Managing a Reticulated Giraffe (*Giraffe camelopardalis*) with Allergies

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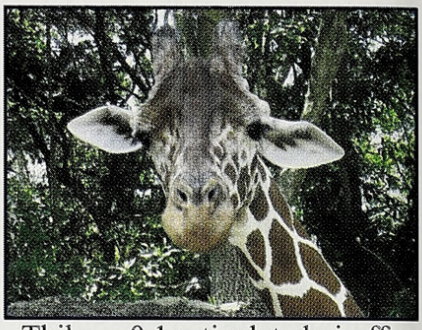
Introduction

Thika, a 21-year-old female reticulated giraffe (*Giraffe camelopardalis*), at Disney's Animal Kingdom in Lake Buena Vista, FL has presented multiple allergy symptoms since August 2000. She was born at the Calgary Zoo in 1989 and lived at the Indianapolis Zoo from October 1991 to December 1997 before being transferred to Animal Kingdom. Prior to her arrival at Animal Kingdom she had a history of lameness due to a broken P3 bone, abomasal endoparasitism, and rumen acidosis, but no symptoms of allergies.



Thika - 0.1 reticulated giraffe

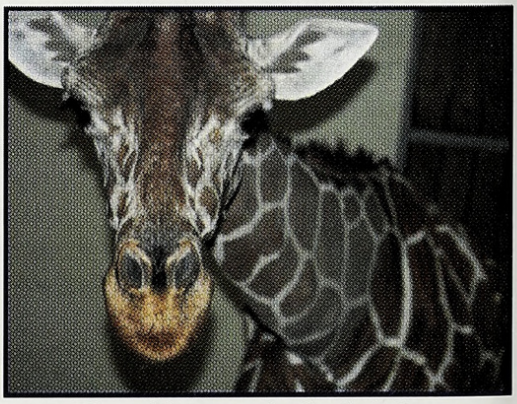
While at Disney's Animal Kingdom she has been housed both at the Animal Kingdom Lodge and Animal Kingdom Park. The giraffe herds have varied in size, from two to 12 giraffes, and age with infants to full grown breeding males and females. She has also shared the savannah exhibits with a variety of ungulates and birds. The savannahs are made up of a diversity of plant life including native and exotic trees, shrubs, and grasses.

Symptoms and Treatment

Thika's initial allergy symptoms included head shaking, ear shaking, and a foul odor, discharge and drooping from both ears. These symptoms occurred seasonally, each summer, for five consecutive years. The following two years keepers noticed that her ear infections were occurring in the summer and fall and were lasting longer each time. Her blood work was also changing, higher culture counts were obtained and the infections were yeast rather than bacterial. Thika also became less cooperative with treatments and occasionally required sedation to accomplish the treatments. Throughout this time the staff veterinarians would take cultures of her ears and draw blood to check for infection. She was receiving ear flushes and antibiotics when infections would set in.

Giraffe in the chute with vet staff

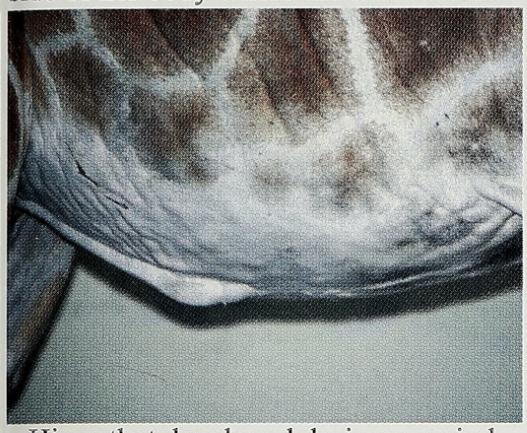
In 2009 there was a shift in her symptoms. Thika began scratching her abdomen, chest, neck and head. She experienced hair loss, mainly in the neck region, and developed sores. Oral antihistamines and hydro-plus flushes were prescribed along with a Nolvasan® flush and a vinegar/water flush for her ears. Nutritionally flax seed oil was added to her diet to help with her dry skin. Staff also altered her holding and feeding set up. Rectangular hay containers were replaced with round hay barrels to avoid edges and hung above scratching level. Grain containers were also raised. New scratching devices were placed in Thika's stall that were less abrasive (soft deck brushes, etc). Thika was held off of the savannah for a period of time as well in order to isolate her from gunite walls on which she had begun scratching.



The white area is the hair loss induced by excessive scratching.

Pain medications and antibiotics were prescribed due to continued infection and swelling in the ears. Antihistamines were increased and altered in an attempt to find a dose and type that would be most effective. Staff was unsure as to why there had been a shift in symptoms

and why the symptoms were so persistent. Allergies to insect bites were a possibility so fly spray was applied, but was found to be ineffective. Veterinarians decided to take punch biopsies from the right side of her body where the skin was most affected, however there were no significant results.



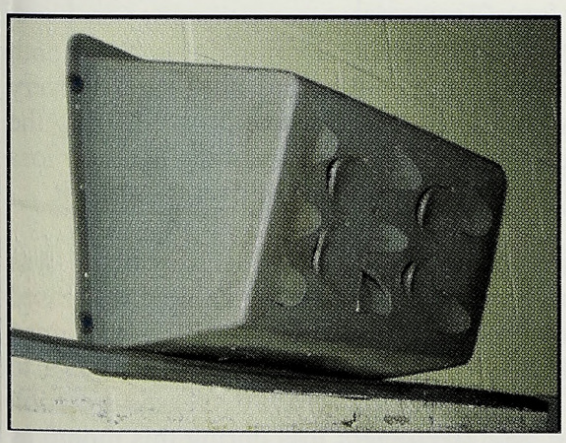
Hives that developed during a period of excessive scratching

A regimen of baths was prescribed. The regimen began with Nolvasan® baths which were applied and scrubbed into the skin using a deck brush. The diluted Nolvasan® would then set for five minutes before being thoroughly rinsed off. The Nolvasan® baths were completed once a day for four days at which time they were discontinued because Thika developed hives on her abdomen presumably from the baths. The next round of baths was a DermaPet DermAllay™ oatmeal shampoo. The shampoo was applied, scrubbed into the skin, and allowed to set for five minutes before being rinsed off. A Derma Soothe™ anti-itch cream rinse was then applied and left on for the day. The DermaPet DermAllay™ baths were given daily for five days then every other day for another 12 days. The final round of baths was Universal Medicated shampoo. They were applied, scrubbed in, and allowed to set for ten minutes before being rinsed off. The baths were given every other day for two weeks before being discontinued. During this regimen Thika showed no improvement and continued to have dry and flaky skin.

In conjunction with the baths Thika was also receiving antihistamines and her diet was changed from a mix of Mazuri® Wild Herbivore and Mazuri Plus grain to 100% Mazuri® Plus. The diet change was mainly due to Thika's loss of weight at this time. External Wind™ nutritional supplement was prescribed for 30 days twice a day, but was discontinued after a week due to Thika's refusal to consume it.

Sores caused by excessive scratching

Following the regimen of baths, a steroid injection was given along with antibiotics, Uniprim™ for the skin infection, was prescribed once daily for two weeks at which time it was extended for another two weeks. Upon a veterinary check-up the prescription was extended for an additional two weeks, so in total she received the Uniprim for six weeks. Her flax seed oil supplements were also increased and fish oil supplements were added into her diet. Bloodwork had shown Thika to be anemic so a red cell supplement was added into her diet as well. Keepers noted the most significant improvement following the steroid injection. Her wounds began healing and scratching decreased. The steroid seemed effective for approximately a month at which time Thika would once again begin scratching and her skin would become flaky. An additional steroid injection was given two months prior to her allergy testing. (In order to obtain the most accurate results steroids could not be given close to the allergy testing.) A list of medications, baths, and supplements can be found in Table 1.



A scratching board that was created to provide relief without sharp edges that would cause injury.

Allergy Testing and Results

In December of 2009 a local veterinary dermatologist was consulted on Thika's case. She recommended skin-based testing for allergies based on equine protocols. The equine test includes 50 injections to test Thika's reaction to several types of hay, grain, and Florida plants as well as a control. The test requires the skin to be shaved and each injection administered in a marked location. We were able to administer all of the injections during one training chute session.

Ten minutes after the injections were given they were evaluated by the veterinarian for histology response in comparison to the control. See Table 2 for the results.

Allergist marking the potential test sites

Allergist administering the individual injections at each site

Allergist evaluating the reaction to each injection 15 minutes after being administered

Based on the results of the testing, an allergy serum was designed specific for Thika. On 15 January 2010 Thika received her first allergy injection from the veterinarian on staff. An 18-gauge needle was used and injected 0.1 ml of serum subcutaneously into one of the skin folds on her side. Allergy injections can have adverse side effects such as regurgitation, diarrhea, hives, ataxia, labored breathing and the animal collapsing. After each treatment was administered Thika was held in the barn or yard for two hours before being shifted onto exhibit to watch for any of these symptoms.

Allergy injections require a "loading period" for the serum to stimulate antibody production in the patient. During this phase the antibody concentration in each vial of serum also increased. Thika's first vial would be used for four injections, increasing from 0.1 ml to 0.8 ml. The same course of treatment was used with the second vial. During this 21-day period no significant change was noted in Thika's behavior. It was noted that she was not scratching as much, but we had seen this pattern before at this time of year.

During this "loading phase" her normal behavioral training routine was modified. A typical training session in the chute was usually based on Thika's willingness to participate. As with all training sessions some days were better than others. The minimum training criteria was to have three feet in the chute and her maximum was to close her in the chute and perform maintenance behaviors (tactile, targeting, etc). We found on days following Thika being closed in the chute she would have major setbacks and not clear the chute for weeks. This was not conducive behavior for regular injections. It was determined on injection days she would be manually pushed into the chute using a permanent wooden push wall, given her injection and released. In doing this, on non-injection days her training would stay consistent and not regress.

The series of injections continued at three-day intervals for the first month. During the second month they were increased to every 10 days and after three months she was on a maintenance level of every two weeks. Keepers were trained to give the injections during the maintenance phase. During the third month (March), no notations were made in the daily reports of Thika scratching and hair loss had stopped. In April she was observed scratching more frequently in holding and on the exhibit.

Throughout the spring Thika continued on the allergy injections, but increased scratching was still observed. She was maintained on her supplements, though there were periods of decreased consumption. She was started on the antihistamine again to decrease the itching and this continued through the summer. Due to the decreased food consumption more and more creative ways to administer her supplements and medicine were tried. In July Thika started to have decreased urination along with the decrease in food consumption. She had substantial weight loss during this month as well.

TABLE 1

Date	Drug	Purpose	Comments
8/15/06-8/21/06	saline	ear flush	
8/15/06-8/21/06	Animax ointment	antibiotic	
8/31/06-9/20/06	dilute Nolvasan	ear flush	
8/31/06-9/20/06	Animax ointment	antibiotic	
8/3/07-8/8/07	dilute Nolvasan	ear flush	
8/3/07-8/8/07	Animax ointment	antibiotic	
10/31/08	dilute Nolvasan	ear flush	Azaperone sedative required
12/31/08	dilute Nolvasan	ear flush	
1/2/09-1/30/09	dilute Nolvasan	ear flush	
1/2/09-1/30/09	water/vinegar	ear flush	50:50 ratio
4/30/09	water/vinegar	ear flush	50:50 ratio
5/3/09	saline	ear flush	
5/3/09	water/vinegar	ear flush	
5/3/09	Animax ointment	antibiotic	
5/5/09-5/9/09	water/vinegar	ear flush	50:50 ratio;qod
5/8/09-5/16/09	Hydroxyzine	antihistamine	400mg
5/10/09-5/16/09	Hydro-plus	ear flush	burrow's solution with hydrocortisone
5/17/09-5/27/09	Hydroxyzine	anti-histamine	increased to 600mg
5/28/09-6/17/09	Hydroxyzine	anti-histamine	increased to 800mg
6/15/09-6/24/09	Hydro-plus	ear flush	burrow's solution with hydrocortisone
6/18/09	Cetirizine	antihistamine	200mg
7/5/09	water/vinegar	ear flush	50:50 ratio;once a week for 12 weeks
7/13/09	Endure	fly spray	every 5 days for 4 treatments
7/22/09	lime sulfur	bath	punch biopsies taken
8/1/09	dilute Nolvasan	bath	scrub into skin, set for 5 minutes, rinse;caused hives
8/5/09	DermaPet DermAllay oatmeal shampoo/Dermal Soothe anti-itch crème	bath	scrub into skin, set for 5 minutes, rinse;crème left on;fly spray discontinued
8/9/09	External Wind	nutritional supplement	35g BID for 30 days, stopped after 1 week due to lack of consumption
8/10/09-8/21/09	DermaPet DermAllay oatmeal shampoo/Dermal Soothe anti-itch crème	bath	scrub into skin, set for 5 minutes, rinse;crème left on;qod
8/24/09-8/28/09	Universal Medicated shampoo	bath	set for 10 minutes & rinse;qod;extended 2 weeks
9/10/09	Depo-Medrol	steroid	

9/10/09	Uniprim	antibiotic	2 packs SID for 14 days;baths discontinued
9/12/09	Excede	antibiotic	
9/12/09	DermaPet Derm Allay oatmeal shampoo	bath	bath given by vet
9/24/09	Uniprim	antibiotic	extended 14 days
10/19/09	Iron Horse or Finishline red cell	nutritional supplement	30 days
10/23/09	Depo-Medrol	steroid	
1/4/10	Depo-Medrol	steroid	Azaperone sedative required
1/4/10	Tulathromycin	antibiotic	Azaperone sedative required
1/14/10		allergy injection	see table
5/12/10	Cetirizine	anti-histamine	400mg
6/25/2010	Cetirizine	anti-histamine	increased to 600mg
8/24/2010	Iron Horse or Finishline red cell	nutritional supplement	discontinued due to blood results
Note: SID=once a day, BID=twice a day, qod=every other day			

In September fewer bouts of scratching were noted. Since resumption of allergy injections in January no open skin sores or ear infections have been noted. She was taken off the red cell supplement and started on a vitamin E supplement based on new blood work results. Thika had appeared to make it through the allergy season better than in years past. However, in November she relapsed. Violent scratching led to open sores on her abdomen. Her fecal and urine output decreased and she became lethargic. Blood was taken and it was determined that she had a bacterial infection. She was given antibiotics, but the scratching was worsening. She was given Diphehydramine but was unresponsive. Steroids were resumed in mid- November. Blood was taken weekly to monitor her white blood cell count for signs of infection. After the infection cleared the scratching also subsided and she was taken off the antihistamine in January of 2011.

Two weeks after being off the antihistamine Thika started scratching again. After evaluating the last year's treatment and allergy injections, the veterinary staff wanted to try a newer form of allergy testing. They drew blood and a sample was sent off for serum antibody analysis along with banked blood from previous blood draws. It was determined to try the blood analysis and compare the results of the two testing styles. See Table 2 for blood analysis results and comparison to the injection results. Based on those results a new serum was developed for Thika's injections.

Conclusion

Currently Thika is in the "loading dose stage" of the new allergy serum and is receiving antihistamine tablets once again along with her flax seed oil, fish oil, and vitamin E supplements. Staff continues to carefully observe and record Thika's behaviors, consumption, and weights however it is too soon to determine if the new serum will help to alleviate Thika's symptoms. We continue to monitor Thika'a progress and look for new and inventive methods of controlling her allergies.

Acknowledgements

We would like to thank Disney's Animal Kingdom veterinary staff for their contributions and guidance. We would also like to thank the West Savannah animal care staff and Savannah Zoological Managers: John Strickland, Karen Jasmin, Steve Castillo, and Gary Noble as well as Joe Christman, Area Operations Manager for their support. Last but not least, we would like to thank Dr. Jill Mellen, Education and Science Director for editing this paper.

TABLE 2

Test	Draw Date 7/12/09 (Banked Blood)	Draw Date 1/4/10 (Banked Blood)	Draw Date 7/12/10	Skin Test 12/18/09	Recommended Treatment
Alder Mix	222	169	212		T
Ash Mix	184	168	193		Treated by Privet/Olive
Bayberry	258	214	181		T
Beech American	154	206	170		Treated by Oak Mix
Birch Mix	184	181	218		Treated by Oak Mix
Box Elder					
Box Elder/Maple Mix	247	181	169		Leave out due to number of allergens
Ca. Pepper Tree	149	144	166		
Red Cedar				2	
Bald Cypress (Cedar)				2	
Cedar Mix (Juniper)	128	178	164		T
Cottonwood (Poplar)	155	167	155		
American Elm					
Elm Mix	149	142	180		Leave out due to number of allergens
Eucalyptus	171	218	193		T
Mulberry White	167	149	167		
Live Oak				2	
Oak Mix	164	177	196		T
Pecan Pollen	206	181	181	2	T
White Pine				2	
Pine Mix	141	167	166		T
Pine Australian	176	204	186	2	T
Privet/Olive Mix	284	244	181		T
Queen Palm	164	194	167	3	T
Sycamore Mix	224	197	165		Leave out due to number of allergens
Walnut Black	210	157	160		
Willow Black	134	149	146		
Orange Tree					
Melaleuca				2	BMS does not carry this allergen for treatment
Bahia Grass	159	201	197	3	T
Bermuda Grass	136	148	154		
Bluegrass (Junegrass)	257	250	183		T
Brome Grass	154	200	176		Treated by Bluegrass
Johnson Grass	121	125	124	3	Treated by Bahia Grass
Orchard Grass	149	146	157		
Reed/Sweet Vernal Mix	128	149	156		
Perennial Rye Grass					
Rye/Fescue Mix	136	182	192		Treated by Bluegrass
Timothy Grass	214	200	183	3	Treated by Bluegrass
Red Top Grass					

Alfalfa Pollen	265	194	182		T
Baccharis	149	107	161		
Clover Red	268	189	170		T
Cocklebur	162	125	128		
Daisy	237	258	177		T
Dandelion	149	125	149		
Yellow Dock					
Sheep Sorrel				2	
Dock Mix/Sheep Sorrel	143	170	149		Leave out due to number of allergens
Dog Fennel (Chamomile)	166	132	155		
English Plantain	228	230	208	2	T
Goldenrod	176	163	149		
Lambsquarters	119	120	247		T
Marsh Elder	115	114	100		
Mugwort Common	135	147	147		
Mustard Pollen	193	184	201		T
Nettle	209	215	213	2	T
Pigweed Mix	161	149	158		
Ragweed Mix	137	144	157	2	T
Russian Thistle	108	131	141	3	Treated by Lambsquarters
Alternaria tenui	176	158	205		Leave out due to number of allergens
Aspergillus fumigatus	144	124	308		T
Aspergillus Mix	116	101	106		
Botrytis cinera	166	143	100		
Candida	154	159	176		Leave out due to number of allergens
Cephalosporium	123	120	263		T
Cladosporium	169	148	215		T
Epicoccum	176	176	250		T
Fusarium	146	144	148		
Grass Smut Mix	176	138	125		
Helminthosporium	100	110	113		
Mucor	168	208	243		T
Penicillium Mix	113	101	129		
Pullularia pullulans	196	239	269		T
Rhizopus nigricans	214	202	260		T
Cat Epithelia	168	133	169		
Cockroach Mix	179	158	171		
Flaxseed	126	128	113		
Grain Mill Dust	192	144	187		T
Mouse Epithelia	149	115	100		
Pyrethrum	336	281	162		Advance only
Sheep Epithelia (Wool)	126	134	149		
Acarus siro	111	106	100		
Ant Black	141	126	133		

Ant Fire	200	200	201		T
Blomia/Lepido Mix	178	177	154		
Caddisfly	178	192	226		T
Culicoides 500				2	
Culicoides 1000					
Culicoides	176	149	161		T
Deer Fly	124	112	127		
House Dust 25				3	
House Dust Mite 25					
Dust Mite Mix	201	170	149		T
Hornet Wasp	219	203	279		
Horse Fly	132	117	135		
House Fly	111	106	133		
Mosquito 500					
Mosquito 1000					
Mosquito	100	100	100		
T. putrescentiae	176	184	166		Leave out due to number of allergens
Horn fly 500					
Horn fly 1000					
Stable fly 500					
Stable fly 1000					
Apple	167	149	156		
Barley	207	210	188		Avoid
Beets	157	160	137		
Carrot	120	124	112		
Corn	190	179	168		
Molasses	100	100	100		
Oats	149	154	156		
Rice	218	187	177		Avoid
Soy Beans	206	204	187		Avoid
Wheat	179	185	192		Avoid

Class Score	Test Score	
Negative	<=150	0
Borderline	151 to 174	1
Borderline-Positive	175 to 199	2
Positive	200 to 400	3
Highly Positive	>400	4

Photos for this article by
West Savannah Animal Keepers
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Ungulate Websites of Interest

www.ultimateungulate.com (Ultimate Ungulate)
www.antelopetag.com (AZA Antelope and Giraffe TAG)
www.saharaconservationfund.org (Sahara Conservation Fund)
www.giconline.org (Okapi Conservation Program)
www.nrt-kenya.org (Northern Rangelands Trust)
www.giraffeconservation.org (Giraffe Conservation Foundation)
www.giraffecare.org (International Association of Giraffe Care Professionals)
www.grevyszebratrust.org (Grevy's Zebra Trust)
www.savethewildhorse.org (International Takhi Group – Przewalski's Horse)
www.conservationcenters.org (Conservation Centers for Species Survival)
www.rhinos-irf.org (International Rhino Foundation)
www.nature.org/ourinitiatives/regions/africa/explore/hirola-campaign.xml (Hirola Conservation Program)

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