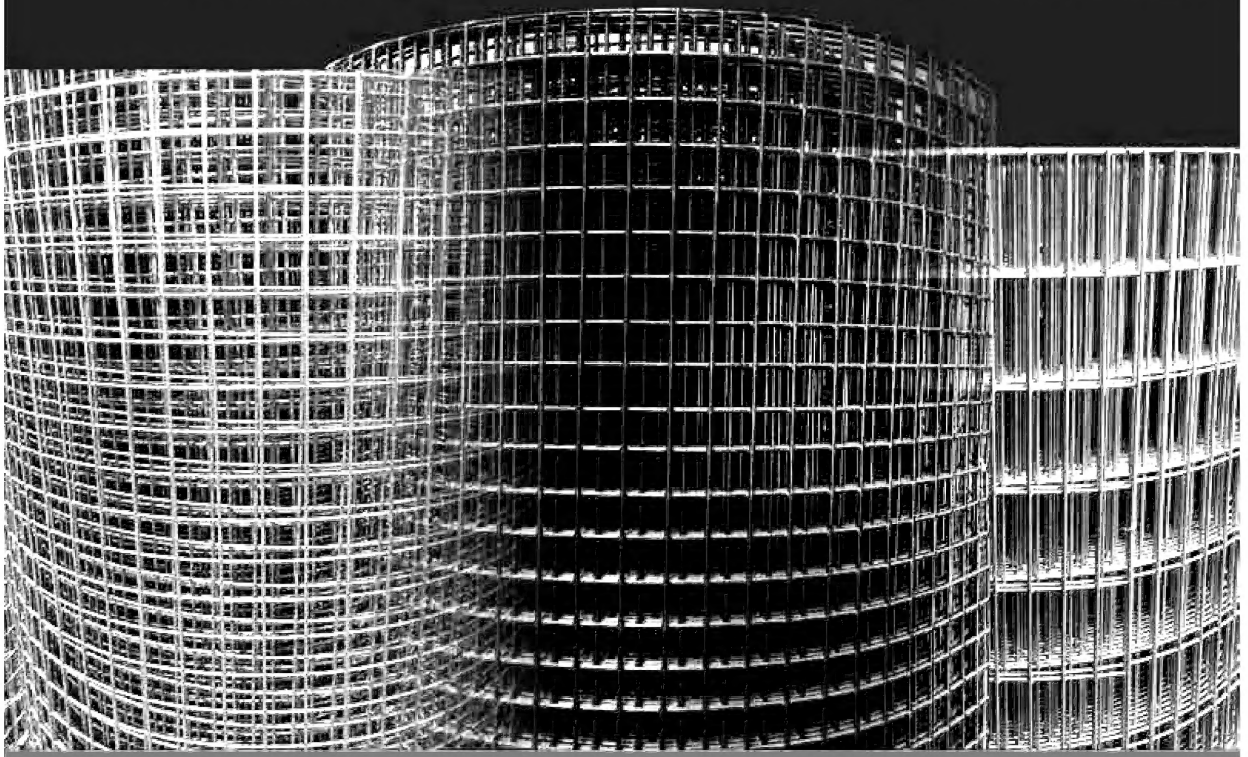

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