

Repetitive phlebotomy protocols applicable to rhinoceroses and tapirs have been proposed<sup>5-7</sup> and effectively applied, particularly by colleagues at Disney Animal Kingdom.<sup>8,9</sup> Despite its effectiveness, few rhino-holding institutions have adopted this procedure because of the time and expense required to train and treat animals that appear entirely healthy until an organ dysfunction becomes overt and irreversible. This reluctance might diminish if cost/effective analyses considered the following: Sustainability of animal populations can be predicted by computer programs that assess factors affecting birth/death ratios. Shifts as little as  $\pm 2\text{-}6\%$  may be capable of altering this tipping point as predicted by the IUCN for certain rhinoceros populations in 2017. Based on vast experience with human ISD subjects, introduction of phlebotomy programs for susceptible species could expand captive lifespans  $>25\text{-}40\%$ . For African black and Sumatran rhinoceroses, this would be equivalent to two or three more breeding cycles, favorably shifting their tipping points and ensuring enhanced quality of lives devoid of the inevitable morbidity of chronic iron toxicity.

#### **LITERATURE CITED**

1. Paglia DE. Acute episodic hemolysis in the African black rhinoceros as an analogue of human glucose-6-phosphate dehydrogenase deficiency. *Am J Hematol* 42:36-45, 1993.
2. Paglia DE. Rationale for phosphate supplementation in prevention and therapy of hemolytic anemia in the African black rhinoceros (*Diceros bicornis*). *Proc Zool Soc Southern Africa Symposium, Contemporary Zoology in Southern Africa*, University of Natal, Pietermaritzburg, R.S.A., 1994, p. 107.
3. Paglia DE, Valentine WN, Miller RE, Nakatani M, Brockway RA. Acute intravascular hemolysis in the black rhinoceros: Erythrocyte enzymes and metabolic intermediates. *Am J Vet Res* 47:1321-1325, 1986.
4. Paglia DE, Miller RE. Erythrocytes of the black rhinoceros *Diceros bicornis*: susceptibility to oxidant-induced hemolysis. *Int Zoo Yb* 32:20-27, 1993.
5. Paglia DE. Recommended phlebotomy protocol for prevention and therapy of chronic progressive iron toxicity in captive rhinoceroses and tapirs. *Proc 3<sup>rd</sup> Biennial IRKA Workshop*, Denver CO, 2003.
6. Paglia DE. Recommended phlebotomy guidelines for prevention and therapy of captivity-induced iron-storage disease in rhinoceroses, tapirs and other exotic wildlife. *Proc AAZV Conf*; 2004, p. 122-127.
7. Paglia DE. Iron storage syndrome in rhinoceroses: Potential role for rhino keepers in prevention and therapy. *Proc 4<sup>th</sup> Biennial IRKA Workshop*, Columbus OH, pp. 1-10, 2005.
8. Losey R. Large volume phlebotomy as a practical management tool for iron overload disorder. *Proc 8<sup>th</sup> Biennial IRKA Workshop*, San Diego CA, 2013.
9. Losey R. Holistic approaches to combating iron overload disorder in black rhinoceros. *Proc 9<sup>th</sup> Biennial IRKA Workshop*, Chester UK, 2015.

#### **PRINCESS AND THE PEA: THE CHALLENGE OF MAKING AN OLD RHINO COMFORTABLE**

Melissa Farr, Utah's Hogle Zoo, [mfarr@hoglezoo.org](mailto:mfarr@hoglezoo.org)

At Utah's Hogle Zoo we have a southern white rhinoceros, Princess, who has a multitude of problems that we have had to find creative solutions for managing. My talk will share each of her problems from least concern to greatest concern, and each of our corresponding solutions.

- 1) Mouth problems
  - a. Possible tooth issue? Discussion of symptoms with video.
  - b. Train wide "open" attempt to train for mouth x-ray, and the difficulties of finding a source.
  - c. Monitoring weight and amount of dropped food.
  - d. Adding feeding stations to a mostly sand exhibit for better intake without the sand.
- 2) Eye Problems – cataracts in both eyes, and severe allergies that present mid-summer through the end of fall.
  - a. Showcase chin station training for the ophthalmologist

- b. Showcase eye flushing and eye drop training
- c. Fly mask training and design
- d. Natural fly repelling plants to exhibit
- e. Adding fly stands to exhibit
- f. Building fly traps around exhibit

3) Arthritis –moderate to severe difficulty moving (videos to accompany)

- a. Hydrotherapy
- b. Physical therapy – leg targets
- c. X-ray training
- d. Substrate challenges, comparing cost vs quality vs preference
- e. Yard maintenance – selective tilling to keep bedding areas soft, but walking paths hard for ease of movement.
- f. +/- exercise? Discussing different theories of activity levels affecting lameness.
- g. Drug and Supplement trials

4) Weight Control

- a. Diet decreases, grain change
- b. Training produce and calorie comparison chart between training treats
- c. Extended feeding opportunities and separations from 1.0 rhino for periods to mitigate food related aggression

5) Quality of movement / Quality of Life Log

- a. Discussion of our current log including graphed out snapshots showing trends in movement declines and inclines with the various changes in therapies/weight loss, etc.

# Princess and the Pea; making an old rhino comfortable

By: Melissa Farr  
Lead Keeper – Africa  
Utah's Hogle Zoo



# Princess

- 38 years old
- Exhibited with half brother George
- Exhibit size: 12,550 SQF w/ 4890 SQF option
- Barn size: 1730 SQF w/1416 SQF option
- Areas of concern:
  - Drooling
  - Eye allergies
  - Chronic left rear lameness



# Mouth Problems

- Chronic drooling - possible tooth issue?
- Tasked with diagnosing without an immobilization
- Trained “open” to get better view
- Training “open” with endoscope or dental x-ray insertion
- Monitoring weight and amount of dropped food
- Removed sand from majority of feeding areas
- In progress



# Eye Problems

- Double cataracts
- Severe eye allergies
  - Swelling of medial canthus
  - Redness and bleeding
  - White discharge



- Eye flushing (water and saline)
- Eye meds:
  - 1. Triple Antibiotic ointment 5 mg/g (Bacitracin; Neomycin Sulfate; Polymyxin B)
  - 2. Neomycin & Polymyxin B & Dexamethasone Ophthalmic 0.1 % (Dexamethasone; Neomycin Sulfate; Polymyxin B)
  - 3. Vetropolyycin HC 10 mg/g (Bacitracin; Hydrocortisone; Neomycin Sulfate; Polymyxin B)

- Fly spray



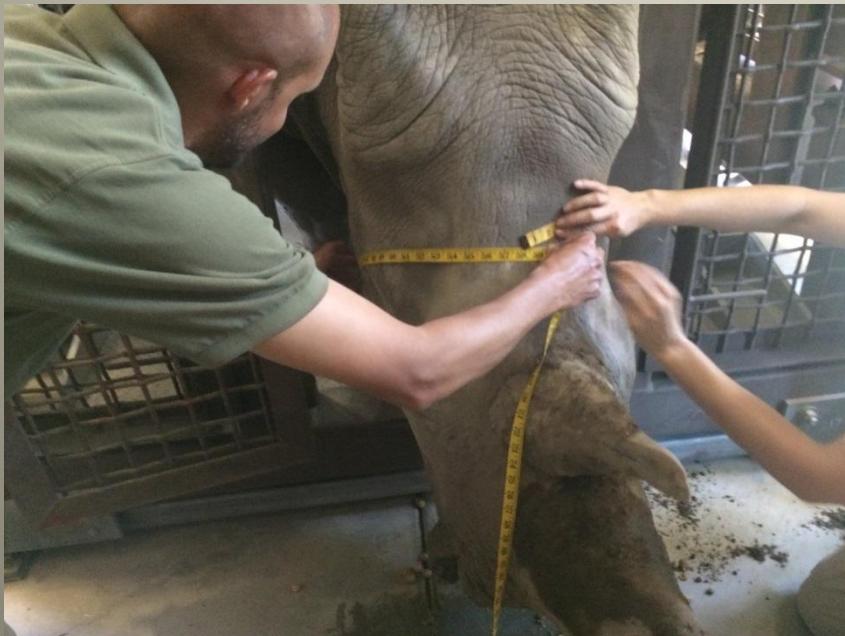
# Eye exam training

- Chin station
- Eye exam



# Fly mask training

- Took 16 measurements
- Local company is producing
- Graphics are planned to explain mask to guests



# Fly repellent plants and stands

- Basil
- Lavender
- Citronella



# Chronic Lameness

- 14 year history of lameness with increasing degrees of severity from an acute injury.



# Game Plan

- Introduce Physical Therapy
  - Hydrotherapy
  - Increase movement (feeding strategies, A to B's)
  - Stretching and leg targets
  - Massage/skin care
  - X-rays
- Address Substrate
- Meds
- Weight control
- Daily tracking of movement

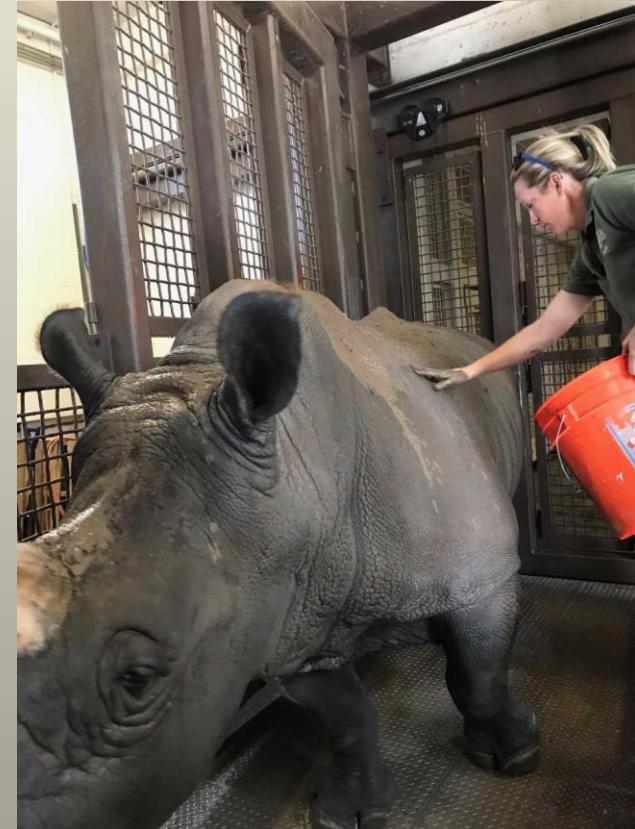


# Physical Therapy

## Hydrotherapy



## Skin Care



# Physical Therapy

- Leg Targets
- A to B's
- Massage (stretching)
- X-Ray training



# Substrate Challenges

- Outdoor exhibit maintenance
  - Near daily tilling with tractor, daily watering, bi-weekly additions of sand.
- Indoor trial of substrates
  - Shavings, sand, straw, rubber mats and compressed pellets.

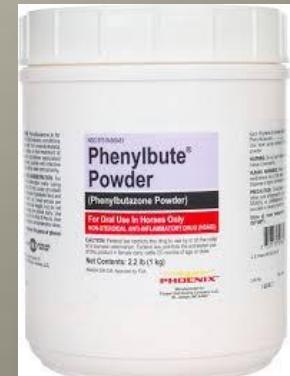


# Meds

- Daily Cosequin
- Daily Bute-Less supplement
- Seasonal daily dose of bute (1 scoop SID)
  - Dosage is 1-2 scoops/500 lbs
- Dosage for acute increases in lameness: 3 scoops BID
- Emphasis on as little NSAIDS as possible early on.



- Supports a healthy inflammatory response
- Top honors from *Horse Journal*



# Weight Control

Starting weight 4,614 lbs.

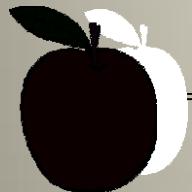
Goal weight: 3,800 lbs.

- Then: 5 lbs. Wild Herbivore + 5 lbs. elephant chow
- Now: 3 lbs. Hay Replacer Pellet
  
- Then: 15 lbs. high value training produce
- Now: 6 lbs. mixed value training produce
  
- Then: Daily Hay fed once in the am
- Now: Daily Hay split into 4 feedings 7am, 9am, 2pm, 8pm
  
- Increased movement oriented training and given more space, increased feeding zones, and physical therapy.
  
- End weight : 3,826 lbs. Total weight loss: 788 lbs.



# Calorie Comparisons

## Individual fruit/veggie



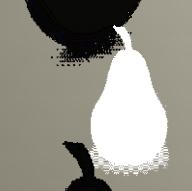
= 100 calories ,  
0.5 lbs.



= 80 calories ,  
0.5 lbs.



=135 calories ,  
0.7 lbs.



= 95 calories,  
0.5 lbs



= 25 calories ,  
0.7lbs.



= 100 calories,  
2 lbs.



= 106 calories  
and 1 lb.

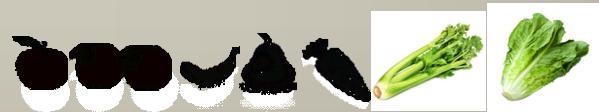
## Total amount, 6 lbs



= 6 lbs. and **387**calories



= 6 lbs. and 616 calories



= 6 lbs. and 721 calories



= 6lbs. and 725 calories



= 6lbs. and 730 calories



= 6 lbs. and 1,080 calories



= 6lbs. and **1,170**  
calories

# Movement Chart

3 scores of movement and one behavior score daily.

## Movement

- Scores:

**5** – Normal movement and range for a rhino.

**4**- Slightly restricted movement and range. Some stiffness when getting up. Readily shifting and crossing thresholds.

**3**- Moderately restricted movement and range. Moderate stiffness after getting up - takes a little longer to warm out of initial stiffness.

**2**- Severe difficulty with movement and range of motion. Severe difficulty after getting up.

**1**- Unable or mostly unable to move. Unable, or mostly unable to shift, change direction, or cross thresholds.

## Behavior

- Scores:

**5** - Attitude and behavior unaffected by movement score.

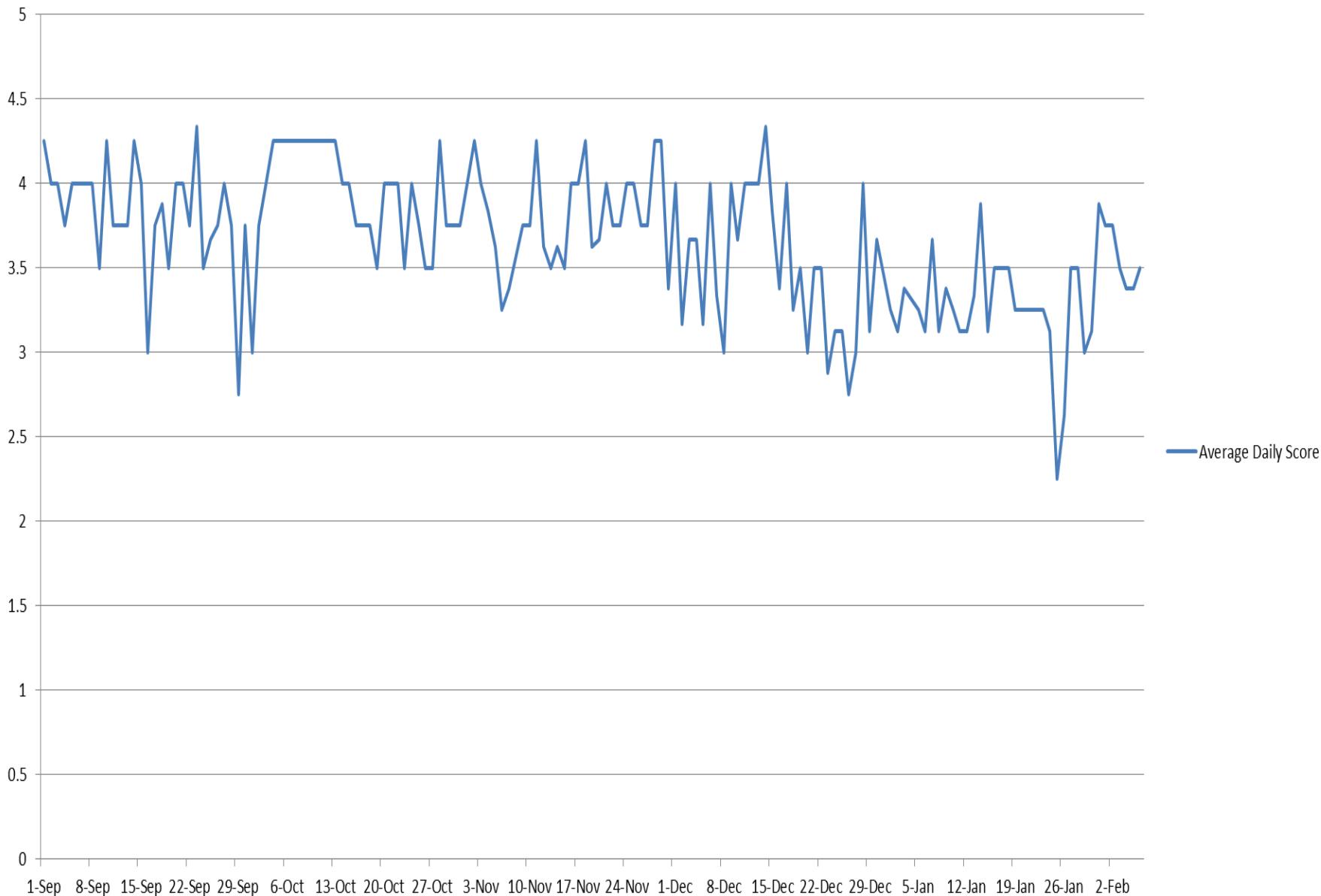
**3**- Attitude and behavior slightly to moderately unusual. Ex: slow to non-participation in feeds, slow to respond to keepers.

**1**- Attitude and behavior significantly unusual. Ex: Anorexia; Fighting or complete avoidance of George; avoidance from keepers, disinterest in enrichment/surroundings.

## Princess movement log

Date:	Early AM	Late AM	Afternoon	Behavioral Score	Average Daily Score	Comments
1-Sep	4	4	4	5	4.25	
2-Sep	4	4	3	5	4	
3-Sep	4	4	3	5	4	
4-Sep	3	4	3	5	3.75	
5-Sep	3	4	4	5	4	
6-Sep	4	4	3	5	4	
7-Sep	3	4	4	5	4	morning low temps in lower 50s
8-Sep	3	4	4	5	4	morning low temps in lower 50s
9-Sep	3	3	3	5	3.5	
10-Sep	4	4	4	5	4.25	morning low temps in high 40s. Dropped co
11-Sep	3	3	4	5	3.75	fighting with george while shifting in
13-Sep	3	3	4	5	3.75	
14-Sep	4	4	4	5	4.25	
15-Sep	3	4	4	5	4	low morning temps
16-Sep	3	3	3	3	3	Gala was the previous night. She came in, a
17-Sep	4	4	4	3	3.75	did not come over for the morning feed
18-Sep	2.5	4	4	5	3.875	
19-Sep	3	3	3	5	3.5	
20-Sep	4	4	3	5	4	
21-Sep	4	4	3	5	4	
22-Sep	3	3	4	5	3.75	
23-Sep	3	4	4	5	4	
24-Sep	3	3	4	4	3.5	was laying in stall #1 after she ate. Would n
25-Sep	3	3	4	4	3.5	
26-Sep	3	4	3	5	3.75	
27-Sep	4	4	3	5	4	
28-Sep	4	4	3	4	3.75	
29-Sep	3	3	2	3	2.75	
30-Sep	3	4	3	5	3.75	walked really good for morning session and
1-Oct	2	3	3	4	3	
2-Oct	4	3	3	5	3.75	
3-Oct	4	3	4	5	4	geore was pretty aggressive towards her ov
4-Oct	4	4	4	5	4.25	was given inside access overnight.

## Average Daily Score



# Daily Scores

- 4 scores recorded in excel spreadsheet
- Average daily score recorded our daily logs
- Helps us identify:
  - When to medicate
  - When to adjust physical therapy
  - Track trends
  - Identify what is working
  - Can ultimately morph into a Q.O.L sheet



**The End**

Q & A