

Discussions by the Laboratory Animal Refinement & Enrichment Forum · Volume V

IT'S OKAY TO CRY



EDITED BY VIKTOR REINHARDT
ANIMAL WELFARE INSTITUTE

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Refinement & Enrichment Forum, Volume V

Edited by Viktor Reinhardt
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INTRODUCTION

This is the 5th volume of selected discussions that took place on the electronic Laboratory Animal Refinement & Enrichment Forum between February 2016 and December 2019. The forum was created in October 2002; it allows the international animal care community to exchange opinions and practical experiences pertaining to the refinement of traditional housing and handling conditions of animals kept in research facilities.

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It is my wish that the discussions compiled in this book will inspire those who are responsible for the welfare of animals in research labs to express their compassion in action, even if this may sometimes require considerable courage. Making life easier for animals in research laboratories not only improves the scientific quality of research data collected from them, but it also promotes animal welfare and our own emotional well-being.

Mt. Shasta, California
December 2019

Viktor Reinhardt
Moderator of LAREF

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CATS

CATS CAN BE DIFFICULT TO WORK WITH. WHAT'S THE BEST WAY TO APPROACH AND HANDLE THEM?

We have received 10-month-old, rather fierce cats for a study; to say the least, some of them have not been properly—if at all—acclimated by the vendor. They are a mix of intact males and females, all single-housed with transparent partitions so they can see each other. These cats are growling, hissing and lashing out whenever you approach them.

Our techs try to make friends with them; they gently talk to them and offer them baby food; they are doing their very best to first have them calm down before they get hold of them. When taking the cats from the cage, the techs only wear the Kevlar which is not as thick and scary. They wear leather and Kevlar gloves when they need to hold legs and block teeth during gavage, but sometimes even this doesn't protect them. We have had so many bites with these cats; maybe the techs are not used to such wild cats. We will probably try Feliway spray for rotations.

I've used Feliway in feline hospital settings and have found it tends to be hit and miss. It had a calming effect in some cases but not in others.

Even our pet cat, who adopted us 17 years ago and who allows me to do anything with her that I deem necessary would growl and probably even hiss and try to strike at me if

I attempted to grab her with leather gloves. To create a safe work environment with cats requires a lot of patience and genuine compassion so they feel assured that they can trust you.



Agreed; gloves are the worst!

In addition to the advice about the gloves, keep in mind that in cat housing, the dynamics of the room will also affect how the animals behave. It's important to pay attention to which cats are housed where and what their interactions are with each other. Is there a lot of staring, flattening of ears, perhaps even growling and hissing between cats that can see or smell each other? It's always a good idea to transfer such animals to other locations where they cannot get into arguments with each other and cause uproar in the room.

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My preferred method is to spend time individually with the cats. I just sit with them in a small quiet room and let them spend time exploring and, if they are so inclined, interact with me. I may use cat toys to get them to play or I may just try to encourage them to come close for head rubs. If you and your staff are able to devote that kind of time, ensure that whoever is trying to acclimate a cat is well versed in cat body language.

First and foremost, get rid of the gloves. They make it difficult to handle any animal properly, and they are only going to elicit fear in the kitties as they will become a sign of “I’m getting grabbed.”

Big towels are much better. Place them with determination but not abruptly over the cat; even if she’s swiping, you are safe and the animal is under your control. If towels are not allowed, use a lab coat—it’s thick, and you can do it backwards keeping your hands covered, and use the sleeves as a catch mechanism.

Start working with the calmest cats in the room. If one frantic cat goes crazy, all the other cats will also freak out—just one low “rowwww” is enough to excite everyone. So if there are those who are easy to handle, work with them first to avoid causing undue stress to the rest. Additionally, approach the animals slowly and calmly, and talk to them with a soft voice. Do not attempt to scruff or snatch a cat without slowly—not abruptly—offering a supportive hand. If the animal lashes, growls, spits or tries to bite, back off and get a towel or lab coat. I say this because once a cat knows that she can elicit fear in a human, she will play the tune like a bass fiddle.

Some of your cats may need to get their frustration out on something; play is an amazing way to take care of that. A play area where they can run, jump around and climb—one cat at a time—could be highly beneficial.

When I have to work with so-called difficult cats, I often visit them and initiate play from a distance with zip ties. I let my ID dangle back and forth right in front of their cage door; they always get fascinated by this game. After hours when it’s quiet I spend time with them; I open a cat’s cage door, sit on the floor and allow the cat to explore the

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room, get comfortable with my presence and perhaps even rub her head on my shoes. I haven't worked with a difficult cat who did not positively respond to patience and persistent kindness.

I'm not sure if it's available worldwide but I use something called Pet Remedy spray. It's similar to Feliway but probably more effective on cats. I've seen angry, hissing cats start purring and rolling on the floor in seconds after a spray of it. It's commonly used in vet practices in the U.K. It works not only with cats but also with other pets; my rats respond to the spray in a similar way as my cats do.

Your side note makes me wonder: How are your rats and your cats getting along with each other? This may be a silly question, but I am curious—very curious—anyway.

Not a silly question at all! The cats, of course, were very curious and were mostly quite happy just sitting and watching the rats in their cage. It was the rats who weren't reacting well! They would get quite stressed when the cats were around; eventually I used to spray the Pet Remedy on the rats' hammock and that always helped: the rats would become more playful and sleep on the hammock.

DOGS

ELEVATED RESTING SURFACES FOR DOGS

U.S. ANIMAL WELFARE REGULATIONS—ISSUED FEBRUARY 2019—FOR DOGS AND CATS STIPULATE THAT “EACH PRIMARY ENCLOSURE HOUSING CATS MUST [EMPHASIS ADDED] CONTAIN A RESTING SURFACE OR SURFACES. ... THE RESTING SURFACES MUST BE ELEVATED.” THIS REQUIREMENT IS VERY LAUDABLE, BUT IT IS A BIT SURPRISING THAT IT IS RESTRICTED TO CATS ONLY. IT SEEMS TO ME THAT DOGS WOULD BENEFIT FROM AN ELEVATED, DRY RESTING SURFACE (PLATFORM/SHELF) NO LESS THAN CATS.

ASSUMING YOU HAVE A LOT OF FIRST-HAND EXPERIENCE WITH CAGED/ KENNELED DOGS, DO YOU THINK IT WOULD BE AN IMPORTANT WELFARE-PROMOTING BENEFIT IF ELEVATED RESTING SURFACES WERE MANDATORY STANDARD FURNITURE OF EACH PRIMARY ENCLOSURE HOUSING ONE OR SEVERAL DOGS?

My experience with purpose-bred and lab-raised beagles is that they will lie anywhere. They use an elevated surface to stand on and gain height over cage mates; they may or may not sleep on it. If it is a hard surface, it appears to me that height is not preferred. If there is a soft surface, it is preferred regardless of height. This implies that a flat kennel with a canvas bed or even just a simple towel may be more comfortable for beagles than a cage with a shelf if its surface is hard.

I have used Kuranda dog beds in the past; they were a huge success. Often we would see the dogs sleeping on them and they were so comfy that our presence didn't really disturb them. They chewed on the edges, though, and sometimes would dig through the beds. As a result, the beds got a bit worn out. But, like any enrichment, the destruction showed that the dogs were definitely using them.

In the facility where I currently work, we use resting boards for our dogs and have noticed varying degrees of use. I do like the raised boards for the simple fact that they add a level of complexity to the cage environment. I have observed dogs hiding toys under them, then digging them out of the hiding space. I have also seen them use the platforms to gain height over their cage mates. They may not always use them for the reason that we intend, but I don't think that makes the furniture less valuable.

We have hard-surface elevated resting boards that most of our dogs use (Marshall foxhound

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mix) for resting and looking around the room. We also offer the Kuranda beds—they are a bit expensive, but come with a one-year free parts replacement plus super nice customer service folks—for post-procedure dogs and/or dogs with lighter colored bellies, as we have noticed that for some reason these guys develop bald patches and/or sores much easier than dark bellied dogs. The few beagles that we have had over the years have used the elevated resting surfaces when they could reach them. We had some HUGE beagles (20 kg+) for a study who couldn't jump onto the elevated boards; they also got Kuranda beds.

I do believe elevated resting surfaces are very important for dogs; so yes, they should be mandatory. Elevated surfaces allow them to climb, see neighboring kennel mates (if high enough), and rest/sit/stand on a surface away from dampness after cleaning and away

from urine and feces when it is present. The addition of elevated surfaces also increases the total surface area of the kennel if they are high enough to be comfortably occupied by the animals.

In one company I worked for previously, our dogs had a bench across the entire length of the back of their kennel that was about 12 inches off the ground. The bench then had a stainless steel ramp that led up into a feeding box. The feeding box was large and provided enough room for the dog to sit up comfortably without having to slouch. The dogs could be fed either on the ground level or in the box, and most preferred the elevated box for eating. Whenever cleaning was done in the kennel you would find all the dogs in their boxes—free to leave if they wish—just watching me clean and interacting with the dogs across the aisle. The bench allowed them to have a higher seat to observe

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their neighbors and also an isolated place underneath if they chose to be alone. All our dogs were paired and you would rarely find the pairs just chilling on the ground level of their duplex. They were always interacting with their side-kennel neighbors. It provided socialization and exercise because it gave the paired dogs room to really chase each other when their dividers were open and the pairs were together.



I definitely agree, elevated resting surfaces should be mandatory. I've worked in facilities where the runs had them and in other facilities where they were absent. Although the dogs without the raised surfaces didn't behave as though anything in their environment was lacking (responsive, alert, playful, interactive, etc.), the dogs with the raised surfaces displayed additional positive behaviors and interactions, even if it was simply to sit beside

you on the platform and lean on you while you brushed them.

Elevated resting surfaces for caged/kenned dogs should be mandatory for sure. When we housed dogs many years ago, these raised boards were greatly utilized by the dogs. Some used them as platforms for jumping/scouting around the room, some used them for resting and some for hiding under when they felt threatened or unsafe. I think a kennel or run without such a platform is inadequate for housing dogs.

Good kennel designs enable dogs to access an elevated area from where they can see what's going on in the room and who or what is coming in. This cuts down on their barking and saves on ear defenders!

ENVIRONMENTAL ENRICHMENT FOR SURGERIZED BEAGLES

DO ANY OF YOU HAVE EXPERIENCE WITH AND/OR CAN SHARE DETAILS OF A PLAY PROGRAM WITH SURGERIZED BEAGLES OUTSIDE OF THEIR HOME CAGES? WE HAVE A FAIRLY LARGE COLONY OF YOUNG MALE BEAGLES

DOGS

WHO ARE EITHER PORTED AND/OR HAVE TELEMTRY DEVICES. THEY ARE HERE WITH US UP TO FOUR YEARS; OPEN FLOOR PLAY IS PROHIBITED BECAUSE OF THEIR DEVICES AND POTENTIAL TO DAMAGE JUGULAR/ FEMORAL VAPS [VENOUS ACCESS PORTS]. I WOULD REALLY LOVE TO GET THESE DOGS OUT ON THE OPEN FLOOR AND ALLOW THEM TO RELEASE SOME OF THEIR ENERGY AND BE ABLE TO PLAY.

I wonder if a piece of clothing—something like a Kevlar neck warmer or a ThunderShirt—that covered the ports of any torso devices would be enough protection to allow them to have supervised play. Also teaching them agility would work their brains, one at a time. The jumps, weave poles and tunnels are easy to make and/or buy. It will take the most amount of staff time to get the dogs exercised and trained, but the animals will benefit so much; they will be able to physically release some energy, get mentally stimulated and interact with their caregivers.

Years ago we had young beagles who had surgery and needed restricted activity afterwards. We allowed them supervised time outside their run, inside the larger room with a technician present, watching and interacting with them. The dogs loved to be outside of their cage; they would run around and have nose contact with the others still inside the runs. Due to the surgery we could only have one dog out

at a time, but this gave them needed exercise, interaction with the technician, and a chance to visit their neighbors.

The few implanted beagles we have are allowed to have supervised free time together in the room. Unfortunately we don't have a beautiful play room like you guys do, but they do seem to enjoy playing with each other outside their cages. Our implants consist of a SQ telemetry device over the back/shoulder with EEG leads that are tunneled to the head. The only time we've restricted their play is shortly after implantation due to seroma formation, but other than that, they get exercised like any of the others.



I have also had great success during a four-year project period with totally interior telemetry-implanted beagles, by first setting up compatible pairs prior to surgery and then allowing the cage companions to continue living together after recovery.

AUDITORY ENVIRONMENTAL ENRICHMENT FOR DOGS



I AM WONDERING HOW MANY OF YOU USE SOFT MUSIC OR SOUND ENRICHMENT (PODCASTS, BOOKS ON CD, NATURE SOUNDS, ETC.) FOR DOGS IN YOUR VIVARIUM? I RECENTLY SPENT SEVERAL CONTINUOUS DAYS ACCLIMATING DOGS TO A PROCEDURE IN THEIR HOME ROOM AND ON THE LAST FEW DAYS I BROUGHT MY LAPTOP IN AND PLAYED MY PANDORA SPA STATION. I IMMEDIATELY NOTICED A CEASE IN BARKING AND EVERY SINGLE DOG IN THE ROOM (~20 DOGS) WAS LYING DOWN WITHIN A MINUTE OR TWO OF MY TURNING THE MUSIC ON!

I KNOW THERE ARE A LOT OF DATA ON THE POSITIVE EFFECTS OF AUDIBLE ENRICHMENT WITH SHELTER DOGS, BUT NOT SO MUCH IN THE LABORATORY SETTING. PERHAPS SOME OF YOU WANT

TO SHARE YOUR OWN EXPERIENCES WITH DOGS OR ANY OTHER ANIMAL SPECIES FOUND IN RESEARCH LABS.

In my past place of employment, we played the radio for the pigs, sheep, dogs and rabbits, and they all seemed to be happier/calmer with the radio on during the day. If someone turned it off by accident or forgot to turn it on for the day, we noticed a difference in behavior for sure; the animals were much more jumpy and agitated.

We have implemented nature sound machines to help drown out nearby disrupting sounds such as foot traffic and doors opening and shutting, which would normally set off barking. Our dogs have become much quieter and less agitated.

We use regular radio sound during the day. At the same time, we also have enforced two quiet hours without radio and without anyone entering the dogs' room. Not sure if that can work in a busy facility, but we find that the two quiet hours helps both dogs and cats calm down and relax.

I love the idea of a two-hour quiet time!

DEALING WITH THE BARKING OF DOGS

THE BARKING OF DOGS IN KENNELS CAN BE A CHALLENGE FOR THE HUMAN EAR!

WHO HAS APPLIED THE CLICKER TRAINING TECHNIQUE BY KAREN PRYOR TO HAVE DOGS RESPOND WITH WAGGING TAILS RATHER THAN DEAFENING BARKING WHEN YOU COME INTO THEIR ROOM? HOW SUCCESSFUL WERE YOU? DID YOU HAVE TO INVEST A LOT OF TIME?

I have applied Karen Pryor's technique while working at my local animal shelter as a vet tech and as volunteer whenever I could. I was given free rein to see what I could accomplish, mostly because the manager of the shelter was my mother-in-law. It did not take long at all, maybe a cumulative total of 60 minutes a day for five days. The dogs were so eager to get my attention and the training reinforcements. They learned quickly from

one another; as soon as the first dog would see me enter the kennel area with the clicker in hand, there was a quick yelp and a quick cascade of silence that followed. All dogs were front and center in their runs with wagging tails. Eventually all I had to do was walk into the kennel area and they would all be silent. This really helped during adoption hours.

I followed Karen's book explicitly since I had no prior experience, and I had such immediate success. Sadly, the turnover at the shelter was high and so the program died out quickly when I no longer had free time to volunteer. I always intended to go back, but have lost the ability to have any free time (four young kids, three hours commuting a day, and just being a working mom), but one day I would like to return and see what kind of difference I can make at the shelter again.

Thank you for sharing this rather inspiring account. You are the only one who responded to my question, suggesting that Karen's simple yet effective technique of quieting the dogs has not yet found its way into the research lab.

Where do I get Karen Pryor's technique? I could probably figure out a way to do it, but why reinvent the wheel?

Here you go: http://www.clickertraining.com/files/click_for_no_bark_zone.pdf. Good luck!

Although we use PRT/clicker techniques quite extensively for other purposes, we have not employed this method to quiet the dogs in our

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research facility. We did, however, use a very different means of behavior management that has been very successful.

When we had the opportunity to design our new kennels a few years ago, we put emphasis on creating a very open visual field, including windows in the animal-room doors, horizontally/widely spaced bars (where bars were necessary), and clear Lexan sliding panels in the kennels. The ability of the dogs to see the entire room and also what is going on in the access corridors literally stopped the barking. I am aware of other facilities that have

used a facility/kennel design approach as well with similar results.

Your dogs are lucky to live in quarters that are designed in dog-appropriate ways providing them with maximum visual control over their living area, including the corridor. They have no good reason to bark excessively. That's the way to go!

Installing all-glass front doors during our building renovation made the dogs way quieter. They only go crazy barking at feeding time.



DEALING WITH AN AGGRESSIVE DOG

HOW DO YOU DEAL WITH NEWLY ARRIVED DOGS WHO ARE AGGRESSIVE?

It has been a long time since we had dogs. We had no protocol to follow in those days but one thing I noticed was that most dogs were uncomfortable with white lab coats. This

DOGS

was the reason why I always put on a surgical gown when caring for them; they never tried to bite me.

I have worked with many aggressive, fearful dogs in the past. Building a trust relationship with these animals is absolutely key not only to creating a safe work environment with them but also to making the dogs feel more at ease, i.e., not stressed.

To gain their trust is a rather time-consuming endeavor, requiring a lot of patience, but once they trust me, they become my best friends. It is truly a very rewarding experience.

I have been fortunate to never encounter a biter in the lab; fearful to the point of snapping at a distance, yes, but never a true biter. Sadly though, I have done enough time in shelters where there were multiple cases of aggressive dogs and several who were not only aggressive, but also biters. This either stemmed from fear, former abuse, or life in the streets. I've come across some very sad cases, and a handful that could not be undone.

The most recent shelter I've volunteered with uses something very similar to the SAFER protocol (developed by the ASPCA) for assessment. All animals are assessed upon entering the shelter and then grouped into three categories—yellow, green and red.

The “red” category is reserved for those animals who bite or show signs of fierce aggression during assessment. These dogs are then handled by only those individuals who are highly trained and are comfortable working

with them. All dogs are provided with daily enrichment, but the “red” dogs are given extra handling and time. They are taken regularly, following meals, to open areas where there are no other people or animals. It's just one dog and one human, along with objects for play. During the first session there is no interaction between the dog and human unless the dog instigates the contact. Then, that contact is assessed for ratings of fear or actual full aggression. The dog is allowed this unforced contact approach for up to three days depending upon the levels of fear and aggression. If the animal starts to come around, great; if not, very slow moves are made toward contact. If the dog is found to continue to be aggressive, and actively trying to attack/bite, a rope or other long toy is used to allow the animal something upon which to take out the aggression. It's a very slow, often tedious process, but there are some wonderfully gifted folks out there who manage to make it all work.

There was one particular dog about a year ago who took almost three weeks to stop snarling at people and other dogs. The volunteer assigned to the animal used every ounce of patience he had. After about two months, the animal was able to be taken to the play yard with other dogs of his size and was ultimately adopted out to a good home.

I've become convinced that all dogs, no matter how aggressive they may seem, are truly good dogs underneath it all. They just need a good reason to bring out their good side, especially when they've never had a reason before.

FERRETS

OUR FERRETS ENJOY CURLING UP IN THEIR HAMMOCKS BUT THEY ALSO HAVE A GREAT TIME DESTROYING THEM. I AM CURIOUS: DOES ANYONE OUT THERE HAVE A GOOD, FERRET-SAFE HAMMOCK SUBSTITUTE?

We had the same problem and solved it in a very simple way. We had some old-style opaque mouse cages that were no longer in use. We drilled a hole in each end and hung them from the top of the cage using snap hooks. The ferrets cannot destroy them but enjoy sleeping in them.

Ferrets love human contact!



When I took care of ferrets, on Friday afternoons when the facility quieted down, we would take ferrets out of their cages and kind of bowl them down the hallway: carefully grasping them around the middle with a low and slow bowling swing, and releasing them a foot or so above the ground. They would stick out all four feet, land and slide along the epoxy floor for several feet and when they stopped moving they would return to us to go again; they really loved it.

I agree, they do love that! I had one as a pet many years ago and I used to call it “bowling with Merlin!” He would do what I called the “sidewinder slinky” (which is hard to explain) and make a chuckling noise while coming back and wait to be picked up again for another go; really cute and, in a way, funny!

That’s an awesome story! For those housing ferrets currently, is this something you could consider doing or do you think it would be frowned upon?

I don’t see why it would be frowned upon; it is safe and the ferrets enjoy it!

I’m just envisioning writing an SOP or approved enrichment strategy list that involves ferret bowling! I can only imagine the looks on the faces of the IACUC during the full committee review! Ha ha!

RODENTS
&
RABBITS

RELATING TO MICE AND RATS IN YOUR CHARGE

HOW DO YOU RELATE TO MICE AND RATS AT YOUR WORK PLACE? GIVEN THE LARGE NUMBER OF RATS AND MICE IN THE BIOMEDICAL LABORATORY, YOUR RELATIONSHIP WITH THEM MAY BE DIFFERENT THAN YOUR RELATIONSHIP WITH THE COMPARATIVELY SMALL NUMBER OF OTHER ANIMAL SPECIES AT YOUR WORK PLACE.

It's true that I can have a more one-on-one interaction with the cats or rabbits at our facility because there are a relatively small number of them; for me it's all about attention and focus when I am in a room. This is one reason why I am not a fan of staff wearing headphones to listen to music or audiobooks. It's so easy to let that capture your attention and your care just becomes rote. You have to be able to listen and pay



attention to what's going on in the room, not just the cage right in front of you. When you are doing that it's much easier to think of them as little lives that need your attention rather than a collective mass of cages that need to be changed.

RODENTS & RABBITS

Very well said; I have the same thoughts!

I relate to mice like they are cute little guys that are difficult to understand. I spend a lot of time just watching them to get a better feel for their behavioral and emotional needs. What attracts them? What makes them shun something or certain areas of the cage? Do they have enough space?

It's easier for me to relate to rats. They show clear expressive behaviors and gestures, similar to dogs. Comfortable, happy rats show you that they love to be petted and they love to play ... and so do I; a match made in heaven!

I relate to the overwhelmingly large number of mice and rats in different ways than with the other species. The number of rabbits, dogs and cats is comparatively small, so we can order different types of enrichment for them and spend time visiting the animals and perhaps giving them treats.

Our mice get crinkle paper; it's inexpensive, hence an affordable enrichment for them. As a young tech I would offer more crinkle paper so the mice got lost in the bunch.

Our rats get sunflower seeds and dried corn, which I would also sneak to some of the mice. I was hoping to keep the new mothers busy with foraging rather than killing and eating pups. Eventually my secret scheme was reported; when I explained why I was giving the mice some of the rats' foraging enrichment, it was okayed.

IT IS MY UNDERSTANDING THAT THE UNITED STATES IS THE ONLY COUNTRY THAT DOES NOT COVER MICE AND RATS IN ANIMAL WELFARE REGULATIONS BECAUSE MICE AND RATS ARE EXPLICITLY EXCLUDED IN THE ANIMAL WELFARE ACT'S LEGAL DEFINITION OF THE TERM "ANIMAL." WHEN RATS AND MICE ARE CONSIDERED TO BE OBJECTS (E.G., RESEARCH TOOLS) THEY ARE TREATED PROBABLY WITH LESS CONSIDERATION FOR THEIR WELFARE AND WELL-BEING THAN WHEN THEY ARE TREATED AS LIVING ANIMALS. WHAT'S YOUR OPINION ON THIS MATTER?

Interesting thought! The AWA actually also excludes birds, but the PHS policy includes all vertebrates, as does the *Guide [for the Care and Use of Laboratory Animals]*.

The situation is even more complicated; the AWA also excludes cold-blooded animals. This is how the term animal is defined:

"The term 'animal' means any live or dead dog, cat, monkey (nonhuman primate mammal), guinea pig, hamster, rabbit, or such other warmblooded animal, as the Secretary may determine is being used, or is intended for use, for research, testing, experimentation ... but such term excludes ... birds, rats of the genus *Rattus*, and mice of the genus *Mus*, bred for use in research ..."

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While rats, mice and birds are excluded from the AWA and cold-blooded animals are not mentioned in it, they are all covered by PHS policy. I've never worked at a facility that didn't treat these species along with cold-blooded animals the same way they treated other warm-blooded species.

I'm certain that if an investigator views the mouse or rat, or any other animal, merely as a tool, then this individual probably has the ability to block out animal welfare considerations. But I've not worked in a facility where that was a common or prevailing opinion.

For animal people, I don't think these regulations mean a darn thing; it is up to them to care for mice or rats with consideration of their welfare and to treat them with compassion. How these animals are treated is up to the caregivers. Just because rats and mice are excluded in the legal definition of the term "animal," and cold-blooded animals are not even mentioned in the AWA, doesn't mean we as caregivers have to think that these animals deserve less attention to their behavioral needs and general well-being.

I agree that we are "animal people."

The problem is that investigators are not necessarily also animal people. A prestigious biomedical scientist wrote in the journal *Laboratory Animal Science* that "investigators think only briefly about the care and handling of their animals and clearly have not made it an important consideration in their work."

In animal facilities, the corporate or academic culture makes the largest impact as to how the animals in biomedical research labs are cared for, especially mice and rats but also cold-blooded animals.

If the upper management treats animal care work as if it's not very important, the individuals hired may be less concerned with the mouse or with the rat. The researchers may be able to just say what they need for a research project and the animal facility staff and/or veterinarian may be unable to utilize best animal care and animal handling practices.

AWA coverage does not guarantee even adequate care. The system is so overworked and understaffed that those who wish to be noncompliant can be noncompliant for years. Animal work always takes more money than expected and, if well done, takes more time than expected. So if it's only beans you are counting, the facility will not be a top-notch facility.

In short, mice and rats get good care at good places. Their lack of coverage under the AWA does not impact their care. The management of the facility does.

I agree with this entire thread. Our facility makes sure all social animals, and this certainly includes mice and rats, are socially housed. If an investigator asks for single-housing living quarters of any social animal, I am assigned that protocol. However, when I approach some PIs, they don't understand why social housing matters for social animals. I think educating these investigators and their staff

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is important, but so is educating care staff on the importance of proper housing and proper treatment of these creatures, regardless of whether they are mice and rats or any AWA-covered species.

ENVIRONMENTAL ENRICHMENT FOR RODENTS

WE'RE STARTING A NYLABONE TRIAL WITH OUR RATS. ANY EXPERIENCE YOU CAN SHARE?

Rats enjoy them. At cage-changing time it is useful to take the Nylabones out and put them all in one container so that the cage-wash person has them all in one place—less chance they will be thrown out by accident when the cage is dumped.

We use them all the time with our rats; they love them.

Our rats chew the veggie or chocolate Nylabones much more than the plain ones.

The flavor doesn't encourage them to consume the material?

It encourages more chewing; I never saw rats actually consuming Nylabone pieces.

We have found the rats prefer the green Nylabones over the white ones.

I agree; our rats love those green ones.



Our rats get green Nylabones, gnawing blocks and manzanita sticks; we rotate those items. The Nylabones last the longest, but judging by the look of the sticks and blocks after one month of usage, the rats obviously like those wood sticks the best.

MY BOSS HAS ASSIGNED ME AND A FEW COWORKERS THE TASK OF EXPLORING ADDITIONAL ENRICHMENT OPTIONS FOR OUR SINGLY HOUSED RATS AND MICE. CURRENTLY ALL OUR MICE AND RATS RECEIVE TWO NESTLETS WITH EACH CAGE CHANGE; THAT'S OUR PRESENT ENRICHMENT PROGRAM.

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BASED ON YOUR OWN EXPERIENCE:

- IS THERE ANY NEW ENRICHMENT FOR YOUR MICE OR RATS THAT YOU WOULD RECOMMEND?
 - IS THERE ANY NEW ENRICHMENT THAT YOU WOULD NOT RECOMMEND?
 - WOULD YOU RECOMMEND SPECIFIC POSITIVE HUMAN-ANIMAL INTERACTIONS, SUCH AS TICKLING? I CAN IMAGINE INVESTIGATORS BALKING AT THIS ONE IF MADE MANDATORY, LOL!
-

Our rats receive manzanita sticks or Nylabones for gnawing. The animals clearly prefer the wooden sticks over the nylon bones.

Our mice receive nesting material, i.e., Enviro-dri [crinkle paper].

Nesting material can hardly be categorized as environmental “enrichment.” For mice, nesting material is a necessity rather than a luxury.



Here is what we use and I recommend:

- For the single-housed rat, wooden blocks, red plastic huts and Nylabones. Recently, we implemented the provision of a food hopper filled with Enviro-dri for rats with behavioral disorders such as excessive scratching or excessive nibbling at the sipper.
- For the single-housed mouse, Enviro-dri, Enviro-dri, and Enviro-dri! Mice love wooden blocks as well but have no use for Nylabones.

Each of our single-housed rats and mice has a hut for shelter. We give them twice-a-week Bacon Yummies, Veggie-Bites or yogurt drops as a treat. Mice get a small chew toy. Rats get wooden blocks and small manzanita sticks; they prefer those over Nylabones.

For our single-housed mice we offer two Nestlets and a red Tecniplast Mouse House. Mice with behavioral issues (barbering, food shredding, stereotypies) get small manzanita gnaw sticks.

Our single-housed rats receive plastic shelters and nesting sheets.

While we do use igloos and tunnels, crinkle paper and Nestlets (some of which is arguably not enrichment but a necessity), perhaps the most important enrichment we offer our mice and our rats is a cage companion. Often overlooked, a compatible cage mate plays a crucial role in enriching the lives of their cohabitators and, therefore, should always be present unless

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there is some very well-justified reason—an assumption or a belief is not enough—for depriving a mouse or a rat of a cage mate.

I'M LOOKING FOR SUGGESTIONS OF ENRICHMENT FOR MOUSE METABOLIC CAGING. WE HAVE THE STANDARD PLASTIC CAGING WITH WIRE MESH. THE MICE WILL BE HOUSED IN THE CAGES FOUR DAYS PER WEEK FOR FOUR WEEKS. THE INVESTIGATOR WILL BE COLLECTING URINE.

Provide a hut so the animal can keep warm. Make sure that it is small and cozy inside, but that the mouse is unable to climb on it from the outside [and urinate on top of it].

When applying enrichment in metabolic cages, there are several aspects to consider both from the animal welfare point of view and quality of research.

The mice are placed individually in surroundings that do not provide warmth, comfort or shelter. These are aspects that you wish to alleviate as much as possible. With regard to quality of research, on the other hand, you wish to collect urine samples as clean as possible, i.e., the least possible waste of urine left behind on inserts. This is especially important when collecting spiked (radiolabeled) urine. Inserting enrichment in those studies means that all inserts need to be rinsed and the rinsing water collected for analysis.

In studies where urine needs to be collected, my first questions are always:

- Does it need to be a 24-hour sample? If not, then collection of urine can be achieved by putting the animals in a bucket just after they wake up and removing them as soon as they urinate. No metabolic caging necessary.
- If multiple-hour samples are necessary, can it be a pooled sample from several mice? If so, house them together in a metabolic cage.
- Can the time span of sampling be shortened, for example 6–8 hours rather than 24 hours in the metabolic cage per day?

RUNNING WHEELS FOR RODENTS

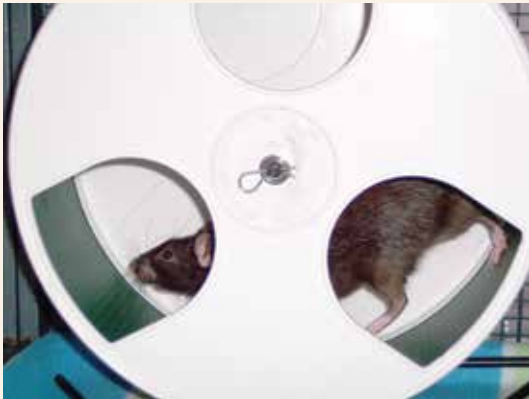
BASED ON YOUR OWN OBSERVATIONS/ EXPERIENCE, HOW PRACTICABLE AND HOW USEFUL ARE RUNNING WHEELS FOR RODENTS?

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I have observed mice use their running wheels, both sentinel and experimental mice, leading me to believe they like them.

We have a pet chinchilla at home and he uses his wheel a lot. Some nights it feels like he is running a marathon on that wheel. He often uses it during the day as well.

The design of the running wheels has changed and improved over the years to make them work better in the cages we have; the running wheel on the igloo is a good example.



Running wheels for rats are still largely not available for the typical lab animal caging. As a pet rat owner I know they, too, will use them.

The igloo-top running wheel is very useful in our standard caging for mice. It's pretty much always in use.

The same wheel is okay for hamsters, but they are a bit too big to fit properly onto the wheel, so they tend to fall off when trying to run at high speed, or they have to stop, adjust their

position, and start over again. Gerbils can use this wheel as well even though it is also a little small for them, but because they are skinnier than hamsters it seems less of a problem.

In my experience, running wheels are very useful for mice. In my previous facilities we used the style that attaches to the dome and could easily be transferred at cage changes and swapped out for cage washing when dirty. The mice became obsessed with them. We had mice who had pedometers attached to their wheel; they ran a crazy number of miles a day—can't recall the exact number but we were shocked. We only had a few concerns with the wheels:

- The wheels did make a slight squeaking noise when in use, and some researchers were concerned that this noise could be a stressor.
- The mice were obviously much fitter having this ability to exercise; this variable would have to be considered when analyzing results of certain metabolic studies.

I have used running wheels for my sentinel mice and found that they enjoyed them immensely. Because they lived in a captive environment, I monitored them closely to ensure the running didn't become a stereotypical behavior accompanied with weight loss.

The running wheel was highly desired, so I checked the animals closely for overt aggressive competition over access to the

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wheel. As it turned out, the mice didn't noticeably compete over access, even though many of them tried and always succeeded to get onto the wheel, all at the same time.



There was a research paper published a few years ago in which running wheels were placed in the wild and it was found that a variety of animals used them as well.

Your comment is so interesting that I checked the article; here is the reference with excerpts:

Meijer J.H. and Robberts Y. 2014
Wheel running in the wild. *Proceedings of the Royal Society B* 281: 2014.0210
<https://royalsocietypublishing.org/doi/pdf/10.1098/rspb.2014.0210>

“Wheel running is often used in the laboratory for triggering enhanced activity levels, despite the common objection that this behaviour is an artefact of captivity and merely signifies neurosis or stereotypy. If wheel running is indeed caused by captive housing, wild mice are not expected to use a running wheel in nature.

Here, we show that when running wheels are placed in nature, they are frequently used by wild mice, also when no extrinsic reward is provided.

Some animals seem to use the wheel unintentionally, but mice and some shrews, rats and frogs were seen to leave the wheel and then enter it again within minutes in order to continue wheel running. This observation indicates that wheel running may well be intentional rather than unintentional for these animals.

Bout lengths of running wheel behaviour in the wild match those for captive mice. This finding falsifies one criterion for stereotypic behaviour, and suggests that running wheel activity is an elective behaviour.

Our findings may help alleviate the main concern regarding the use of running wheels in research on exercise.”

NESTING MATERIAL FOR MICE

I'VE BEEN WORKING FOR A YEAR TO DETERMINE THE BEST NESTING MATERIAL FOR THE MICE AT MY FACILITY. WE'VE COME TO THE CONCLUSION THAT THE COMBINATION OF ENVIROPAKS AND A NESTLET MAKE THE BEST, MOST INSULATED NESTS. WE HAVE 60,000 CAGES OF MICE, HOWEVER, AND THE LOGISTICS, ALONG WITH THE COST, OF PROVIDING THE MATERIALS ARE A BIG DEAL.

MANY PLACES USE THIS TYPE OF NESTING AND WILL ONLY CHANGE THE MATERIAL WHEN THE NEST HAS BECOME SUFFICIENTLY SOILED, WHICH CAN TAKE TWO TO THREE WEEKS. OUR HUSBANDRY MANAGERS ARE CONCERNED ABOUT THE ABILITY TO KEEP THE TECHS' CAGE PREP STRAIGHT WHEN THEY WILL SOMETIMES HAVE NESTING AND SOMETIMES HAVE NO NESTING TO TAKE CARE OF.

CAN THOSE OF YOU WHO USE THIS OR SIMILAR NESTING MATERIAL PLEASE ELABORATE ON HOW THEY

PREP THEIR CAGES? IS THE MATERIAL ADDED IN CAGE WASH OR IN THE ANIMAL ROOMS? HOW AND WHEN DO YOU PROVIDE NEW MATERIAL? HOW DO YOU MAKE SURE THAT THE SHREDDED MATERIAL DOESN'T CLOG THE VACUUM SYSTEM IN THE DIRTY CAGE WASH?

We used Nestlets as a base nesting material that was placed in each cage during processing. For breeders and animals with special needs, either paper shacks or crinkle paper was added to the Nestlet. We replaced these materials as needed, i.e., every few cage changes. This worked out to be the most efficient way—in terms of cost and time—to provide adequate nesting material to our mice.

How many cages were in the facility?

Close to 10,000 cages.

I'M CURIOUS ABOUT YOUR IMPLEMENTATION OF THE LOOSE CRINKLE PAPER. MY FACILITY IS CURRENTLY EVALUATING ENRICHMENT MATERIALS AND I'M GETTING A LOT OF PUSHBACK BECAUSE THE MATERIAL GETS EVERYWHERE! PLUS THERE IS CONCERN ABOUT MAINTAINING AN 8 GRAM ALLOCATION PER CAGE. DO YOU ALL HAVE ANY TIPS OR TRICKS THAT WORKED FOR ALLOCATING THE

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LOOSE MATERIAL? IT'S SO CHEAP AND THE MICE LOVE IT. I'M TRYING TO FIGURE OUT HOW TO MAKE IT EASIER TO IMPLEMENT. DO YOU HAVE TECHNICIANS OR INVESTIGATORS COMPLAIN ABOUT NOT SEEING THEIR PUPS OR MISSING DEAD ANIMALS?

Our research staff are pretty accurate, I think. We put the measured amount in a Ziploc bag and attach it to the top of the storage container so lab personnel can gauge how much to use. We do have some complaints but I feel the benefits outweigh the risks. The most important thing to a mouse is a good nest. We may not see every mouse or litter and we explain to researchers that if date of birth is important then they should be checking their breeding boxes daily themselves. If we are checking boxes and notice a litter, we record it but otherwise it is up to the labs to check for litters. We do however look for issues within the box that may signal trouble. These would be a lone mouse away from the group, blood in the cage, a poorly built nest, too little/too much feces or urine, etc. If anything looks off we put the box in the transfer station and have a look. I have done this for many years and can say that I don't think I have missed a whole lot.

We add the Enviro-dri [shred] in the housing rooms instead of in cage wash. Essentially, our staff have an autoclaved mouse cage with the shred in it and they simply portion it out into the cage under the transfer station.

We measure out 8 grams into a small Ziploc bag that stays near the change station in the housing room as a guide for people to use because we found some people had no idea what 8 grams should look like and were essentially filling the cage with shred. The mice were not making nests in that, and many were trying to push the shred out of the cage up through the wire bar feeder. We've been able to get people to stay fairly close to the 8-gram size, now that they can see what it looks like, but it did take some education, sometimes as a one-on-one conversation with a researcher.



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Our care staff dispose of the shred nest in the housing room rather than send it back to cage wash in the soiled cage. We use a vacuum waste system and those shredded paper nests will completely block the line, which can shut down our cage wash operations for a full day depending upon where it would get stuck. Initially we had a good bit of pushback on that because people were concerned about the time it would take to do that during cage change rather than cage wash, but it turned out it didn't add significant time delays.

ONE MORE QUESTION: DO YOU ALSO TRANSFER THE NEST EVERY OTHER WEEK TO DECREASE AGGRESSION RATES AND INCREASE BREEDING SUCCESS?

We do, for both males and females. This leads to most cages having a continual nest of 10–14 grams. They're glorious! And hard to emergency check ... but worth it!

Thanks for the comments, everyone! I just hope it's enough to convince our program to increase their nesting provision!

This is difficult with regulators who expect a visual check of every animal every day, especially when they're a USDA species. Even for one on the bandwagon, it's difficult to convince folks that it's OK not to see the mice every day, even if it's better for, and

the definite preference of, the animals. The struggle is real!

You are absolutely right; we don't have the time or resources to look at every mouse. I would prefer to be able to see everyone from each cage every day, but for us that is not possible unless the time and staff were made available.

CHECKING MICE IN THEIR NESTS

FOR ALL OF YOU WHO USE NEST BUILDING MATERIALS THAT OBSTRUCT VIEW OF THE MICE (ENVIRO-DRI, ENVIROPAKS, ETC.), HOW DO YOU DO HEALTH CHECKS OF THE MICE? IS EACH CAGE MOVED A BIT TO ENCOURAGE THE MICE TO COME OUT FOR BETTER VISUAL ASSESSMENT? IF THEY'RE IN THEIR NEST, IS IT ASSUMED THAT THEY'RE FINE AND SO THEY ARE LEFT ALONE OR DEEMED HEALTHY?

I use approximately 8 grams of Enviro-dri per cage. I can't see every mouse daily but I consider that sometimes, the mouse having

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a proper dome-style nest is more important than me seeing the mouse every day. It may be quite stressful for a mouse not to have a nest that suits her needs, so I think it should be provided. We have to pull out every cage, every day to have a look if the sipper tube is correctly placed in the cage, so most times this movement is enough for the mice to come out of the nest, have a look around to see what is going on, and return back into their nest. I don't open every cage every day, but when I notice anything unusual, e.g., blood, inadequate nest, a mouse left outside the nest, I take the cage into the transfer station and have a closer look. If a mouse is sick or in a study that will make her feel unwell, then I will check that box daily in the transfer station.

There are things that are going to be missed, but I think the advantages for the mouse of having a proper nest outweigh the fact that we might not see each mouse every day.

We have some researchers who fill nearly half the cage with shredded crinkle nesting paper. The animals don't even bother trying to build a distinct nest because there's so much paper. They just sort of tunnel underneath/into the mass of paper. Combine that with a hut or platform, wire-bar lid or cotton Nestlet and there will be no way to see the mice nor even the water valve at the back of the cage. You have to try to look for other indications, such as food level dropping, evidence of urine or feces in the cage, movement of nesting material, no traces of

blood, no obvious odors of dead animals. We try to avoid physically handling the cage just to do a visual inspection of the animals since that can be very disruptive to some of the sensitive (overly-sensitive) breeding moms. There have been only two instances out of nearly 24,000 cages where a health concern was missed. So at least for our facilities, we've found that daily visual inspection of each individual animal isn't a necessity. Obviously there are some instances—e.g., tumor monitoring, surgical recovery, wound monitoring—where that won't be the case. But for the standard breeding colonies, it doesn't appear to be the issue we all assumed it would be.

We also warn those researchers who overfill the cages with paper that we can't see the animals and thus early warning signs might be missed between cage changes.

We are using Enviropaks [premeasured amounts of Enviro-dri in a tea bag], and encourage everyone not to disturb the nests in order to look at pups unless absolutely necessary. If you take a piece or two of loose Enviro-dri to the front of the cage, healthy mice will use the strands and incorporate them into their nests.

In my old facility we began adding nesting material and the mice absolutely loved it! We had some vets complain that they wouldn't be able to observe the mice, but in the end it was never a problem. I also found that if I really needed to see the mice, I could slowly scoot the cage out a smidge and observe the mice from underneath so I wouldn't have to disturb them.

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I do that too, though I always feel slightly rude doing it! It's all feet and private parts, LOL!

Certain veterinarians and regulators insist that if you cannot see the mice, you must open the cage and be sure they are OK. This attitude is unfortunate and shows a lack of understanding of what makes a less stressed mouse; it is based on the original regulations that were about husbandry and very basic care, at a time when “dead mouse in the cage” was a routine finding and hundreds of mice a day were found dead. I question anyone working in a large facility who says that every animal is seen/checked every day. I know, in a room with 12 double-sided vent racks, that is not true. We all have rodent cages that we overlook. It is human nature to sometimes spontaneously take short cuts and that means not every cage gets your attention every single day.

The argument from regulators about having to see the animals is also dated. NO ONE can check 20,000 cages a day individually regardless of how many staff you have. Good husbandry staff have always used the eyeball test to know which cage to look at individually. A sick mouse cannot really be overlooked; being kicked out of the nest will make her very noticeable.

I think we should know and focus on when a cage needs attention (e.g., critical phase after tumor implant) to ensure the welfare of mice rather than make a nice-sounding policy.

I'M WORKING ON CONVINCING OUR MANAGERS AND IACUC THAT WE NEED TO PROVIDE MORE THAN ONE NESTLET PER CAGE OF MICE FOR NESTING MATERIAL. UNSURPRISINGLY, I'M GETTING THE SAME OBJECTIONS ABOUT NOT BEING ABLE TO SEE ANIMALS EVERY DAY. DO ANY OF YOU WHO ARE USING OTHER INDICATORS (LIKE NEST QUALITY OR FOOD LEVELS) OF WELL-BEING HAVE SOPS YOU'D BE WILLING TO SHARE? MY IACUC DIRECTOR THINKS THAT WOULD GO A LONG WAY TO PERSUADING PEOPLE THAT IT'S DOABLE.

We've been using 8 grams of Enviro-dri per mouse cage (housed in trios) plus one Nestlet sheet with or without Nestlet pads for years now; we never had any issues over not being able to see all mice every day. Worst-case scenario, if mice do not get out of their nest, we will open the cage and lift the nest a little, trying not to alter it too much. In the wild, mice are often bothered by disruptors such as wind, rain or other animals. For our lab animals kept in a perfectly boring environment, a little disruption of their nest is just a good way of keeping them bright and alert; and it gives them something to do. One comment you might get to this: “Well okay, but having to open each cage to lift the nest in order to be able to see the mice will take too much time from an operational

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perspective.” Our preclinical facility performs long-term carcinogenicity studies; we have 200 to 270 cages per room. It is absolutely doable! I have to admit though, that for carcino studies, mice are manipulated every day for dosing. Plus, if you count all the other weekly activities (body weight, feeding, detailed exam and cage exchange), there are not a lot of days where you can’t see each individual mouse at least once during an activity. We do not need to open cages that much just to “observe” the mice.

That is helpful to hear! I’ve already gotten the response that it takes too long to jostle each nest, so it’s good to know that your facility is able to do it. Thank you!

SHREDDED OFFICE PAPER FOR MICE

**IS IT A GOOD/BAD IDEA TO PROVIDE
MICE WITH AUTOCLAVED SHREDDED
OFFICE PAPER?**



We used shredded, autoclaved office paper all the time and never had any issues with it. Autoclaving was not a problem and the paper stayed intact. We don’t use it anymore because it was just a little messy and difficult to properly portion out. The other thing was that we had no steady supply and would sometimes run out of it. Since we have the funds for other commercial bedding, we gave up the shredded paper.

I’ve recently done multiple nesting material trials in our facility and found that, in order to get the high walls the mice need to trap heat and get out of sight, they must have a material that provides structure. The crinkle folds in the Enviro-dri paper strips are essential to providing this function.

The trials we did with strips of flat paper scored very low in nest quality, even when given 10 grams, or when combined with a more insular material like Nestlets.

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We have been using autoclaved shredded phone books as nesting material for our mice for many years and it has worked well. We haven't had any issues with injuries or tangled feet and the mice seem to really enjoy it. Our mice get Nestlets and shredded phone books; they intertwine the two materials together when building their nests.

When I became manager of a small facility, many moons ago, the mice and gerbils had only shredded paper for bedding and the poor things had paper cuts all over their feet! Needless to say, the practice of using shredded paper as bedding material was stopped immediately.

We've debated it previously, but I have concerns about inks and other potential chemicals in the paper.

It would be interesting if we could get a chemist to analyze the common paper recycled in business correspondence and see if it contains anything we would not want in our research.

If we are seriously concerned about certain chemical ingredients in office paper ink, we should probably first check if the mice actually ingest ink material while they use it for nest building. I think traces of such ingested dry ink will be insignificant, if at all measurable.

TRANSFERRING NEST MATERIAL FROM THE OLD TO THE NEW CAGE

HAS ANYONE GOTTEN PUSHBACK FOR NEST TRANSFERRING BECAUSE IT INTRODUCES HANDS INTO THE CAGE, INCREASING CHANCES OF A BIOSECURITY BREACH?

WE CURRENTLY TRANSFER MICE ONE AT A TIME WITH FORCEPS THAT ARE DIPPED INTO A CLIDOX-S MIXTURE IN BETWEEN CAGES.

You could transfer the nest with the forceps as well, thereby leaving the hands out of the cage.

If you transfer the mice with forceps, I would think it would be acceptable to also transfer nesting material with the same forceps; that's a win-win scenario.

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WHEN YOU TRANSFER A MOUSE AND THEN HER NEST WITH FORCEPS FROM THE OLD TO THE NEW CAGE, CHANCES ARE THAT THE NEST ARRIVES IN SHAMBLES. HOW DOES THE MOUSE RESPOND TO THIS MESS?

It's been a very long while since I've had to use forceps to transfer mice and their nests. I did try to keep the nests intact but that wasn't always possible. Usually the nests were disrupted but I didn't find the mice to be overly stressed by that; they still cared for their pups properly and didn't immediately begin fussing about the cage or try to reorganize the nest in any way. Usually they didn't even seem to really notice the nest disruption and were solely focused on checking and grooming their pups.

We do not use forceps but cupped hands. I try not to make too much of a mess of the nest but, of course, because it is going into a clean cage, the mouse always has to arrange it somewhat. It seems that they usually start the fix-up shortly after the move, there is a short checking-out-the-new-environment phase, then repairs begin.

I actually don't think it's a problem if the nest needs tidying after it's moved. If you watch mouse behavior in regard to nest building, they are constantly re-building and making

adjustments. This wouldn't be much different than in natural settings where ground shifts, weather, animal activity, etc. require the continual rebuilding and tidying of the nest. Plus, if we look at the purpose of enrichment to fill idle time, the more interaction that is elicited with the materials, the better.

BARBERING IN MICE

BASED ON YOUR OWN OBSERVATIONS, DO YOU FEEL THAT COMPULSIVE HAIR-PULLING IN MICE (BARBERING) CONSTITUTES AN ANIMAL WELFARE ISSUE FOR THE MOUSE WHO DOES THE BARBERING? I AM ASKING THIS QUESTION BECAUSE COMPULSIVE HAIR-PULLING IN HUMANS IS CLASSIFIED AS A MENTAL DISORDER THAT CAN CAUSE CLINICALLY SIGNIFICANT DISTRESS.

I personally view it as a welfare issue for all concerned, for the mouse doing it and for the mouse that it is being done to.

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Barbering is a major welfare issue for all involved. It not only indicates distress in the animal with the disorder, but it can also be a major welfare issue for the one being barbered. When mice lose fur on their body, they lose a major mode of insulation; they get cold-stressed.

Barbering may be a sign that a mouse is no longer able to cope with species-inappropriate living conditions; if this assumption is correct, the barbering mouse would experience distress.

I've always considered it to be a welfare issue for any animal who is overgrooming, even if there is an underlying physical cause for it.

It seems strange that the *Jackson Laboratory Handbook on Genetically Standardized Mice* (2009) lists barbering as a “normal” murine social interaction.

Barbering is definitely an animal welfare issue in my opinion. Stressful for all involved, including the investigators and their staff.

IF BARBERING AND BEING BARBERED ARE SIGNS OF POSSIBLE STRESS OR POSSIBLE DISTRESS, HOW RELIABLE ARE RESEARCH DATA COLLECTED FROM AFFECTED MICE? BARBERING IS NOT AN UNCOMMON PHENOMENON IN LABORATORY MOUSE COLONIES; THIS MAKES BARBERING NOT ONLY AN ANIMAL WELFARE ISSUE BUT ALSO A METHODOLOGICAL RESEARCH ISSUE. HOW DO RESEARCHERS DEAL WITH THIS VARIABLE?

From my experience, it really depends upon the project as to how the researchers handle it. I've seen some projects that just address the symptomatology—separating animals and adding more enrichment—but I've also seen projects where they treat the affected mice as they would treat mice that had been involved in a cage flood. I can't speak to how they handle any data that may be impacted by the event, but I have seen projects where they either didn't use the animals for a transplant study until hair had fully regrown or didn't take them to the maze room for testing.

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BASED ON YOUR OWN EXPERIENCE, CAN YOU ACTUALLY CURE A BARBER FROM BARBERING WITHOUT CHANGING THE GROUP'S COMPOSITION?

I've not seen it stop without changing the group composition. We've tried a variety of alternative enrichment options and seen reductions in the frequency, but never stopping completely.

FOOD GRINDING IN MICE

WE HAVE A PROBLEM WITH GRINDERS IN OUR FACILITY. HUSBANDRY STAFF CHANGE THE CAGES EVERY DAY BECAUSE OF THE FOOD BUILDUP. HOW IS THIS HANDLED IN OTHER FACILITIES?

It seems like daily cage changes would be extremely stressful.

I agree, cage-changing daily is only adding to the problem. Let the food pile up. It looks unsightly but if not wet/moldy, I would leave the mice undisturbed till next cage change.

Instead of daily box changes, it seems that it would be easier to only give small amounts of feed and to replace it daily.

Since we changed our rodents over to Enviropaks, we have seen less food grinding in our facilities. In the past we have offered a variety of things for them to chew on, but the nesting material seems to work the best.

Food grinding is no longer a serious issue at our facility either after we started providing Enviropaks to all group-housed mice and one Nestlet plus tissue-like nesting material to all single-housed mice.

We find that food grinding occurs during periods of high air humidity. We just change cages more often until air humidity goes down again and, along with that, the food grinding stops.

It's my experience that providing vegetable-flavored Nylabones, scattering some sunflower seeds, rabbit chow or just regular chow on the bottom of the cage and lowering the food hopper and the water sipper will decrease food grinding in mice.

DEALING WITH EXCESSIVE AGGRESSION IN RATS

TECHS IN ONE OF OUR FACILITIES HAVE REPORTED SOME UNUSUAL AGGRESSION ISSUES IN THEIR RATS, AND I'M AT A LOSS. THEY'RE TRANSGENIC NEURODEGENERATIVE MODEL RATS, AND THE TECHS ARE SEEING FIGHTS BETWEEN MALE PAIRS, FEMALE PAIRS, AND EVEN BETWEEN MALE/FEMALE PAIRS. THESE RATS ARE ALSO AGGRESSIVE WITH HUMANS, TO THE POINT OF LUNGING AT HANDS IN THE CAGE AND BITING. THIS CONSPICUOUS AGGRESSION IS MANIFESTING IN MULTIPLE STRAINS, LONG-ESTABLISHED ONES AND NEW ONES, AND IN YOUNGER AND OLDER ANIMALS. THESE RATS ARE NAÏVE, SO IT'S NOT A TREATMENT SIDE EFFECT. I CANNOT FIND OUT HOW LONG IT'S BEEN GOING ON, BUT AT LEAST SEVERAL MONTHS.

ANY SUGGESTIONS ON HOW TO DEAL WITH THIS ISSUE?

We have a group of Long-Evans rats who are behaving the same way as you describe for transgenic rats, and no one knows why they are so aggressive.

When I would do the transgenic rat room for someone else, the rats were very agitated by my presence and often had small fights when I put them in their new cages. These rats were also near the cage-wash area, so noise could have also played a part.

You may want to check if there are loud noises (e.g., nearby construction), vibrations (e.g., failing HVAC system) or a dripping faucet that may distress the rats. I would also suggest plenty of environmental enrichment, cardboard shelters and sunflower seeds scattered on the bottom of the cage to promote foraging activities.

I've witnessed this hyper-aggressiveness in many Sprague Dawley rats on neurodegenerative projects. We gave them the large Shepherd Shacks, but they just destroyed them. We then started using a LOT of Enviro-dri; it seemed to help calm them a bit, even though sporadic fights were still occurring between cage mates. Cage transfer was typically accompanied by squirming and aggressive vocalization, especially when we had to do the process within a hood. Obviously, the noise aggravates aggressive tension and frightens the rats. One of our techs has found this procedure goes more smoothly when

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she allows the rats to bury their heads in the Enviro-dri before she picks them up and transfers them to the new cage.

Thank you all for your input!

There wasn't any appreciable ultrasound in any of the housing rooms, nor had there been any changes to husbandry practices or staff that anyone could think of. I recommended more destructible environmental enrichment and tunnels, especially for transfer at cage change, and calm, quiet cage changes. Hopefully that will help at least with the human-directed aggression!

GUINEA PIG HOUSING

I'M LOOKING FOR SOME OUTSIDE-THE-BOX IDEAS ON WHAT PEOPLE MIGHT BE USING FOR GUINEA PIG HOUSING BESIDES THE STANDARD, STAINLESS-STEEL RACK CAGES.

We use a Lenderking cage and add some rubberized flooring to the bottom of it to ensure no feet get stuck in the drop-through

holes. We also have a playpen set up in the middle of the room for compatible pairs.

I have used the Ace plastic rabbit cages with cardboard covering about half of the floor. We did not see any leg injuries with the rabbit-paw-sized holes. The animals chewed the cardboard and we replaced it when it either looked gross or was no longer a large enough piece to rest on comfortably. We also used a lot of long-strand hay as nesting material and as enrichment. If pests are a concern, you can take the hay and put it in a grocery paper bag and autoclave it lightly at 212°C for 3–5 minutes. This makes it smell awesome; the guinea pigs love it.

We house guinea pigs in floor pens with rubber matting and shavings. The pens are actually puppy pens; they work really well as living quarters for guinea pigs. They're provided with hay and various items of enrichment, including tubes, feed balls and fruit/vegetables. Each pen also has a number of red polycarbonate huts.

Recently we tried housing some female guinea pigs in floor pens. There was a vacant room available that had been used for rabbit groups. We put aspen shavings on the floor and added some structures as hiding shelters. To be honest, whenever we entered the room all guinea pigs would always be under the shelters, so it appeared as though they were not making much use of the extra space. However, the animal care attendants who would spend lengthy periods of time in the

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room did mention that the guinea pigs would eventually all come out and roam about.

Overall, our facility found housing in floor pens to be a far better setup than the smaller cages we previously were using. It not only gave the guinea pigs more space but it also made it possible for them to express their inherent need for social contact and social interaction.

HOUSING OF CHINCHILLAS

**WE HAVE AN INVESTIGATOR WHO IS
PLANNING TO USE CHINCHILLAS. I**

**BELIEVE THE ANIMALS WILL BE HOUSED
IN STANDARD RAT CAGING.**

**ANY ENRICHMENT SUGGESTIONS
FOR THESE GUYS?**

Rat cages for chinchillas!? Given their size and activity, a more spacious rabbit cage would be more appropriate than a small rat cage.

We provided our chinchillas with a dust bath in a small cat litter box every day. Chinchillas need to dust bathe regularly to keep their fur nice and clean, otherwise it gets oily. I gave them a large hut for hiding and wooden blocks for chewing. They always had access to hay.

Oh, chins are SO MUCH FUN! They can seem a little skittish upon arrival, but once they settle in, they're darling little things. You're going to love them. I agree with everyone who has said rat cages will be too small. We tried a couple of different cages, but found cat cages worked quite well, as they came with a perch. Thus, rabbit cages would likely work too. Just be sure to put a liner into the cage so their feet don't get caught in the wires. Provide them with a hiding structure; old shoeboxes or any other long boxes work nicely. I found their favorite types came from trach [tracheostomy] tubes and long pipette boxes.

Dust baths are a **MUST** and advisable at least twice a week. We used mouse boxes as dust containers and let the chinchillas have a

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blast for 30–45 min. As for environmental enrichment, we gave them loose hay, hanging hay treats, tiny bits of veggies, yogurt drops, tubes and wooden blocks. Also, I purchased a couple of those large clear exercise balls so we could let them go bananas about once a week for exercise—they're very active little critters!

When we housed our chinchillas in standard caging we used rabbit racks. We'd kept adults in pairs and juveniles in trios. They received an area for hiding (such as a PVC tube or elbow or a plastic hut they could perch on top of), a gnawing device (such as a pumice stone or wood block), weekly dust baths, daily access to loose hay, and periodic treats/rewards (such as Cheerios or raisins) for being handled by lab staff.

Our chinchillas are kept in rabbit cages that we modified in such a way that small animals cannot squeeze through openings and get out of the cage. We furnish the cages, each with a dust bath, PVC pipes and elbows, along with

[golf] tees on the floor and a few tees mounted on the cage walls serving as little perches.

CAN ANYONE TELL ME IF THERE ARE ANY ISSUES WITH HOUSING CHINCHILLAS IN GROUPS?

We group-house our chinchillas. The groups that arrive may not be of the same age but they do fine when set up together. Rarely do we see any overt aggression; they like to play-fight but that's not a concern.

I trio-housed some males a few years ago without any problem. They were of different ages and there was some wrestling, but it worked out just fine. I used a large cat-enrichment cage with some hiding boxes (empty pipette, shoe boxes, etc.) and other



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enrichment. It was a total riot watching them bounce from level to level and seeing the most dominant play “king of the mountain.”

RODENTS RECOGNIZING INDIVIDUAL HUMANS

**DO RODENTS IN YOUR CHARGE
RECOGNIZE YOU? IF YOUR ANSWER
IS YES, WHAT MAKES YOU THINK THAT
THEY DO RECOGNIZE YOU?**

I firmly believe that rodents recognize their regular caregivers. They first react to voice and then of course to smell when the cage is opened. My sentinel rats would always take treats from my hand but would be reluctant to take treats from a person they didn't know.

Certainly rats do always recognize people in ways we can easily see. They kind of greet a familiar person in typical rat manner, but they will stay away from a stranger. In long-term experiments, rats who know me well will literally stand still for me to give them an

injection or gavage; they know it will be quick and afterwards they are gonna get a treat.

Mice probably recognize people by smell. They don't show it as clearly as rats do. Even pet mice I have had did not always run over to say hi the way rats do.

The rats in my charge definitely recognize me! I once worked with a group of rats for several months and would carry their home cages to the procedure room every day. One day I got a new assistant and asked her to carry the cage to the procedure room in my place. As soon as the assistant lifted the cage, the rats started running frantically in circles within their cage, but they all calmed down when I took the cage from her.

**WOULDN'T IT BE COMMON SENSE IN
THE RESEARCH LAB SETTING TO MAKE
IT A RULE THAT NOBODY HANDLES AND
TREATS ANIMALS UNTIL THEY HAVE
ESTABLISHED A POSITIVE, IDEALLY
MUTUAL TRUST RELATIONSHIP WITH
THEM? THIS WOULD NOT ONLY FOSTER
ANIMAL WELFARE BUT ALSO REFINE
SCIENTIFIC METHODOLOGY; AFTER
ALL, A STRESSED ANIMAL IS BOUND TO
YIELD STRESSED RESEARCH DATA.**

Absolutely! I wish my lab had had such a rule in place when this incident happened, which was when I was a brand new master's student

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and didn't yet know that rats reacted not just to actual physical contact, but to their cage (with lid on) being carried by an unfamiliar person. I think in general, researchers conducting experiments should put more emphasis on socializing the rodents they work with, not merely habituating them to common procedures.

As you said, establishing a positive, mutual trust relationship is so important.



FORAGING ENRICHMENT FOR RODENTS AND RABBITS

DO THE RODENTS AND RABBITS IN YOUR CHARGE GET FRESH PRODUCE?

Our rabbits get food enrichment daily, which may include treats or produce. Apples, carrots and greens are staples as far as produce goes.

Currently, I have our guinea pigs on a rotation of fresh vegetables four days a week as follows: Mondays - carrots, Tuesdays - broccoli, Wednesdays - kale and Thursdays - lettuce; Fridays we suspend NutraBlocks.

We do provide fresh fruit and veggies to our guinea pigs and hamsters three times a week. This includes cucumber, lettuce, broccoli, kale and apples.



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Our mouse colony is very large; the investigator has yet to decide to give them at least sunflower seeds.



Because there are so many, our rats and mice don't get any fresh vegetables. Instead, we give all of them sunflower seeds on a daily basis; they love them. I have tried dried carrots, peas and corn with a few rats; they took the peas and the corn and left the carrots untouched.

Our guinea pigs get a variety of fresh and dried produce. We have not found anything they do not like.

Our rats get dried veggies regularly, and on occasion we will give them peanuts and sunflower seeds.



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Most places at the highest level have had to accept that they must provide enrichment for dogs, cats and primates. Other larger species have crept into the conversation but rodents are still second-class citizens when you suggest additional enrichment.

In many ways their sheer numbers work against mice when discussing enrichment. We have 60,000 mouse cages. I'm trying to picture the look on my directors' faces if I recommended fresh produce for the mice! We have only about 50 rat cages. I've just recently been able to enact keeping little plastic buckets of treats like Fruit Crunchies and Fruity Gems in the rat rooms for anyone to use, especially if doing any handling or restraining of the rats. The animal users are very grateful and on board. I have to remind them all the time that one treat will do; we don't need obese rat subjects!

We are working to get approval for a university-wide accepted mouse/rat food-treat list that would include dried fruits and veggies and some other treats. I think it is a big step in the right direction!

We have about 50 cages of rabbits and guinea pigs but over 20,000 cages of mice. The rabbits and guinea pigs are housed in fairly traditional open caging where I can easily drop special food into the feeder or just open the cage door and place the item inside. But our mouse cages all have to be opened in aseptic conditions. Plus, all of

the food would need to be certified and irradiated if it's being used in our rodent cages. I think our technicians would love to be able to provide fresh produce, seeds and nuts. It's just not yet logistically possible to do on a large scale. We do have some smaller colonies that get irradiated sunflower seeds, but those are purchased by the researcher and are only given when we are opening the cage for the standard cage change or some other procedure. I suspect that in time this too will change and more and more animals will be provided with food enrichment plans, especially since more companies are providing items that can be certified and/or irradiated. I have had success with mandated scatter feeding at cage setup of certified rabbit food or irradiated sunflower seeds for mice. If the extra food is added when cages are bedded, it can get to a large number of mice without having to figure out how to open 1,000 cages a day in addition to regular work. This way, mice also can get some food enrichment, at least at cage change.

I have used sunflower seeds in both hand-bedded and bedding-dispenser clean sides. We put them in after the bedding dispenser. Our clean-side staff was also very speedy, so to shake a few pieces from a scoop of either the rabbit high-fiber chow or sunflower seeds was easy for them. Certainly, adding them at cageside after any manipulation is a huge positive because the animals will associate you with something they like and, therefore, may adapt to your procedures more quickly.

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FOR THOSE OF YOU WHO USE FORAGING FOOD ITEMS FOR RODENTS, HAVE YOU EVER ENCOUNTERED PUSHBACK FROM THE USDA BECAUSE FOOD TREATS ARE MIXED IN THE BEDDING, THUS ON THE CAGE FLOOR AND CONTAMINATED WITH FECES/URINE?

We have not. We use sunflower seeds and rabbit chow for hamsters and gerbils and yogurt drops for guinea pigs.

During our last AAALAC inspection, no one had comments about foraging treats. Then again, we don't have a very strong global policy about foraging treats. They are given to sentinels and certain colonies or groups, but not in such a number that I would consider there ever being a large amount of treats on the cage floor. Sunflower seeds blend in on the floor of mouse cages, so you'd really have to be looking for them. We use Veggie-Bites for rats; they are more noticeable.

We always give enrichment with cage changes; just add some treats to the clean bedding and never had an issue with USDA inspection.

It is almost impossible to provide a clean space in a rodent cage because the animals leave traces of urine and feces pretty much everywhere. Not only that, but rodents are coprophagic, meaning they eat their own

feces. Plus, I remember reading that they also mark safe food items with urine. I would say that there isn't any reason not to provide feeding enrichment at cage change.

ENVIRONMENTAL ENRICHMENT FOR RABBITS

WHAT ARE PRACTICAL AND EFFECTIVE OPTIONS OF ENVIRONMENTAL ENRICHMENT FOR SINGLE- OR PAIR-HOUSED RABBITS WHO ARE KEPT IN CAGE RACKS (NOT FLOOR PENS)?

I like to stuff paper towel rolls with hay or wheat grass, and use empty glove or mask boxes, put some Veggie-Bites or Fruity Gems on the bottom, and fill each box with hay. Both options effectively promote skillful foraging activities in the rabbits.

When I cared for rabbits, they all received a cardboard box to hide in/chew on, a hardwood block to chew on, hay, and a stainless bowl that they loved to throw around, making a lot of noise.

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We also give our rabbits a block of wood (pinewood) to chew on and they get hay every day in a rack that is attached to the cage.

We put a rat cage turned upside down in each of our rabbit cages so the animals can get on top and stretch out on them. Each cage is also equipped with a spiral hay feeder and a canning jar ring.

Basically, any toy a rabbit can manipulate and push around does the trick.

I've found that small-sized canning jar lids, with the rubber part discarded, are a big hit



for rabbits to make lots of noise in their cages. Cardboard boxes or litter boxes (turned upside down) inside the cages provide perfect platforms. It's also fairly easy to set up a playpen and then rotate the rabbits through so that they all get time in the pen. You can get puppy playpen segments at any pet supply place. We put down rubber mats, but I've also seen places that are able to use straw or bedding of some sort. You can angle the playpen segments to fit any space and then just put toys and other items the rabbits enjoy in the pen.

I have found the ultimate bunny goodie is bite-sized unsweetened shredded wheat; I can shake the bag and everyone comes running to the cage fronts for their square. It's a riot! Finally, once our bunnies settle and I've developed a good rapport with them, many love a good scratch. Some are so into it, they'll bump my hand like a house cat when I reach into their bins.

Our rabbits go crazy for plain Cheerios! They will run to the front of the cage, all of them

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banging the toys until you get to each one of them and hand out the treats.

Our rabbits like to be visited by friendly humans who not only bring along treats—such as banana chips or carrots—but who also interact with them. Not all, but some really like it when I gently scratch them, especially behind the ears. Those visits are probably one of the most appreciated enrichment options for caged bunnies.



We are fortunate to have double-wide cages, so many of our rabbits are socially housed; in each cage both rabbits have a shelf, their own feeder and a Lixit. If they cannot be socially housed, we try a clear divider, sometimes with holes in it to facilitate social experience. However, not all rabbits like their neighbor, so we have solid dividers too.

We have absolutely fantastic animal care technicians who really take the time to enrich the living quarters of their rabbits. The rabbits receive a rotation of toys such as balls, rattles, wood chew blocks and dumbbells. Everyone gets daily free hay. Sometimes they get special food treats, too, such as carrots or frozen fruit. Brushes are kept on hand so the technicians can groom the rabbits.

If there is any aggression observed between cage mates, hay is stuffed into empty cardboard glove boxes, cardboard tubes or paper bags and provided up to three times a week to help relieve tension in the cage.

ONE OF THE ITEMS I WOULD LIKE TO ADD TO OUR RABBITS' ENRICHMENT OPTIONS IS HAY STUFFED IN SOME SORT OF CARDBOARD OR PAPER BAG. I KNOW RABBITS LOVE CARDBOARD BOXES AND PAPER BAGS. I AM HESITANT TO ADD THESE ITEMS BECAUSE I DON'T WANT ANY ISSUES WITH DIGESTION, AND I DON'T WANT THE MATERIAL TO AFFECT THEIR DIET SINCE THEY ARE ON CHOLESTEROL STUDIES. IS THERE

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**ANY SAFE, DIGESTIBLE CARDBOARD?
HAS ANYONE ENCOUNTERED NEGATIVE
EFFECTS WHEN GIVING CARDBOARD
TO THEIR RABBITS? WE HAVE NEW
ZEALAND WHITE RABBITS.**

We have been using cardboard destructibles for several years with our rabbits and have never had digestive issues. All cardboard items are autoclaved to avoid the spread of any potential pathogens. Our rabbits shred the cardboard; I never saw them actually ingest it.

At our institution, cardboard boxes are regularly given to rabbits (NZWs) and there were no issues to date that I know of. When I cared for them, I used to make sure that the boxes had minimal dyes (from stuff being printed on them) and that they were, of course, clean. I have no proof that they didn't ingest some of the cardboard but would always find the chewed-

up stuff on the bottom of the cage so I am assuming they didn't ingest much, if any, of it.

I think if your rabbits are not on a food-restricted diet but have plenty of nutritional stuff they normally eat, then the cardboard would probably just be ripped up and not eaten.

We've had a number of bunnies on cholesterol studies here. I've given them empty glove boxes, paper tubes and/or paper lunch sacks on almost a daily basis. We haven't had a single issue with digestion, and there was no interference with the cholesterol levels. The study here required a high blood cholesterol level—the animals received a high-cholesterol chow. So, if that's what you guys are doing, I can affirm there will be zero issues from providing them with paper products.

Yes! That's what I wanted to hear! No interference with the study. Thanks so much!

HIDING STRUCTURES FOR RABBITS

I WAS WONDERING IF/WHAT YOU USE FOR GROUPS OF FLOOR-HOUSED RABBITS TO HIDE IN. WE CURRENTLY USE LARGE CARDBOARD BOXES, WHICH GET JUMPED ON, SMOOSHED, MARKED WITH URINE AND TORN APART. THIS TURNS INTO A PRETTY NASTY MESS AFTER ABOUT A WEEK, SO WE DISPOSE OF THEM AND START ALL

OVER. I AM LOOKING FOR SOMETHING A LITTLE MORE STURDY/DURABLE AND SANITIZABLE. WOOD HUTCHES ARE GREAT, BUT WOULDN'T WORK FOR OUR LAB ENVIRONMENT.

We have used old, large rat boxes and cut an opening into one side so the rabbits can go inside if they want. These rat boxes are great because they are recycled from the facility and can go through cage wash!

At my previous workplace we did something similar with old food bins and barrels and either cut holes in them or cut off the entire bottom to make tunnels. They were easily sanitized; the rabbits loved them not only for hiding and resting but also as lookouts.



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We reuse the large barrels we receive our cleaning chemicals in. Once they are empty, they are thoroughly cleaned and then cut vertically and/or horizontally. We cut an entrance/exit either on the end or on the sides to allow the animals to get in and out. Our bunnies use them all the time.

Our rabbits have access to Sonotubes and handmade plywood shelters, which they use as hiding/resting places and as perches. The plywood is sealed with four coats of polyurethane and hosed down when the pens are cleaned. The USDA inspector has not had a problem with them.

VERY interesting! However, don't they chew/scratch on the plywood? My concern is, if they created enough damage to the structure, then the sealant would no longer be valid, and the plywood would absorb water and/or any soap being used to sanitize the material. So, how do you deal with this? Or do you simply have ultra chill bunnies?

The rabbits do nibble a little on the lower arch and top cutouts. But it takes the entire academic year to get to the point where the sealing coat starts to show cracks; a once-a-year paint job does not seem to be too much work for us.

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What are Sonotubes? What material are they made off? Are they inexpensive?

They are the cardboard tubes used for holding cement in a cylinder, for instance to manufacture posts for a deck to be placed on. They come from 8 to 24 inches in diameter. They are chewed by the bunnies and last about a month before they are either too dirty or too chewed up. Then we throw them out and replace them with new ones. A tube costs around 10 dollars. You can get them at any hardware store.

Thanks everyone for all of the great suggestions!



HOUSING ADULT RABBITS IN PAIRS

IS IT SAFE TO HOUSE ADULT FEMALE RABBITS IN PAIRS WITHOUT ANY PRELIMINARY FAMILIARIZATION PROCEDURE?

We mainly have New Zealand White rabbits that were bred on campus, so most of the animals are littermates. We pair them at weaning and have had successful male-male and female-female pairs for as long as a year. Research manipulations are relatively infrequent—namely blood collection, microchipping, genotyping, and breeding. If they are actively bred, paired cage mates are separated, as we've observed increased aggression in breeding bucks and pregnant does.

We did work with Covance to order pre-paired adult rabbits, too. We knew well ahead of time that we would need 7-month-old males and females, so they were able to set up pairs at weaning for us and we bought them seven months later. The animals were shipped

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in pairs and we were able to unpack them and keep them as pairs; no issues! It was great.

We do try to pair young adult females that were brought in singly and have had some good success. We don't try to pair adult males.



Our female rabbits are routinely housed in pairs upon arrival. We first mark them with urine from bucks and then move them straight from their boxes directly into a cage with a partner, typically with their buddy who was shipped in the same box with dividing panel. We tried the route of having the vendor pair the animals prior to shipping but honestly that turned out to be more of a hassle than it was worth, especially since we've had such good luck with pairing them regardless of their history prior to shipping. We've paired dozens of does this way with a very high success rate.

We are also re-pairing post-op females without problems. Once their E-collars [Elizabethan collars] are off and their incisions

are healed or mostly healed, we mark them with urine and put them back together, ideally with their previous partner.

CAN YOU PLEASE DESCRIBE URINE MARKING?

We use Annie Valuska's method: <http://pqdtopen.proquest.com/doc/1112868360.html?FMT=ABS>.

We collect urine from the bucks we have in house, dip a piece of gauze into the urine and rub it on the does' foreheads between the eyes/ears. Sometimes we "dose" them again or add urine marks on multiple locations on their bodies if we have a pair that doesn't seem to be meshing right away—scuffling more than normal but not injurious aggression. Marking them again with buck urine calms those fractious females down.

We store the urine in the freezer between uses.

That's pretty gross. Are the results significant?

Based on Annie's data and our high success rate, I would say so! As a disclaimer, we aren't doing controlled studies, so I don't have anything to compare to, but from word on the street—talking to other folks who are pairing without the urine marking—our rate does seem higher.

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WHAT'S THE BEST WAY TO TRY PAIR-HOUSING ADULT MALE RABBITS WHO ARE NOT KIN-RELATED BUT HAVE BEEN HOUSED NEXT TO EACH OTHER FOR MANY MONTHS? THEY CAN TOUCH NOSES THROUGH THE BARS OF THEIR CAGES AND HAVE SHOWN NO SIGNS OF INJURY.

I WOULD INTRODUCE THE TWO AS POTENTIAL COMPANIONS IN A LARGE SPACE WITH LOTS OF PLACES TO HIDE. WHAT DO YOU RECOMMEND?

Do NOT do this! Lab-bred rabbits are not social. It is unfortunate that they have been pegged as social.

We had a research staff person place two male rabbits temporarily together while he was cleaning their cages; within seconds we had an almost complete castration. The two males fought viciously, targeting each other's scrotum; they were separated immediately to avoid fatal injuries. These rabbits had been housed side by side with a clear panel in between them for several weeks.

Please, reconsider your plan!

We did a few trial introductions of unrelated adult males; the fight behavior was instantaneous. With quick separations, we did not see any significant wounding. Interest in each other and peaceful interactions through

dividers seemed to predict that these male rabbits would do well once the divider was removed. That said, if you have to singly house your rabbits, providing protected social access and/or time alone in a larger play space can be a great way to offer them some distraction.

I agree, attempting to pair unrelated adult males rabbits is very dangerous.

We do pair-house adult males under the condition that they are siblings. We have had success maintaining such pairs past sexual maturity without significant wounding, with enrichment rotation and monitoring for behaviors that tend to precede aggression. A quick spray from a water bottle is a great first step, as it will often give them just enough distraction to retreat to their own sides and groom away the water.

If your two males start fighting, your instinct will tell you to separate them immediately, yet it would be optimal for them to work out their dominance hierarchy on their own in order to establish a stable social relationship. While it may look and sound vicious, if there are no wounds on the genitals or on their eyes and if there are no profusely bleeding lesions, the two rabbits can usually be maintained with appropriate enrichment and veterinary monitoring. They re-establish their dominance relationship daily with chasing/mounting, so this is a natural behavior that needs to be allowed even though it may look aggressive at times.

We have based our pair-housing program for male rabbits and for female rabbits

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on extensive research into wild as well as laboratory-rabbit natural behaviors to ensure that we aren't anthropomorphizing their behaviors. Rabbits are inherently social and thus it is our responsibility to house them as such for good animal welfare, as well as to maintain regulatory compliance. There is also research detailing the detriments of singly housing a social species, which can interfere with the research outcomes, so we feel that housing the animals in social settings is less likely to affect the research.

We have an average census of ~400 rabbits per year and have had only one interaction that led to a rabbit being euthanized, and this resulted from human error.

Pairing rabbits is a difficult and time-consuming, but extremely rewarding job.

We've had some success with establishing rabbit pairs of adult male siblings and keeping the partners together after one of them had surgery. We started using infant pants post-op instead of E-collars. The infant pants allow the rabbits to get to their night feces, prevent them from biting or irritating their incision, and do not hinder the partners' ability to stay together and freely interact with each other.

I have tested the infant pants eight times with two male pairs. Each time, the pants were on for around four days and then taken off. My male pairs look good and partners get along very well with each other!

We're still working out the kinks, but so far, it's been pretty successful.

Congratulations Kristina, you have come up with great ideas; your work has important practical implications. It's great that you published your findings along with rather cute photos. Here is the reference to Kristina's article along with the abstract:

Bartley, K.A. & Johnson, C.H. 2019 *J Am Assoc Lab Anim Sci* 58(4): 510-516
"Elizabethan collars (E-collars) are commonly used in various species to safeguard healing wounds. However, E-collars inadvertently restrict the expression of normal species-typical behaviors, including coprophagy, self-grooming, and social housing. To maintain social housing in accordance with recommendations in the 8th edition of the *Guide for the Care and Use of Laboratory Animals*, we implemented the use of human infant pants instead of E-collars for postsurgical protection. We retrospectively reviewed the medical records of 154 intact male New Zealand white rabbits (age, 2 to 3 mo) regarding the use of E-collars (group 1; n = 72) compared with human infant pants (group 2; n = 82) for postoperative protection after 308 femoral angioplasty procedures. Maintenance of social pairs throughout the postoperative phase, replacement rate of infant pants, and self-mutilation rates were measured. Our findings indicate that using infant pants for postoperative protection was most successful in maintaining social

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housing, offers a more cost-effective option to E-collars, and does not increase the rate of self-mutilation in intact male New Zealand white rabbits.”

I am going to have to admit ignorance here. What exactly are infant pants? I am assuming that is not a diaper. Or is it?

Infant pants are basically commercial pants for infants who are 0–3 months or 3–6 months

old. We tailored them a little, but they fit our rabbits well.

I would absolutely love to see pictures if you have some to share. This is such a great idea!

Here you go!



RODENTS & RABBITS

In what types of projects are you using the infant pants? I would LOVE to get my bunnies out of E-collars! We had someone actually recommend we turn the collar around and use it like a skirt. I was like “Oh, heck NO!” So, if this could work, and I think it might for a couple of our projects, I would love to give it a go.

We actually do turn the E-collars around sometimes, mostly for neck incisions. We cut the collar short, though, so it’s only about 3 inches long. We have the old-style cages that have been modified with tunnels to allow rabbits to hop from one cage to the other; the E-collars cut short and turned around allow them to pass right through!

HOUSING ADULT RABBITS IN GROUPS

WE HAVE SEVERAL BIG OVERLAPPING RABBIT PROJECTS ON THE HORIZON, AND OUR RABBIT POPULATION IS GOING TO EXCEED THE NUMBER OF

CAGES WE HAVE, PROBABLY FOR A COUPLE OF MONTHS. WE ROUTINELY PAIR-HOUSE IN OUR CAGES, BUT WE’RE THINKING THAT TO GET THROUGH THESE PROJECTS, WE WILL SET UP SEVERAL TEMPORARY GROUP PENS.

DOES ANYONE HAVE ANY SUGGESTIONS FOR TEMPORARY GROUP CAGES?

We use hand-sanitized indoor/outdoor plastic pet pens. They are nice because they can be configured into different arrangements, so if you have rabbits that don’t get along, they can still have a level of social interaction while being divided for safety.

At a previous facility where I worked, we set up enclosures for the rabbits with baby gates; it worked well for our needs. We had a full room of several different types of baby gate corrals, and could add on extra panels to increase space. Assuming you have NZW bunnies, my only suggestion would be to make sure you use the tallest type of baby gates you can find. We often had bunnies try to jump out over them (and occasionally succeed). With a few pairs we had to construct makeshift lids (a sheet over the pen) to contain the rabbits.

We had deep aspen-chip bedding directly on the floor and added buckets, boxes or other pseudo burrows—which I think is what gave many of our more

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adventurous rabbits a helping hand to jump out of their enclosures. The baby gates didn't stand up to our tunnel washer (panels warped), so we spot cleaned them daily and sanitized them in place every two weeks.

For short-term housing of small groups of rabbits, we purchased plastic kiddie pools and plastic pet pens that fit inside. We filled the pool with shavings and enrichment; the rabbits seemed to love it. The pens are not made for repeated disinfection—the paint chipped and caused some rust issues. Apart from that, the setup was a great short-term housing option for us.

HUMAN CONTACT FOR RABBITS

BASED ON YOUR OWN EXPERIENCE, WOULD YOU AGREE THAT YOUR PRESENCE AND FRIENDLY INTERACTION

RODENTS & RABBITS

WITH THE CAGED RABBITS IN YOUR CHARGE PROVIDE AN EFFECTIVE (ENTERTAINMENT FOR THE ANIMALS AND FOR YOURSELF) AND USEFUL (STRESS BUFFER DURING HANDLING PROCEDURES) STRATEGY OF ENVIRONMENTAL ENRICHMENT?

I say definitely yes!

Years ago I was assigned a group of rabbit rooms where the rabbits hadn't been given any sort of enrichment. There were about 150 single-caged rabbits. A number of them were stompers and growlers any time you opened the cage door. Those who weren't aggressive were very fearful.

I got permission to try some enrichment items with them and purchased canning jar lids. I then placed one in every cage. As I went about the daily husbandry duties in the rooms, I would interact with each rabbit: picking up and tinkling the lid, offering timothy hay by hand, or just speaking to them. The rabbits loved to pick up their lids, drop them on the cage floor and push them around. When I entered a room and the rabbits were quiet, all I had to do was drop a lid or tap it against a cage door to make the familiar tink sound and the rabbits would start making quite a racket with their jar lids. It seemed that they liked the noise that they could create with these lids.

In a relatively short time I was only left with one rabbit who was aggressive, i.e., he

was very protective of this jar lid and would charge me if I dared to temporarily remove HIS possession so that I could clean it. All the other rabbits had become much more at ease and no longer showed signs of distress when I approached them and opened the cage door while gently talking to them; they had learned that they could trust me.

I would also say resoundingly yes. We make it a point to handle all of our rabbits frequently so they are better able to cope when we need to manipulate them for an experimental procedure. The staff enjoys having the opportunity to interact with the animals outside of their home cages in a relaxed and playful environment. That type of activity definitely acts as a stress reliever when we have an especially bad day/week.

Yes, friendly contact with humans is very beneficial for caged rabbits. I have learned over the past couple of years that spending a good amount of time touching and gently handling them not only provides enrichment, but allows for greater ease in handling them for procedures. I've seen bunnies go from thumping terrors to putty in my hands just by visiting them often and giving them something to throw and chew.

Yes, to all! If they are used to friendly human interaction, rabbits are easy to handle. If they are easy to handle, it is less stressful not only for them but also for me. I have found that caged rabbits will actually seek human

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attention if socialized well enough. Positive interactions with rabbits always provide a good enrichment for the animals and for humans; can't beat it!

That's also my experience; some rabbits will indeed seek human attention and human contact. We have some bunnies who will head-butt my hand like a house cat to receive a gentle scratch. This is a most wonderful *work* enrichment!

PAPER ENRICHMENT FOR MACAQUES

I'M LOOKING FOR PRACTICABLE PAPER ENRICHMENT IDEAS FOR MACAQUES. THE DIFFICULTY IS FINDING A PRODUCT THAT WOULD NOT CAKE THE CAGE TRAY OR CLOG THE DRAINS. ANY THOUGHTS?

We use paper lunch bags for our cynos; we stuff their forage inside so it gives them something to rip open and shred. The lunch bags easily disintegrate in water and don't clog our drains nor do they cake the trays. We also use a lot of small (4 oz) paper cups to make frozen treats. I've also used butcher paper a lot; my personal favorite was making a braid out of rolls of butcher paper and stuffing each roll with forage items like seeds, nuts and Fruity Gems. I've also wrapped a favorite treat in wet butcher paper, and then placed it in the freezer. The cynos spend quite some time

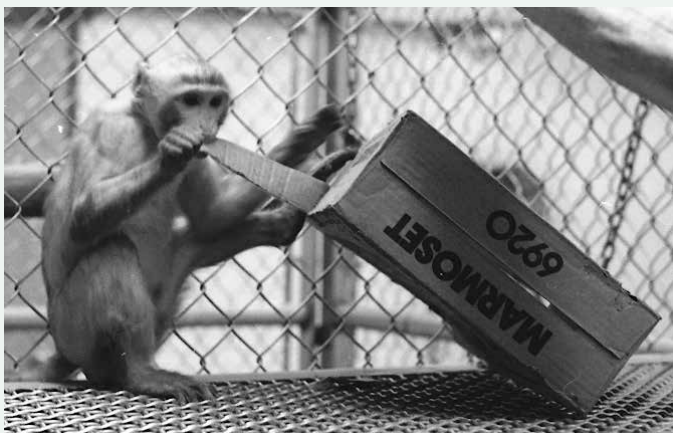
picking at the frozen paper to finally get the hidden, high-value treat.

I've given our cynos lunch bags filled with some Enviro-dri and treats and paper cups with frozen treats without encountering any drain clogging issues. I've also used paper plates, spread a small amount of peanut butter or honey on them, added forage mix, rolled them up, froze them, and then gave them to our monkeys. They always ripped the paper, so I had to pull out the large pieces to avoid clogging of drains. The small pieces were not a problem; they disintegrated in water. Many animals chewed pieces into small spit balls which also never caused an issue with the drains.

I put treats inside packing paper, and then shove that into paper towel tubes. No problem with clogged drains, but our cynos spend extra time exploring the tubes, ripping them apart and finally retrieving the treats. Our animals also get treats hidden in lunch bags; again, we encounter no clogging problems with this simple foraging enrichment.

Our animal care staff doesn't mind taking the extra bit of time to clean the cage pan or the pen during their daily cleanings. In fact, we don't have any restrictions on paper products and often use heavy cardboard boxes, shredded paper, paper bags, phone books, paper plates/cups and paper towels for our enrichments.

NON-HUMAN PRIMATES



I think the enjoyment the animals get out of shredding or destroying the paper products far outweighs any inconvenience to the staff. I have attached a photo of Mely, one of our male pigtail macaques, exploring a phone book and tearing it apart.

We have never had any issue with the paper product clogging the drains, and as long as you clean out a little bit of the wet/used paper from the cage pans every day, all the paper product is gone within two to three days.

I've used Aquasol paper. All you have to do is spray the cage out in the morning and the paper material completely and easily dissolves. It worked pretty well; you just can't give it to the animals when there is some water in the cages as the paper dissolves instantly in water. So in the afternoon when all the cages were



dry I'd give large handfuls to the monks and they'd have a go; they loved playing with the paper strips.

What happens if a monkey ingests the Aquasol?

It just dissolves as soon as any liquid (water, urine, saliva) hits it, so they can't really eat it since it disappears. As the material was used for GLP toxicology monkeys, our veterinarian checked it before bringing it in house; he didn't find anything toxic.

USING WOOD SHAVINGS AND FEEDING BROWSE WITHOUT CLOGGING DRAINS

I'M WONDERING, HOW MANY OF YOU ARE OFFERING BROWSE TO MACAQUES, AND WHAT (IF ANY) ILL EFFECTS DO YOU SEE WITH DRAINS? WE HAVE AN EXTENSIVE BROWSE LIST, BUT THERE ARE LOOMING CONCERNS OVER THE IMPACT THAT THIS TYPE OF MATERIAL WILL HAVE ON OUR DRAINS. WHAT DO YOUR FACILITIES DO TO COMBAT THIS, SO THAT YOU CAN CONTINUE TO OFFER THESE ITEMS?

At my previous facility we had a small mesh at the top of the drain, so basically, I could walk the trough to the drain with a dust pan and bag and scrape the straw off the drain, dump it in the bag and repeat until all of the water was able to easily drain. Then I picked up the mesh and dumped it into the bag. It was a bit messy for sure but I wore rubber boots and a rubber apron that came to about mid-boot, so I never got my scrubs or uniform splashed. I'd say it possibly added two to three minutes time to cleaning the room—including walking up and down the trough and then exiting the room—but most likely less time than that.

Having the ability to provide bedding or browse to a variety of species makes all the difference and, in my opinion, is worth the extra time it takes to be careful with the drains.

Unfortunately, here in this facility for our pen rooms we've not had success with keeping the drains clear and thus have had to eliminate floor bedding. We tried a few things to keep the drains clear. But after several months of having to come out multiple times a week, the campus facilities department basically told us to stop or they would have to fine us.



NON-HUMAN PRIMATES

It really comes down to how diligent your staff can be and what protections you can take to keep things out of the drains. If your staff just hose everything into the drain, it's going to be problematic. So you'll need their buy-in for whatever solution you try with your drain.

I think you're absolutely right about husbandry diligence. If we can convince them to place more items directly into the trash as opposed to straight down the drain, we would have much better luck avoiding drain problems. It's a matter of getting management to assist with enforcing this, instead of just removing the browse option altogether.

Playing devil's advocate here; if the browse provides visibly enjoyable and interactive enrichment for the animals, isn't that the incentive to make an extra effort when cleaning?



Couldn't possibly agree with you more!

The clear benefit to the animals should be more than enough motivation to put in the extra effort. Sometimes it takes a little extra convincing, though.

I don't think it's playing devil's advocate to ask that question at all. You'd think that the benefit to the animals would be sufficient to get all of the staff on board but unfortunately, at least in our case, it wasn't enough to get our staff to be careful about the drain. Perhaps they just didn't think it was that serious and that it wouldn't really result in our losing the ability to provide those items.

Did someone talk to them and explain the theory behind it?

Oh yes, in great detail. We even asked them for their feedback on how they thought we could keep the same enrichment but still protect the drain. Unfortunately, sometimes it only takes one person to not buy in to ruin the plan.

I know of a couple facilities that have moved to a dry system for this reason. Would your facility consider at least moving to a dry system for your browse-loving species?

I assume by "dry system" you mean waterless husbandry? Our browse program is almost exclusively for rhesus; I wonder how much more labor intensive a dry system might be? The lab would also want to weigh any increased exposure risk.

NON-HUMAN PRIMATES

We do use a dry system with shavings only. Husbandry techs will change out those NHP cages every two weeks by dumping the shavings into a bag, and taking the cages down to cage wash areas to clean. The common misconceptions are:

- *The shavings make the cages smell.* I personally haven't really noticed this. It smelled the same when we had the wet system and were hosing down the cages daily.
- *It's more work for the technicians.* It's labor intensive when they have to change out those cages, but at least two technicians are working on it. They aren't changing them every day, so it's just a little more labor intensive on change out days.
- *NHPs eat the shavings.* They don't. I've never seen our monkeys eat the shavings.

Honestly, I love the dry system and having shavings as bedding in the cage to catch the urine and feces. It has expanded our enrichment program tremendously. We place more destructibles (bags, boxes, etc.) in the cages. All of our monkeys have full hair coats—no alopecia. I love just throwing seeds and cereals in the cages during the day so they can forage. They stick their fingers through, and start sifting through the shavings and eating the seeds. We don't worry about the drains at all; a little wire mesh cup inside the drain catches any big material. We have had drain problems with the wet system where the drains would get clogged due to enrichment items and technicians trying to spray those

down the drain—which is part of the reason we moved to a dry system.

Thank you for sharing this very helpful, practical and user-friendly information.

I'm very intrigued with your program's method!

Approximately how many animals (or cages) do you have at your facility?

Do you have standard stainless steel, mesh-floor caging? How do you guys handle cleaning cage walls? Since you no longer hose, do you just spot clean daily?

We have 35 monkeys, most are housed in small groups. We have standard caging, do spot clean, and dump the pans weekly. We sweep and mop daily and sanitize the monkey rooms monthly.



VISUAL ENVIRONMENTAL ENRICHMENT FOR NON-HUMAN PRIMATES

DOES ANYONE HAVE AN INDOOR PRIMATE FACILITY THAT USES MURALS/ TAPESTRIES FOR VISUAL ENRICHMENT?

There are very simple things you can paint on walls for your monkeys even if you are a non-artist (like me) LOL. It makes the monkey rooms not so stark white and more interesting both for the monkeys and for the attending personnel.

It's also fun to paint monkeys and birds on the walls and see the animals' different reactions, but trees are simpler and don't take as long to paint.

Your murals on the wall are made with oil paint?

No, I use a nontoxic acrylic-type paint. It does hold up to gentle washing, and doesn't come off when sprayed with a hose. It will come off with scrubbing with diluted bleach; I can always paint over.

We tried letting our monkeys who paint their cages with their feces use finger-paint instead. That didn't work out as we envisioned: they

just ate the paint rather than paint with it. I may have to add that we used paint that was safe for children.

I used to take children's nontoxic paint and color the walls myself. Because we hosed the room down completely once a week (the walls were tile), I would just wash it off and then do it again. Not sure if the monkeys (female rhesus) enjoyed it, but I sure did! We would occasionally give them some paint to see what they would do; for the most part they just ate it! There was one girl who painted on paper and then consumed the paint.

I've put up those glow-in-the-dark stars in our monkeys' rooms so they can feel like they are sleeping under the stars at night.



NON-HUMAN PRIMATES

HOW ABOUT HANGING CEILING MOBILES IN THE ANIMAL ROOMS?

I use baby mobiles in our procedure rooms for our chaired monkeys. They love them. Depending on where they are hung, I will use a small fan to make them spin.

When I visited a facility in Texas, animal care staff made their own monkey mobiles. They used paper plates and glued animal and nature scenes to the plates, laminated them, then strung them together with zip ties and hung these mobiles in the central area of the monkey rooms so that the animals couldn't get to them but could see the mobiles slowly turn in the air current of the room. It worked very well. The techs could also take the mobiles down and spray them off and hang them at a different spot in the room.

These are all great ideas; I'm going to try the mobiles!

We use wall cling photographs of trees, butterflies and other beautiful natural scenes. Since the clings are removable/reusable, we change them every once in a while to keep it interesting for the monkeys. They are definitely particularly interested when the clings are new.

I print out whole-page pictures of colorful fruit, foods, candies, trees, birds, monkey

babies and nature scenes, and then laminate and stick them (using magnets or double-sided sticky foam tape) to the room doors/walls. We rotate the pictures around the room and bring different ones in every now and then. I have also been using smaller laminated pictures strung together with zip ties and hung from the ceiling as mobiles; we rotate around the room(s) regularly. I read somewhere that cynos would lip-smack and show affiliative behaviors when shown pictures of human babies; so I incorporate pictures of our techs' babies into the mobile collection.

LOVE this idea!



TVS IN MONKEY ROOMS

WE ARE PLANNING TO INSTALL TELEVISIONS IN OUR MONKEY ROOMS. FOR THOSE WHO HAVE TVS MOUNTED IN NON-HUMAN PRIMATE ROOMS, HOW IS THE HUSBANDRY STAFF SANITIZING THE ROOMS WITHOUT SOILING OR WETTING THE TVS?

NON-HUMAN PRIMATES

We purchased plastic covers for each TV. They slide over the top of the TV and can be bunched up in the back around the mounting apparatus and cords.

In one of my former facilities, we had a huge population of cynos/rhesus and thus had several rooms. Moving TVs around on carts got to be a bit hectic, so we had big flat screen TVs mounted high on the walls at the back and at the front (over the door) of the rooms. All TVs were linked to a central, remote DVD player, so the same show played simultaneously in every room. Our model shop fashioned Plexiglas protective boxes over the TVs that could withstand daily cleaning and regular room sanitation. We had those TVs up for years with no issues, other than the Plexiglas started to fog with age. We ended up changing the protective boxes out when they got too foggy.

It worked really well for us and for the animals!

We did something similar. We have a hinged access door on the side of the Plexiglas box because our TVs are combo TV/DVD players, so we can change the movies and/or play a CD to give the monks a movie-watching break.

At our facility, TVs are also mounted high up to the walls with Plexiglas boxes protecting them. They are all centrally connected so that we can control what movies are played at a given time.

Our wall-mounted flat screen TVs are covered with a biohazard bag during room sanitizing

to minimize water splash. I've been very careful for the two years they've been up and encountered no problem.

Our TVs are mounted high enough that they aren't sprayed when sanitizing. We do have to be careful not to hit the TVs when sanitizing the monkey rooms.

We have our TVs on a moveable cart. I don't want to have them in the animal rooms all the time, lest they lose their purpose and become constant background noise. We roll them in for TV time and then remove them for sanitation and such.

MIRRORS FOR MACAQUES

ARE MIRRORS USEFUL ENVIRONMENTAL ENRICHMENT GADGETS FOR MACAQUES?

We have adhesive acrylic mirrors on the walls of our rhesus and cyno rooms. The animals

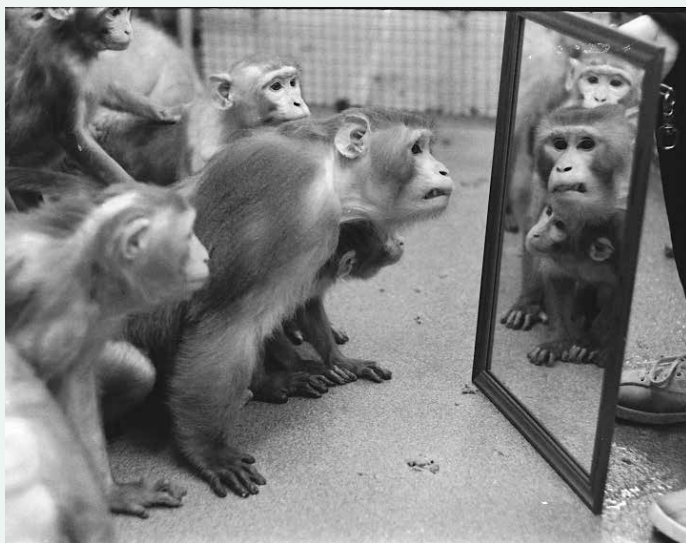
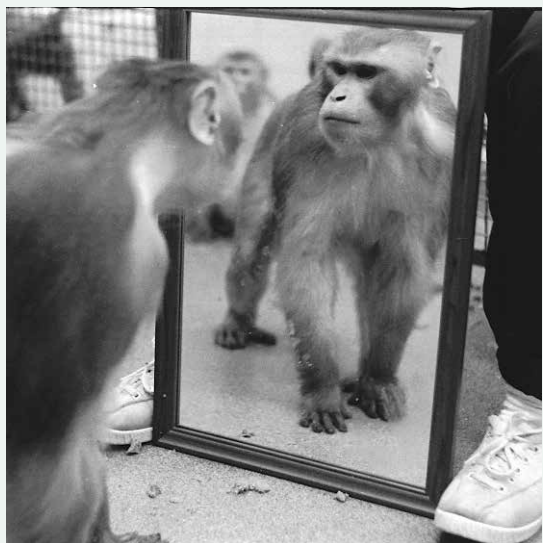
NON-HUMAN PRIMATES

make use of the mirrors and react to their own reflection with lip-smacking, presenting and grimacing. The mirrors are not expensive; there are no breaking glass issues and the material is washable on the wall with a hose.

Our rhesus macaques had mirrors hanging from the front of their cages; they seemed to primarily use their mirrors to look at whoever was coming down the corridor. I occasionally saw them looking directly into them and threatening them as if they were seeing a conspecific rather than themselves. There was one exception, a monkey named Drake. I watched him stare into the mirror, open his mouth, and pick at his teeth with his finger, using the mirror! I was amazed! He's the only rhesus I ever saw who seemed to have

recognized himself in the mirror's reflection. He was also extremely affectionate, and just seemed to be wiser and smarter than the other monkeys. You could look at him and just imagine that he was introspective and sensitive. Of course I may have been anthropomorphizing, but it was just my sense.

I tested the response to a mirror in group-housed rhesus macaques. The animals' facial expressions left no doubt that they related to the reflection in the mirror. The male in the attached photo (left figure) tries to impress the other male, but he isn't quite sure of himself (right figure); maybe the "other guy" is very dominant and will beat him up because he doesn't show respect but looks straight into his eyes.



NON-HUMAN PRIMATES

This topic brings such wonderful memories of my friend Annie, a very special cynomolgus macaque. Annie did indeed recognize her own image in the mirror. She used one finger to lift her lip and examine her teeth in the mirror. Seeing a small speck of raisin stuck to her tooth, I observed her using the mirror to guide her index finger to remove the speck of raisin.

Another time we placed a tiny sticky dot on Annie's forehead above her brow, while she was sedated for a routine exam. When she was completely awake and had romped about for a few hours, we knew she was not aware of the dot. I then took her to a mirror. As soon as she looked at the mirror, she stared into the mirror, reached up to the dot with her fingers, and removed it from her forehead! Annie used the mirror many, many times during her life to examine her teeth and body and just admire herself!

iPads FOR MACAQUES

HOW DO YOU INTRODUCE AN iPad TO CAGED MACAQUES? IN THE BEGINNING THEY ARE PROBABLY APPREHENSIVE OR EVEN SCARED TO BE EXPOSED TO SUCH A STRANGE GADGET.

In my experience they need a gradual introductory period, as in all things.

I'll bring the iPad into the room for a few days, and play with it myself. When the animals show some interest or curiosity, I'll point it to them so they can see it. I find pictures are best for the intro phase; pictures may be interesting but not intimidating. Then as curiosity overrides their neophobia, I bring the iPad closer to them and allow them access to it via the food hopper opening. When they touch the screen I say, "Good job!" If they lose interest in the pics, I open Fruit Ninja, because the slow action of it draws and keeps their interest. They often try to look behind the iPad to see where the fruits are going; kinda funny!

I switch between apps in order to keep their interest in the iPad as an entertaining enrichment.

Our rhesus macaques love the painting apps and the games that they have to swipe to make objects disappear. I have a lovely collection of monkey paintings; the attached one is Scooter's creation! :)

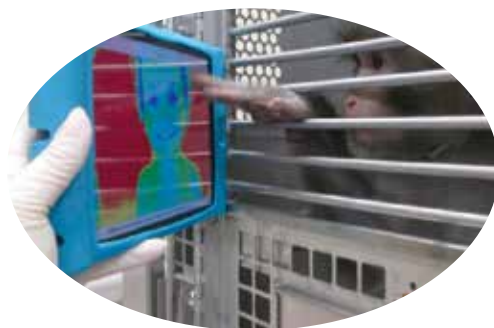


NON-HUMAN PRIMATES

We use iPads at my job all the time because our entire system is computerized. Our iPads come in OtterBox cases, so they are very easy to disinfect and are well protected from impact. I had Netflix set up on my iPad just to make sure it worked in the room, and noticed all the NHPs staring at the iPad. I held it up to one of the males via the food hopper opening; he very gently explored it.

In the beginning, this male was watching movies on the iPad. To try some other stuff, I downloaded Fruit Ninja for free, and he was ENTHRALLED. He kept pulling the iPad toward him so he could see behind it to figure out where the flying fruits were going; LOL! I showed him how to swipe them; he copied the action almost immediately! He was so funny, swiping the fruits and HOOing in excitement. Later I tried baby tapping action games, but he had a really hard time with aiming and tapping. His dexterity just couldn't handle that. Swiping was much easier for him. I had a bunch of pics and videos in my iPad of other NHPs in the facility for him to swipe through; one video showed the male cyno pair Biggie and Tupac; Biggie was very dominant. I thought it was interesting that this male would swipe to Biggie's picture and then lip-smack and present his hind end to him in the iPad! I showed him Biggie and Tupac repeatedly on different days; his behavioral reaction was consistently the same. It was rather hilarious to watch his display.

Vet techs with their iPads held up for a short amount of play during room visits have become a very entertaining enrichment for our macaques—and for our techs.



PUMPKINS FOR NON- HUMAN PRIMATES

IT'S PUMPKIN SEASON, AT LEAST HERE IN THE UNITED STATES. ARE YOU TAKING ADVANTAGE OF THIS INEXPENSIVE RESOURCE FOR THE ANIMALS IN YOUR CHARGE, PERHAPS NOT ONLY MONKEYS BUT ALSO RABBITS AND OTHER SPECIES? IF YOU DO, HOW DO YOU PRESENT THE PUMPKIN(S)?

Every year our techs get together to carve some small sugar pumpkins that we then give to our rhesus. Each monkey gets her or his own pumpkin. Our techs and monkeys love it! We've been doing this for three years now and haven't had any issues.

Our macaques absolutely love whole pumpkins, which we give them throughout the year, not only at Halloween. They carve little holes in the side and pull out the seeds. This makes a wonderfully fun mess! They also enjoy roasted pumpkin seeds that we

bake in the oven. This year I painted faces on their pumpkins using nontoxic (safe for human consumption) paint; a few of these little darlings chew the painted face off before picking the pumpkin apart to get to the delicious seeds inside.

It's so interesting to watch how each individual responds to her/his pumpkin. Many we can predict, like Corney will have his "smashing pumpkin festival" while Jala will gently lip-smack and carefully groom her pumpkin friend's bald head, before she takes it outdoors and floats it in the pool—she floats everything in the pool.

Pumpkins provide amazingly attractive foraging enrichment for captive animals!

We get a donation of pumpkins every year from local churches within our community. The larger pumpkins are cut up and put with the innards into Dixie Cups to freeze for a special treat later. We distribute the smaller pumpkins whole in several of our outdoor corrals and indoor/outdoor pens. Not only our primates but also our pigs, sheep, goats and rabbits get their share of the annual pumpkin donation. Some of the seeds and innards find their way to our rodents.

This year, we have decided to take the opportunity to do a pumpkin carving contest within our staff; so it will not be me and my technician carving them all ourselves. We're hoping this will enrich more than just our animals!

What a great idea!

NON-HUMAN PRIMATES

We carve the pumpkins for our rhesus. Most of our guys are on water restriction so it's still a super-special treat. We also give pumpkins to our pigs. They get whole pumpkins, which they love to push around and try to break open; they are always successful!

Each year, we have a human-enrichment event for pumpkin carving. The resulting pumpkins and some of the pumpkin pieces are distributed to our macaques, pigs, and dogs. Some of the monkeys only like the guts with all the seeds, while others enjoy tearing apart the shell and creating quite a mess. The "party" helps with staff engagement and makes the animals happy.

I love the idea of having a pumpkin carving event for the human primates as well as for the non-human primates!

Our macaques got small pumpkins. I drilled holes into the pumpkins and stuffed them with little treats like raisins, Craisins, and even a little bit of honey with sunflower seeds. I painted the skin of each pumpkin with honey, sprinkled seeds on it and handed it out to the animals. They stuck their fingers into the holes while biting and tearing away at the pumpkin to get all the treats and seeds, thereby creating a nice big mess; but they seemed to be very happy monkeys, at least at Halloween time!



COCONUTS AND BAMBOO FOR MACAQUES

WE RECENTLY HAD TO STOP GIVING OUT COCONUTS, WHICH WAS PART OF OUR WEEKLY ENRICHMENT PROGRAM, DUE TO A FEW CURIOUS MONKEYS CONSUMING THE STRING AND GETTING UPSET BELLIES. CAN ANYONE RECOMMEND A SIMILAR EDIBLE ALTERNATIVE? I'VE BEEN GROWING WHEAT GRASS AND CUTTING IT INTO BROWNIE-SIZE PIECES WHICH OUR MACAQUES LOVE, BUT IT JUST DOESN'T LAST AS LONG AS I WOULD LIKE.

I don't know the scale of your operations/frequency of implementation, and I've never done this myself, but the first thing I would think of would be to pull the long strings off the coconuts yourselves. I know it reduces their value but it still would be good enrichment. You could do it during meetings :-)

At my previous institution, we used bamboo for our aged rhesus and pigtailed. We grew it ourselves and kept the plants in cage-wash-chemical drums that would otherwise have been discarded.

Wow, that is really interesting! How did they like the bamboo? Was it easy to clean, did it clog drains or anything? Are they able to eat it like bamboo shoots? I've never heard of this; sounds awesome!

We normally kept the drum on a trash barrel dolly so it was easy to bring outside to catch some sun/rain, then bring indoors when we wanted to feed it to the animals. We had the option of breaking twigs/leaves off, or rolling the dolly right into the rooms and parking it in front of the animals' cages so they could pick off what they wanted; then we'd wheel it to the next animal. The animals seemed to enjoy this kind of foraging enrichment. We never left them unattended with the bamboo plant dolly in the room so we could make sure they weren't taking too much or knocking it over. Our technicians collected stems and other debris before cleaning the room so that pieces didn't enter the drains. We never had any problems with digestion.

EGGS FOR MACAQUES

DO MACAQUES LIKE EGGS?

I've offered hard-boiled eggs once to macaques. Some animals were scared of the eggs and others seemed to enjoy dropping them to hear the shell crack on the cage floor and then carefully picking the pieces off and eating them.



Our macaques sometimes get boiled eggs for enrichment purposes. At first they were afraid of the eggs, which they had never seen before. However, it did not take long before they explored them and learned that they are edible. Most of the animals like to eat the eggs. Some crack them by throwing them on the floor. Others squeeze them apart with their hands. Once the eggs are open, some monkeys eat them right away—egg and shell together—while others eat only the soft egg material after picking it off the hard shell. Since we have no stove on site where we could boil eggs, employees do it at home and bring them to work. Since we take care of about 200 animals and want to make sure that each one of them gets her/his egg, we organize a “boiled-egg party” occasionally as a special treat for all the animals.

I have given raw—yes raw—eggs to several hundred cynos and rhesus without any adverse effects and truly believe that raw eggs provide perfect food enrichment.

It's amazing and amusing to watch macaques exploring a raw egg for the first time. Instinct tells them how to handle this treasure. Some use a canine to carefully poke a hole into the shell and then drink the contents. Some crack the egg lightly enough to open it perfectly and then first lap the yolk and then the runny and wiggly, yet tasty whites. Others shove the whole thing into their mouth, crunch down and savor it. A few get so excited that they drop the egg, but they will lick up every last droplet of the splattered treat. In their

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natural habitat, raw eggs are a highly valued source of protein for non-human primates.

I did much research regarding the safety of raw egg consumption for cynos and rhesus and came to the conclusion that the health risk is miniscule, especially since most commercially available eggs are ultra-pasteurized and our animals are not artificially immunocompromised.

It's also my experience: Raw eggs are a favorite of non-human primates! I have never seen a monkey turn a raw egg down. However, I have found hard-boiled eggs are not as readily accepted. They get rolled around, smacked about, sniffed and looked at as if they were covered in bitter herbs.

When we have macaques who cannot eat biscuits well because of dental problems—primarily older animals—we give them a variety of soft food stuff which includes a hard-boiled egg daily. Our animals eat the boiled eggs without any issues.

I remember when wild monkeys (vervets) stole hard-boiled eggs from our breakfast table and ate their treasure with great gusto and no signs of guilt. It was so funny to watch the scene that we did not chase the bandits away but allowed them to finish all the eggs; when they were done, they tried to help themselves to the bread and the bananas, but we told them “It's enough and you better go!” They came back next morning!

We had some very ill cynos a couple of years back, and they wouldn't eat much of anything. I suggested we try feeding them raw eggs, but there was great concern regarding the mess that would be made, so providing them was initially frowned upon heavily. Then, one weekend, I snuck in some raw eggs. Those little guys went ga-ga and consumed the raw eggs whole. Everyone was quite surprised how much more energetic they were on Monday. I was then allowed to make “meatballs” using crumbled chow and raw eggs. Initially I made them like ordinary meatballs, cracking in the egg and discarding the shells; they didn't go over as well as I had hoped. Then, I just crushed the whole egg—shell and all—into the chow and it was like magic. It's now part of my arsenal for primate critical care.

FORAGING ENRICHMENT FOR MARMOSETS

WE HAVE A GROWING MARMOSET COLONY AND WANT TO CREATE MORE FORAGING OPPORTUNITIES FOR THE ANIMALS. CURRENTLY, I JUST

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GO AROUND TO EACH ROOM AND HAND OUT MEALWORMS AND PLACE SEEDS AND/OR DRIED FRUIT INTO PVC ELBOWS MOUNTED ON THE OUTSIDE OF THE 25 ENCLOSURES (MOSTLY PAIR-HOUSING). IT WOULD BE GREAT IF SOME OF YOU WOULD LIKE TO SHARE SUGGESTIONS OF ADDITIONAL WAYS TO PROMOTE MORE FORAGING ACTIVITIES IN THESE ANIMALS.

When we had marmosets, I saved empty glove boxes from around the primate area and stuffed them with Enviro-dri (crinkle-cut paper) or paper towels, added small treats and gave them to the animals. They loved pulling all the paper out of the boxes and finding the treats; it kept them quite busy. I have attached a photo of Petrie, one of my favorite little guys.



We do the same at our facility. We fill up the empty glove boxes with different substrates like hay or shredded paper, then add mealworms, raisins, shelled peanuts or sunflower seeds and give the baited boxes to our marmosets. They LOVE diving into those boxes, which are the perfect size for marmosets!

The boxes are readily available at your institutions. I just set up a bin where techs bring their empties and then once or twice a week, depending upon schedule, I'd fill the boxes for the marmosets and then hand them out while doing health checks or cage changing. As an added bonus, the marmosets would play in the boxes once they had found all the items.

ACACIA/ ARABIC GUM FOR MACAQUES

HAS ANYONE USED ACACIA/ARABIC GUM WITH RHESUS OR CYNOS?

Our rhesus and cynos don't really seem to like it. I tried it plain in a small Dixie Cup,

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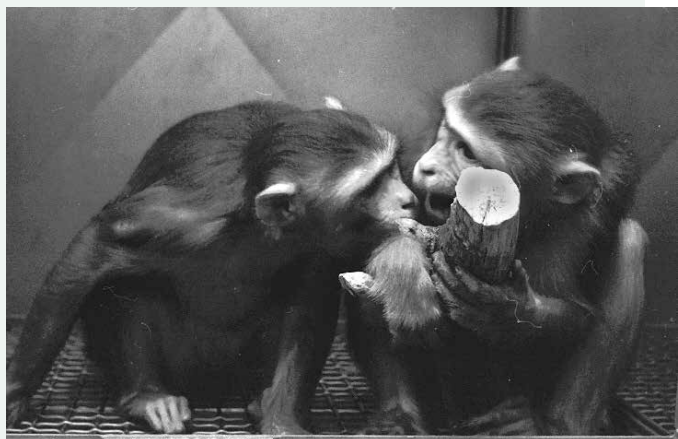
with added treats, and smeared on a gnawing stick. They just picked around it without even making an attempt to taste it. Maybe our guys are just picky.

I use the powdered acacia gum for cynos, rhesus, vervets and squirrel monkeys. A few

weeks ago I mixed up a thick, pasty batch and smeared it over Plexiglas puzzle boards, added wheatgrass and cereal, and then froze it. It turned out perfect and kept the animals picking and foraging for over an hour.

ENRICHMENT FOR NON-HUMAN PRIMATES ASSIGNED TO TOXICOLOGICAL STUDIES

I AM IN THE MIDST OF TRYING TO EXPAND OUR NHP ENRICHMENT OPTIONS (FOOD, PRODUCE AND MANIPULANDA) FOR TOX STUDIES AND WOULD LOVE FEEDBACK ON WHAT IS OFFERED AT YOUR FACILITY(S). RIGHT NOW WE HAVE A PRETTY STRICT AND LIMITED LIST FOR OUR TOX NHPS, BUT AN ENDLESS LIST FOR OUR OTHER COLONIES.



I work in Tox/GLP and our monkeys are given just about any produce; we did stop beets, as the stool got just too red with it, but they

are given tomatoes and strawberries for regular daily enrichment, and dried cherries, cranberries and strawberries for training. We

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have pretty much free rein with produce and finally got permission also for cereal, other dried fruit mixes, nuts and mini marshmallows for training only. We give lots of toys, all certified except the wood, which is now even allowed for GLP studies. The animals just love wood so much!

How did you go about getting approval for red items and wood?

The red items were here already when I started; no one confused these for blood. The wood just began to be approved for GLP. It was already approved for our stock colony and non-GLP studies. The vets felt wood was an important enrichment item after reading articles about it. They asked the study directors to okay giving it. We use sanitizable manzanita wood.

Our main restriction in our GLP environment is citrus fruits. Produce that is safe/intended for human consumption is typically allowed for the animals. The scientists are expected to specify restrictions and justify why a particular food item is not allowed.

Wood products have been accepted because they are sold as being certified.

PAIRING JUVENILE MACAQUES WITH ADULT MACAQUES

WE HAVE A FEMALE JUVENILE RHESUS MACAQUE WHO COULD BE PAIRED WITH AN ADULT FEMALE WHOSE FORMER CAGE MATE WAS SEPARATED FROM HER FOR A RESEARCH-RELATED REASON. I WAS WONDERING IF ANYONE HAS EXPERIENCE PUTTING THIS KIND OF PAIR TOGETHER, AND WHAT ADVICE THERE IS ON THE BEST INTRODUCTION METHOD. THE ADULT FEMALE IS PRETTY QUIET AND SHY, AND DOESN'T SHOW AGGRESSIVE BEHAVIOR.

I have established many adult-infant rhesus macaque pairs, both adult female-infant and adult male-infant pairs without encountering problems. The pairs were formed by simply

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introducing the infant into the adult's cage. I have attached a photo of an adult female rhesus who was paired with an infant three months ago (top photo) and another photo of an adult rhesus male shortly after he was paired with an infant (bottom photo).



As long as the infants are not older than 18 months, they have typical baby features that inhibit overt aggression in psychologically healthy adults.

We do this type of introduction at our facility on a regular basis with good success, better than like-age pair formations, in fact. We always start with a period of protected contact, just out of prudence and our routine; the duration is highly variable, but often brief.

PAIRING ADULT FEMALE MACAQUES

HOW DO YOU PAIR PREVIOUSLY SINGLE-CAGED ADULT FEMALE MACAQUES?

We have a large colony of adult female cynos here and have had wonderful success with pairing new partners while they are sedated.

Using a novel housing room is probably key for success; we remove the sedated

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animals from their familiar living quarters and bring them together as a pair to a housing room that is unfamiliar to both of them and where they are strangers to the other animals in the room. This pair formation method has been 100% successful for our colony since we started using it a few years back, with the majority of the pairs remaining compatible for six months or longer.

I was always on the fence about using “sedated pairing” before coming here, but I have seen how wonderful it can be with creating long-term pairs.

Congratulations!

What’s your trick to keep pairs compatible in the long term? How are the home cages designed? Are companions allowed to stay together 24 hours/day?

I am not really sure of what the trick is, but I feel that living together in unfamiliar surroundings greatly helps new partners bond quickly as a compatible pair. We typically keep them together 24/7 unless we notice that one partner is losing weight as a result of food competition; this happens only rarely. We house the pairs in one-over-one double-tiered cages with the center floor removed.

It has also been my experience with rhesus and stumps that establishing a new pair in an environment that is new/unfamiliar to both partners is one of the open ethological secrets for successful pair formation. I suspect that many of the failed pair-formation attempts

reported are due to the fact that partners were introduced in an environment that was familiar to one or both partners, for example, by removing the dividing panel of neighboring home cages. It’s true that this approach is faster, but it bears considerable risk for the animals.

I have attached a photo of two previously single-caged, pre-familiarized adult rhesus females a few hours after they were introduced to each other in unfamiliar surroundings.



Pairing previously single-caged macaques has always been one of my favorite, and most challenging things to do! I do have to say though, as a former doubter, the sedated pairing here has done wonders for our socialization program success; we rarely have a single-housed animal for any extended period of time—and we have a large colony!

PAIRING ADULT MALE MACAQUES

HOW DO YOU PAIR ADULT MALE MACAQUES?

In a pilot study, I established five compatible adult male rhesus pairs. Potential partners were first given the opportunity to establish a dominant-subordinate relationship during a 1- to 5-day noncontact familiarization period in double cages in which they were separated by a grated cage-dividing panel. They were subsequently introduced to each other as a pair in a different double cage (to avoid territorial antagonism) that was equipped with a privacy panel (to avoid food competition), two high perches and two gnawing sticks. The new cage mates confirmed their rank relationship within the first 10 minutes after pair formation, with submissive yielding and/or looking away, and dominant slapping and/or threatening without resorting to biting or fighting. To avoid possible antagonism related to sex competition, all male pairs were caged at locations that were out of sight of receptive females.

I applied this protocol to a larger sample of 40 previously single-caged adult males. Of 20 potential pairs tested during noncontact familiarization, the partners of four dyads failed to establish clear rank relationships within 24 hours and, therefore, no attempt was made to pair them. Pair formation of the remaining 16 potential pairs was not accompanied by overt aggression; partners confirmed their rank relationship with harmless gestures.

One of the 16 pairs became incompatible at the end of the first month after pair formation (fighting), and two pairs became incompatible 11 months after pair formation (fighting, depression). The other 13 pairs (81%) remained compatible during a follow-up period of 12 months. The accompanying photo shows Max and Ray sharing apples seven years after they were introduced to each other as a compatible pair.



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When establishing adult male rhesus pairs, I use a staged pairing process. I start with a clear cage-dividing panel that allows potential partners visual but not physical contact for one to two days. If the two males give the impression that they accept each other's company, I replace the transparent panel with a grooming-contact cage divider so that they have partial physical contact but cannot interact in any aggressive manner. The potential pair remains in this housing arrangement for one day to two weeks, depending on the behaviors and gestures exhibited by them. When I can see that the two are getting along well, without one of them showing overt aggressive inclinations while the other is depressed, I remove the grooming-contact panel. It is my experience that pairing males of different age (e.g., 6 vs. 12 years) and different body weight (e.g., 6 vs. 10 kg) is more likely to be successful (no injurious fighting and no depression) than pairing males of the same age group and similar body weights.

Using a very slow progression of visual exposure, followed by bar access, full access supervised, full access unsupervised during the day, and finally unsupervised access 24/7, I am in the process of pairing two 14-year-old adult male cynos, Papi and Chulito. Presently we have reached the full access supervised portion.

The two males have both been single-housed for four years due to study exemption. They've been in the same room for two years and are quite familiar with each other.

I've seen only affiliative behaviors, but Papi shrieks and frantically lip-smacks when Chulito works himself up to looking at him directly, or reaching out to touch him. Chulito immediately backs off and will present his hind end to Papi. They kind of hang out side by side eating biscuits, playing with toys and self-grooming. Occasionally Papi tries to reach out to Chulito, lip-smacking like crazy, and then he'll chicken out. At other times, Chulito will reach out, Papi shrieks and Chulito backs off.

They haven't had a lot of time to work it all out. I think they just need the time to find out through experience that they can coexist and work up to physical touch in their own time, without a human ogling them.

Honestly, from that explanation it sounds like this pair is doing great! As you said they will need some time to gain confidence with each other. It sounds like Papi is not quite sure if he can trust Chulito's overtures. In my experience this will resolve on its own, given some time.

I like to use a camera to record a new pair when I am out of the room. This allows the pair to have alone time without the presence of an observer; this can provide me with better insight into the partners' compatibility than direct visual observations can achieve.

I also find video recording to be amazingly valuable to the whole process of pair formation, both in protected contact and free contact. Our presence really does affect the animals' behavior. On many occasions, I saw zero interaction while in the room, but the minute

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I left they'd start grooming. If it's a pair I'm a bit nervous about, I'll set up the camera and sit quietly out in the hallway; that way I can hear if things go wrong and I need to intervene.

HOW ARE PAPI AND CHULITO? BY NOW THOSE BOYS SHOULD HAVE HAD ENOUGH TIME TO WORK IT ALL OUT AND LIVE TOGETHER AS A COMPATIBLE, HAPPY PAIR; DO THEY?

Okay, so here we are on the first day of full access without supervision; I observed for one hour. They seemed to be working up to being closer. No aggression. Lots of lip-smacking, and sitting next to each other eating favored treats with no problem. But physically touching seems to make Papi very nervous. When Chulito tries to reach out gently, Papi shrieks and Chulito backs off; Papi then tries to reach out to Chulito while lip-smacking frantically. They repeat this routine a few times, so I leave them together all day; no fights no injuries.

Coming back into the room at the end of the day to separate for overnight, the two were both relaxed, Papi in the right cage, Chulito in the center tunnel. At one point Papi began lip-smacking and approaching Chulito, who had his back to Papi. Papi came up to Chulito gingerly ... and then bit him in the back and ran away screaming. Chulito turned and

looked at Papi like "what the heck was that?" Papi just fear grimaced and lip-smacked and shrieked until Chulito went back to his spot and turned away again.

This was not a serious bite; I'd be surprised if Chulitio even has a bruise, but it certainly shows how wonky Papi's social skills are. It may be that it was meant to be a playful taunt? They returned to being settled and relaxed, and there was no aggression as a result. Chulito will have to be very patient for this pairing to work, I'm afraid.

What happened reminds me of little kids who hit someone to get that person to chase them on the playground.

Yes, I also have the feeling that Papi kind of took the liberty to tease Chulito. That Chulito didn't turn around and attack/punish Papi supports this feeling.

If it's really just teasing, the two will do just fine. After all, teasing is always a sign that the relationship between two partners is affectionate. Little human kids and little monkey kids who get along very well with certain adults like to tease them from time to time; it's a fun interaction that is often accompanied, at least in humans, with smiling/laughing.

What I perceived when I read your description of this interaction was that Papi's non-injurious bite to Chulito was playful teasing. It reminded me of Tyler, one of our cyno males, who sometimes interacts in a playful teasing manner with little non-injurious "love bites" to those he admires.

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I perceived this not only when considering Papi's behavior, but combined with Chulito's reaction to his behavior (equally important). I believe that Chulito would have known if Papi's behavior was a serious problem. And if that were the case, Chulito would have reacted much differently, and there likely could have been a problem.

DO YOU HAVE ANOTHER PAPI/CHULITO UPDATE THAT YOU CAN PLEASE SHARE?

They have been together full time for over a week now!

The pair across from them had an intense fight and it didn't set them off, which I thought was a great sign. I've gone in and peeked at them a few times, and every time they are sitting together side by side in their tunnel, when they could choose to be much further apart.

The husbandry tech reported yesterday that Chulito went up to nervous Papi, and was petting the side of his face. The tech said Papi just stayed still and lip-smacked.

It took Papi YEARS to allow me to groom him! I'm hoping Chulito has a faster turnaround than me.

It makes me very happy to see each one of them having a porch buddy. All they're missing are glasses of lemonade/sweet tea and rocking chairs, LOL!

SEPARATING MACAQUE PAIRS DURING THE NIGHT

I JUST STARTED AT MY FIRST POSITION IN A FACILITY WITH MACAQUES. CURRENTLY, THE PRACTICE IS TO SEPARATE PAIRS OVERNIGHT, FOR MEALS, AND FOR ENRICHMENT DISTRIBUTION. THE IDEA BEHIND IT IS TO MINIMIZE CHANCES OF FIGHTING, BUT THE PRACTICAL EFFECT IS THAT THE MONKEYS ONLY GET A FEW HOURS OF SOCIAL CONTACT EVERY DAY. DOES ANYONE ELSE DO THIS?

Overall, we don't separate our pairs during the night. We do have certain pairs who have demonstrated issues when receiving treats or enrichment. For those pairs, we have signs posted in the monkey rooms, informing staff to separate for enrichment. Once they are done (which can be minutes or hours), the partners are put back together. We have also

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had a few pairs who had issues with food in general, and in those rare instances, we have separated overnight.

We never separated any successful pairs, except right after surgery; once recovered, the two partners are paired again in their home cage.

If a pair has to be separated during the night because of food competition, I would say that the two partners are not compatible or insufficient attempts have been made to avoid food competition.

Our cynos are all fed together and remain together all day and night; very few pairs need to be separated for enrichment. In such cases there is a sign posted on the cage to separate partners for 10–15 minutes.

When I worked with rhesus, many paired partners were separated daily for feeding and enrichment only: about one hour in the morning and one hour in the afternoon.

In our facility we do not separate paired macaques during the night nor during the day for feeding or enrichment.

Thank you all for your feedback! I was pretty sure that separating this much wasn't a common practice, but it's good to hear from other facilities. Hopefully next week we'll move to 24/7 pairing.

Good luck!

SOCIAL HOUSING OF MACAQUES AFTER SURGERY

POSTOPERATIVE RECOVERY ALONE, IN AN UNFAMILIAR ENVIRONMENT CAN BE EXTREMELY DISTRESSING FOR MACAQUES. WHEN DO YOU ALLOW AN ANIMAL TO RETURN TO HIS OR HER SOCIAL PARTNER(S) AFTER SURGERY?

Following surgery, we keep our paired macaques alone in recovery cages. The next morning, they are brought back to their home cages and reunited with their cage mates.

I try and get the animals back to their group or to their partner within 24 hours after surgery. As long as they are coherent and not experiencing any deficit that would not allow them to defend themselves and/or consume food and water, they are returned to their social companion(s). I believe the social setting assists with healing and decreases

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postoperative stress. Also, depending on the type of surgery, social companionship sometimes assists with keeping the incision wound clean.

When I worked with pair-housed rhesus macaques, we never encountered serious problems with returning animals back to their familiar home cage and companion within 24 hours after surgery. Typically, surgery was done early in the morning and, depending of the type of surgery, the animals were returned back home in the late afternoon or in the morning of the next day. The attached photo shows Bim (left) and Lisa (right) sharing treats one day after Bim had a cranial implant surgery.



ALLEVIATING SEPARATION STRESS IN NON-HUMAN PRIMATES

UNFORTUNATELY, FOR AN UPCOMING STUDY, FOUR RHESUS WITH SPECIFIC ANTIBODIES NEED TO BE USED; THESE ANIMALS ARE CURRENTLY ALL PAIRED AND WILL HAVE TO BE SEPARATED FOR THE STUDY. I AM HAVING A HARD TIME WITH THIS BECAUSE I'VE SPENT A LOT OF TIME TRAINING THESE MONKEYS, AND THEY ARE ALL VERY CLOSE WITH THEIR CAGE MATES. DOES ANYONE HAVE ANY SUGGESTIONS ON EASING THE PROCESS FOR THEM?

There is nothing more frustrating than having a pair that you have worked hard with get separated. Can you read the protocol to see what kind of justification is given to the IACUC for the need for separation? Sometimes there are ways around it that the researchers are not aware of.

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We screen our monkeys for a certain NAb [neutralizing antibody] status depending on the vector that is used, and the PI justifies separating them to avoid seroconversion in spite of the fact that one of our studies has shown that paired monkeys have seroconverted throughout the study and it hasn't affected anything. I am hoping, down the line, this will be explored so we don't have to separate or single-house animals, but for now I have to work around it.

If partners really “need” to be separated, there should be a way to arrange the animals' caging so that partners can at least keep close-range visual, acoustic and olfactory contact with each other. Grooming-contact bars or grated cage-dividing panels would do the trick.

By the way, chances are very high that antibody production of separated companions will be affected by physical separation stress/distress.

I have a pair that the PI isn't comfortable keeping together because of the fragile nature of their head caps. They have 24/7 grooming-contact-bar access to each other; they can fit their arms and legs through, and we have seen them at the bars grooming each other for long stretches.

We mainly have monkeys with head caps and there was definitely resistance a few years back to pair-housing them for fear the cage mate would somehow cause damage to the head cap. We have never had an issue

with head-cap damage due to a cage mate tampering with it. For the most part, the pair engage in natural behaviors rather than paying any attention to the head cap.

The reason for wanting to keep the primates singly housed with head caps was not justified, so we did not oblige the request and had the backing of the animal care committee. With time, the researchers realized it as well. We don't really get anyone requesting this anymore—this took some time to achieve!

Congratulations!

HAIR PULLING AND EATING IN MACAQUES

**THOSE OF YOU WORKING WITH
MACAQUES, WHAT DO YOU THINK
COULD BE THE CAUSE OF SELF-
DIRECTED AND PARTNER-DIRECTED
HAIR PULLING AND EATING?**

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We don't often see hair pulling and eating, but we try to determine and document its antecedent cause when we do. In almost all cases we have observed, this behavior has been a result of various stress responses. Here is one recent example: One of our female cynos lost her companion of 20+ years and has not been acting like her usual self. On top of that, she is losing her eyesight and has become fearful when someone (monkey or human) approaches her too quickly! She screams out until she realizes who it is. She's an emotional mess at the moment. The other monkeys were all reactive to her strange and disturbing behaviors and this was upsetting the whole building. Two of our cynos were observed pulling and eating their hair for the first time in their lives. Others were restless, agitated, throwing things, fighting, and screaming together with her. We removed this little cyno from the building; the hair pulling stopped and peace was restored in the room.

The one exceptional case that didn't seem to involve stress was with a rhesus known to mimic specific behaviors of humans, monkeys and other animals. For a couple of days he was housed directly across from a new arrival who was pulling and eating his hair. Because of the new arrival we were video recording 24/7. We noticed on the recordings the mimicking macaque was attentively observing the new monkey pulling and eating his hair. Within an hour, he was pulling and eating his own hair! We moved our mimicker to another area and he stopped the behavior. He never did it before, he's never done it since. I think there

are only two possible reasons why the behavior happened in this rare case: He got stressed by watching the other monkey pull and eat his hair, or he was really just mimicking the newcomer's strange behavior. I say he was mimicking! I don't think this is a common trigger for self-directed hair pulling.

I did see a case like this in the past with a pair of male rhesus macaques. The dominant partner would pluck hair from himself and chew it. At first, we thought maybe he was sick. After close observation, it was noticed that he was not sick but highly stressed. Not only did he engage in pulling his hair, but he also started to bite his arm. His schedule was the same, his cage mate was the same, and we couldn't figure out what the issue was. There was one situation that predictably triggered the hair pulling and the arm biting in this male: As soon as you brought a mop into the room he would fly between cages and hide at the back of a cage pulling his hair and biting his arm. Once this was reported, mops were no longer used in the room; this stopped the hair pulling and arm biting!

When I studied the behavior of a rhesus breeding troop in a spacious indoor pen, hair pulling and eating was a rather common behavior. The troop comprised 22 adult and subadult animals and one infant that was not included in the observations. In the course of 162 hours, hair pulling and eating was shown 302 times by 19 of the 22 troop members, with one animal pulling hair from another member of the troop. Self-directed hair pulling occurred only three times.

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To have one's hair pulled out must have been painful, as it triggered squeaking, fear-grinning, crouching or fleeing. It's therefore no surprise that partner-directed hair pulling was shown in 95% of cases (287/302) to be by a dominant partner. I concluded that hair pulling and eating between group-housed rhesus macaques is an aggressive behavioral disorder reflecting adjustment problems to confined living conditions. Being forced to share closed living quarters with other conspecifics on a permanent basis may be irritating, and the resulting buildup of aggressive tension is then released in aggressively pulling tufts of hair from subordinate group members. The attached photo shows such a scene; the alpha male pulls hair vigorously from the scalp of a low-ranking subadult male who submissively screams but cannot escape.

DEALING WITH SELF-BITING IN MACAQUES

ONE OF OUR CYNO FEMALES SHOWS NON-INJURIOUS SELF-BITING BEHAVIOR WHENEVER ATTENDING PERSONNEL ENTER THE ROOM AND DURING HIGH ACTIVITY, ESPECIALLY CLEANING, WHICH REQUIRES HER TO BE TEMPORARILY CHAIRED. SHE WILL ACT AGGRESSIVELY TOWARD ME IF I APPROACH; SHE THREATENS AND RETREATS TO THE BACK.

SHE SHARES A VERY LARGE EURO CAGE WITH TWO OTHER FEMALES WITH WHOM SHE IS GETTING ALONG WELL. WHAT CAN I DO TO HELP THIS FEMALE STOP SELF-BITING?

The fact that she resorts to self-biting “during high activity, especially cleaning, which requires her to be temporarily chaired” suggests that the self-biting functions as redirected aggressive behavior. That she will act aggressively toward

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you if you approach and retreats and retreats to the back shows that she has intense fear that she cannot properly express in overt aggression against the fear-provoking stimulus/situation; so she uses her own body as a substitute target of her frustrated aggressive urge.

When did you first see the self-biting behavior? Does it correlate with any changes that may have occurred in her housing arrangement or research paradigm? Also, are you allowed to perhaps video monitor her to see if the behavior occurs at other times when personnel are not present? Sometimes getting behaviors such as these on video allows you a deeper understanding.

To my knowledge, this female started self-biting several months ago. She has lived with her two cage mates in the same room and same cage for over one year; she is not assigned to a research project.

I video recorded her last night and the self-biting along with pacing only occurred when a technician entered the room. Shortly after the technician left the room these behaviors ceased. We recorded from midday yesterday to this morning and the entire time she was being repeatedly groomed or was grooming her cage mates; she remained in close proximity with her two cage companions all night.

Obviously, the female's self-biting is not related to the fact that she is living together with the two other female cage companions.

These ladies are compatible; they have good relationships with each other, so it's unlikely that the self-biting behavior is triggered by social tensions.

HAVE ANY OF YOU SUCCESSFULLY TREATED A MACAQUE WHO EXHIBITS STEREOTYPICAL BEHAVIOR PATTERNS SUCH AS SELF-BITING?

I've found that I'm most successful treating those types of behaviors when I have a good guess as to why the behavior is occurring. Video monitoring can be your best tool when trying to figure it out! Most of my interventions have included (1) rearranging the room when macaques who engage in self-biting are stressed by other macaques in their line of sight, and (2) changing how staff who seem to trigger the self-biting interact with the animals.

If the stereotypy intensifies to the point where the animal is injuring herself or himself (e.g., floating limb that escalates to SIB [self-injurious biting]), we have used anxiolytics (Prozac) with great success. The behavior doesn't go away but the meds do decrease the severity significantly.

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HAVE YOU EVER BEEN ABLE TO ACTUALLY CURE AN ANIMAL FROM STEREOTYPICAL SELF-BITING—I MEAN NOT ONLY DECREASE THE FREQUENCY OF THE BEHAVIOR'S OCCURRENCE BUT ERADICATE IT?

In short, the answer would be no; but I have seen stereotypical self-biting decrease to such a degree that unless you're really looking for it, you won't see it. I once had a male macaque who engaged in severe self-directed behaviors (namely SIB) and motor stereotypies (pacing). Unfortunately we had to keep him alone because we couldn't find a compatible partner for him. The partners we tried liked him just fine, but he wanted nothing to do with them.

In an attempt to stop his SIB, we upped his enrichment, used PRT to train some basic cage-side behaviors, changed his housing situation (moved him to a room with female macaques), and medicated him. It appeared he had been cured—no one saw him exhibiting either SIB or pacing. However, with a lot of video recording, I found SIB was still there, but the intensity and frequency was significantly decreased. He'd put his wrist or his foot in his mouth occasionally without actually biting and then calmly go back to his enrichment.

Overall, his SIB went from something that was observed numerous times a day and often caused lacerations, to a behavior that

caused no wounds and occurred so rarely that it was overlooked during the day. He may not have been cured, but seeing the change in his behavior made my heart happy!

I've just had the same experience and outcome with one of our rhesus boys: Mojo was pair-housed, yet was biting his thigh and leaving multiple puncture wounds. It seemed to be almost like part of an aggressive display. He would do it and then look at you like "This is what I would do to you so don't mess with me." He was across from two females and spent HOURS pacing and staring at them. He started biting his cage mate, too.

We added a cage to the pair, giving them three duplexes. This way his cage mate Astro was able to get a reasonable distance from Mojo when he was amped up. We also moved their cages in such a way that they no longer could see the two females. Obviously, Mojo could still hear/smell them, but they weren't in his line of sight 24/7. This made a HUGE difference—the whole room settled down after this move. We also created a special enrichment plan that included the following elements:

- A Prima-Hedron (which Mojo and his partner both LOOOOOVED).
- A busy board with a bell and other gadgets on it to fiddle with—very popular.
- The veterinary technician in the room was instructed to engage Mojo in iPad play, and biscuit play during daily checks. With the iPad play we offer Fruit Ninja (swiping game), Baby Egg (tapping game), and a finger-painting app. Mojo preferred the

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painting app. The biscuit play involved tossing the biscuit up on the top of the cage, and then replacing it when he knocked it off. Kind of like fetch, but the human is fetching.

- About two times a month Mojo got a water-play enrichment that came in the form of about 2–3 inches of water in a rat-cage bottom and fruits floating in it. This was a big hit for him; he enjoyed getting eye level with the water and watching how the light refraction distorted the image. He would also climb into the cage bottom (yes he barely fit) and jump up and down; hilarious!



Result: The self-biting injuries stopped completely for a whole year!

We've just, unfortunately, had to move them to a new room and I've seen him biting his hand a few times, but no injuries. I'm

hoping it will settle when he acclimates to the new room. There are no females in this room and he is the clear alpha male, so we will see how it goes.

I'm trying to picture a male rhesus bouncing in a rat cage. That must have been completely hilarious! Thanks for sharing. Hope Mojo settles down in his new room.

I had to deal with seven cases of compulsive self-biting in adult rhesus macaques: three single-caged females and four single-caged males. The housing history of the animals and direct ethological observations made it clear that social deprivation was the cause of this behavioral pathology. These animals were extremely frustrated because their social needs were not met in any way.

I found compatible companions (six adults and one juvenile) for all seven animals. They were checked twice a day for self-biting behavior over a period of one year or longer. The self-biting stopped immediately, i.e., on the day of pairing in three cases; it stopped gradually within two months after pairing in the other four cases.

TAIL BITING IN CYNOMOLGUS MACAQUES

WE HAVE A CYNO WHO IS CONTINUALLY BITING AT HER TAIL. SHE INJURED IT MONTHS AGO AND WE HAVE BEEN TREATING IT EVER SINCE. THE VETS HAVE CONTINUALLY PLACED OINTMENT ON IT, PUT BANDAGES ON IT, AND HAVE SURGICALLY REMOVED A SMALL PORTION OF THE TIP OF THE TAIL. SHE IS PAIR-HOUSED; I HAVEN'T OBSERVED HER CAGE MATE BITING HER TAIL. WE HAVE GIVEN HER EXTRA ATTENTION, EXTRA ENRICHMENT, BUT I CANNOT THINK OF ANYTHING ELSE TO DO. DOES ANYONE HAVE ANY SUGGESTIONS?

We have had the same issue from time to time. I do the same as you do, just go through different enrichment items to try and find that one thing that catches the interest of the animal, but I have to admit, I have yet to come up with a successful intervention.

This type of behavior is so frustrating. We have tried all kinds of applications on the wound that are not supposed to taste good and should deter

the animal from licking it. Polly posted a cool recipe using metronidazole some time ago: “I would crush a few metronidazole tablets and mix the powder in water to make a paste, and apply the paste to the area the cyno is sucking. This paste also works great to stop them from licking/chewing sutures, wounds, etc. If you dip the end of your finger in the paste and touch it to your tongue, you will fully understand why they won’t want to taste it—LOL, that stuff is WICKED.”

Do you know how this cyno injured her tail, and was she already pair-housed when this happened?

We actually don’t know how the tail originally got injured. We think she scraped it on something in the cage.

Does she have the option of sitting on a perch/platform/shelf that is high enough so that her tail is not touching the floor of the cage?

Yes they have high perches where the tails cannot touch the floor of the cage. They have a Prima-Hedron that they can swing from in addition to the perch.

You may want to consider other stressors in the room. The animal may need a change in location, or to be moved to another room [or need a different cage mate].

We have had some success with using diazepam [Valium, an anxiolytic and sedative] once to twice daily until the tail is fully healed. We have also used metronidazole paste to deter licking; it really works.

MAKING USE OF A LASER POINTER

WHO IS MAKING USE OF A LASER POINTER AS AN ENVIRONMENTAL ENRICHMENT TOOL OR AS A TRAINING TOOL?

We have used the laser pointer to get rhesus to activate their sipper upon request. There were some animals who were initially afraid of the pointer itself, but wrapping it in a brightly colored wrap to change its appearance allowed us to overcome this.

I use a laser pointer with our macaques for both training and enrichment, and with positive results for both uses!

For enrichment, I hide a treat somewhere within an enclosure before the monkey enters. The animals have learned that if they follow the curious laser light all over their living quarters, it is not only fun but will ultimately lead them to a great, well-hidden treat! They really do enjoy following and trying to capture the moving ball of bright light!

The attached photo is of a training session where a male cynomolgus macaque finds it is a fun game to try to touch or grab the laser light in my hand. The goal is to train the male to voluntarily put his arm through the chain-link fence and let me gently hold and restrain his arm for sedation or an injection if needed.



I make sure it's always a fun experience for the animals, even when it's not a game and when we actually need to give an injection. I don't ever want them to think I am tricking them into an unpleasant situation. So when they do get to a point where they are comfortable letting

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me hold onto and restrain their arm through the fence for an injection, I always desensitize the area where I will need to insert a needle by tickling that spot with my finger just before I deliver a gentle poke with an ultra-fine 30 gauge needle. They don't even feel it! They aren't afraid! They aren't mad, and they will trust me enough to cooperate in the future each time I need to give them an injection.

It might not seem like a big deal using a smaller gauge needle, but personally I would also prefer my own physician using a 30 rather than a 22 gauge needle :O)

What is emotionally disturbing for the animals is NOT the insertion of the needle but anxiety or fear. This spontaneous reaction and its physiological consequence can be avoided by first having the animals learn through experience that they can trust you, so they have no reason to be afraid of what you are going to do. If there is no trust in the handling person, even the most skillful procedure is bound to trigger a stress reaction in the animal.

I agree with your comment! I do know that without the trust factor it really wouldn't matter what size needle I was using!

What volume are you injecting using a 30 gauge? How long do they stay still for you with that needle inserted?

I use the 30 gauge needle to inject ketamine; the amount varies depending on the monkey, but usually 0.5–1 ml. The animals stay still long

enough for me to inject—and to fall asleep while I am still grooming their arm. They never try to pull away.

When they wake up, all they remember is just before they fell asleep I was grooming their arm. They might have felt a tiny pin prick, but it wasn't enough to make them want to move away from having their arm groomed.

I used to work with a 22 gauge needle for ketamine, but we—this includes me—all prefer a 30 gauge. What can I say, we're sissies; but that tiny needle size factor combined with trust really does seem to make a difference with my guys!

TRAINING MACAQUES TO COOPERATE DURING INJECTION AND VENIPUNCTURE

**HOW DO YOU AND/OR THE
INVESTIGATOR(S) MINIMIZE HANDLING-
ASSOCIATED STRESS IN MACAQUES?**

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It didn't take me long to fully habituate adult rhesus to present for routine injections without making use of the squeeze back. It was extremely helpful. I used high value treats, which the animals received immediately following injections.

You are right; desensitization training based on a mutual trust relationship between you and the animal, along with consistently rewarding the animal for cooperation, is an easy and effective way to make macaques accept injections without showing signs of being stressed.

I've never performed any procedures on macaques but everyone I know who does has

trained them to some degree to avoid forced restraint. The only training I ever had to do was to have them go through a tunnel to a new cage during cage cleaning. I did have some cheeky ones (cynos) who would rush forward to grab the fresh fruit from the new cage and then rush back to their home cage so that I couldn't close the doors. I then started giving the fruit reward after they were back in their fresh cages. Worked much better!

Although we use the squeeze back in the cage for sedative injections, for routine blood collection we use chairs to which each animal has been acclimated. Most animals willingly present a leg after some



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positive reinforcement training for femoral blood collection with minimal restraint; our chairs provide very limited arm restraint, just to prevent the animal from reaching the venipuncture site, but few try. This is for PK blood sampling where the time points can be very frequent, and also for clinical or diagnostic blood collection.

Using a simple positive reinforcement technique, I always first trained the animals (rhesus and cynos) to cooperate during blood collection for PK/TX studies in their familiar home cages.



We use positive reinforcement with our macaques in training for cooperation, and the unique word “candy” is used as a primary and successful tool in just about every case. We teach the monkeys that when they hear “candy” something positive is going to happen.

While we don’t actually give them candy, we give them something that is of high value to them. For one macaque, “candy” might mean a mango seed, for another it could be having a human massage the extended leg. So in training for cooperation in various areas we first determine what it is that is uniquely rewarding to each individual monkey. That valuable thing is then referred to as “candy.”

While I have developed a mutual trust and friendly bond with most of our macaques, and can gain voluntary cooperation, the concern is that if I am unavailable at any point, someone else would need to fill my spot, and interactions from someone the macaques aren’t familiar with aren’t likely to go as smoothly as they do with me. With that in mind we worked with the monkeys so that the key word “candy” could be used as a familiar sound that can aid in positive reinforcement training by anyone working with them. The monkeys might not know the new human, but they do know that “candy” means something positive is coming their way, and they all know that the squeeze cage is nothing to fear. It took some time in the beginning to create a “friendly thing” of the squeeze cage, by allowing the animals to go in and out at will to find hidden treats within the cage and leave whenever they choose. Then we started briefly closing the exit, offering a treat and then releasing the monkey with positive chitchat. Once in the squeeze cage with positive reinforcement, they have all learned that extending an arm or leg for injection is nothing to fear.

TRAINING MACAQUES: SEX DIFFERENCES

IF YOU HAVE EXPERIENCE WITH TRAINING ADULT RHESUS MACAQUES, WOULD YOU AGREE WITH THE STATEMENT “THE MALE RHESUS MONKEY ... IS A VERY AGGRESSIVE ANIMAL AND CANNOT BE TRAINED TO ADAPT TO EXPERIMENTAL SITUATIONS AS EASILY AS THE FEMALE ANIMAL CAN”?

A resounding “Oh, heck no!” Male rhesus macaques are much more willing to be trained than females, who easily become determined not to cooperate.

No! In fact, I always found the males easier to train than the females as they tend to be less shy and will start taking treat rewards sooner than the girls. I loved working with rhesus. I found they trained faster than cynos.

I agree, adult male rhesus are more at ease than adult females when you train them to

cooperate with you during procedures; this implies that they learn in a shorter period of time to work with you.

How is it with cynos? Is it easier to train adult male cynos than adult female cynos?

I also think it is easier to train male cynos than female cynos for the same reason. I have many girls on a current study whom I can't get to come and take a treat. The boys are very different and all of them don't hesitate taking treats from my hand.

WHEN TRAINING ADULT RHESUS MACAQUES TO COOPERATE DURING PROCEDURES, DO YOU FIND THAT THE ANIMALS RESPOND BETTER TO FEMALE THAN TO MALE TRAINERS, OR VICE VERSA?

IF YOU NOTICE A DIFFERENCE, WHAT COULD POSSIBLY BE THE REASON FOR IT—PERHAPS DIFFERENT GENDER-SPECIFIC SCENTS OR A DIFFERENCE IN PATIENCE/COMPASSION?

Smell may play a role; women and men have different body odors, which may trigger different emotional responses in the animals.

From my experience, female trainers have more success with cooperative training than male trainers. I think it's a mix of

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variables—compassion and patience being an important factor.

I've also noticed that the adult rhesus I've worked with responded very differently to me versus male coworkers. The monkeys are less nervous and less aggressive when I work with them. They quickly learn that they can trust me; this helped me very much in forming a mutual trust relationship with them and implementing training for them.

On the flip side, I've had some issues with adult male cynos who really never trusted me and have responded much better to male trainers than to me.

In my experience, adult rhesus macaques respond better and are more willing to cooperate with female trainers than with male trainers. I think they are less afraid of women than of men and are more easily inclined to trust them. Men in general tend to be larger and broader in stature than women, and they have deeper voices; the animals probably find this more threatening, so they are more hesitant to work with a male trainer than with a female trainer.

BAD REPUTATION OF ADULT MALE RHESUS MACAQUES

ADULT MALE RHESUS MACAQUES HAVE TRADITIONALLY BEEN REGARDED AS VICIOUS ANIMALS WHO ARE BETTER KEPT ALONE IN SINGLE CAGES AND RESTRAINED WITH PHYSICAL FORCE OR SEDATED/ANESTHETIZED DURING COMMON PROCEDURES SUCH AS INJECTION, BLOOD COLLECTION AND CAPTURE.

CAN ANY OF YOU SHARE YOUR OWN EXPERIENCES DEMONSTRATING THAT ADULT RHESUS MALES

- **ARE NOT VICIOUS ANIMALS IF THEY ARE PROPERLY APPROACHED AND CARED FOR,**
 - **CAN BE HOUSED AS COMPATIBLE PAIRS AND,**
 - **CAN EASILY BE TRAINED TO COOPERATE DURING COMMON PROCEDURES?**
-

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Though we work in heavily protected contact with all of our macaques here, there's not a single one (adult male or otherwise) I would describe as vicious. From what I've experienced, they all provide very clear warnings when they are becoming irritated or afraid; as long as I pay attention to what they're telling me and respect their feelings, we get along just fine.

It seems quite likely to me that singly housing them may contribute to their reputation for being vicious. They're socially deprived, with few or no opportunities to engage in direct social interactions. Not only that, but many interactions they have with people are aversive, and they have no cage mate for emotional support. This circumstance must be deeply distressing for them.

Based on my own experience with adult rhesus males, I very much agree with you. If you know

your animals, you can understand what they are telling you. When you respect what they communicate, there is no reason to be afraid of them. It's typically human fear that triggers fear along with defensive aggression in pretty much any animal, including adult rhesus males.

I worked with adult male rhesus for over 15 years. These animals were not vicious! They all had names and I knew each one of them very well as we kept them for many years for PK studies. I often placed IV catheters single-handedly with no issue; as shown in the attached photo, the monkey would present his leg before I even asked for it, and I was able to hold off the vessel, place the catheter, slide my hand down the leg to hold it off while I placed the cap on and taped it in. I never had any real problem males, to be honest.



TRAINING NON-HUMAN PRIMATES TO SIT ON A SCALE FOR WEIGHING

HAS ANYONE EVER TRAINED GROUPS OF NON-HUMAN PRIMATES LIVING IN LARGE ENCLOSURES TO SIT ON A SCALE—ONE ANIMAL AT A TIME—FOR WEIGHING? I'M INTERESTED IN HAVING THE PRIMATES SIT ON A SCALE WITHIN THEIR ENCLOSURE TO WEIGH THEMSELVES. THIS MIGHT BE IMPOSSIBLE BUT WHO KNOWS?! I WORK WITH A VARIETY OF PRIMATE SPECIES AT A SANCTUARY AND WOULD REALLY LIKE TO RECORD THEIR WEIGHTS ON A REGULAR BASIS WITHOUT HAVING TO KNOCK THEM DOWN EVERY TIME.

YES it is possible, and we have been very successful!

We rotate the monkeys—cynomolgus and rhesus macaques—from their home

quarters into the weigh station as needed via wire tunnels. When the monkeys are passing through the tunnels, we have a shift gate we can open to let them into the weigh station one animal at a time. The scale is impervious to water and bolted in place. There are no small parts on the scale for the monks to remove or get themselves into trouble with. A little device mounted on the outside of the station displays the weight as the monkeys are sitting on the scale to get their treats. They have learned that we hand out treats in the weigh station and that they have to sit on the scale to get them. The cool thing is that they don't even realize the scale is there, they just think it's another ledge to sit on.

Ingenious!

I have trained several breeding troops of rhesus macaques and one breeding troop of stump-tailed macaques to first enter a holding area of their home enclosure, then exit one animal at a time on vocal commands into a transfer box that I lifted on a mobile scale. I recorded the animal's weight and released the animal back into the home enclosure, where an apple or a banana was waiting as reward for cooperating with me.

No extra person was required to do the routine weighing of the troops or to catch an individual animal for medical treatment. The procedure was not distressing for the animals; they cooperated without being frightened in any way. The training protocol was published in *Lab Animal* 1990, 19(6): 52-53.

SHIFTING MACAQUES

WE ARE HAVING SOME DIFFICULTY ENCOURAGING OUR ADULT MALE RHESUS MACAQUES TO SHIFT FROM THEIR INDOOR ENCLOSURE TO THEIR OUTDOOR ENCLOSURE FOR CLEANING PURPOSES. OUR UNUSUALLY LONG FREEZING WEATHER PERIOD HAS NO DOUBT INFLUENCED OUR RECENT ANIMAL STRIKE, AND THE CONSTRUCTION WE HAVE GOING ON IN THE AREA PROBABLY DOES NOT HELP EITHER.

ONE OF THE ISSUES WE MAY BE HAVING IS THAT THE STAFF (LAB, CARE AND VET) ARE ALL TRAINED TO ASK THE ANIMALS TO GO OUT OR GO INTO A TRANSFER BOX DIFFERENTLY. EACH INDIVIDUAL SEEMS TO HAVE CERTAIN TRICKS THAT APPEAR TO WORK BEST. WE WOULD LIKE TO STANDARDIZE THIS SO THAT WE CAN IDENTIFY ANIMALS WHO MIGHT NEED EXTRA TRAINING OR ATTENTION.

DOES ANYONE OUT THERE HAVE A STANDARD PROCESS IN PLACE FOR SHIFTING THEIR ANIMALS OUTSIDE? HOW IS YOUR STAFF TRAINED TO

ASK THEM TO GO OUT, AND WHAT TROUBLESHOOTING METHODS ARE THEY ENCOURAGED TO USE TO HELP WITH COMPLIANCE?

WE HAVE UNFORTUNATELY GOTTEN TO THE POINT WITH SOME OF OUR ANIMALS WHERE THE STAFF FEELS THE ONLY WAY TO GET THEM OUT IS TO TAKE A NET, ENTER THEIR ENCLOSURE, AND CHASE THEM OUT. EVEN MORE UNFORTUNATE, SOME OF THE ADULT MALE RHESUS ARE NO LONGER FAZED BY THIS AND CONTINUE TO TAKE A STAND AGAINST THE INTRUDER ENTERING THEIR SPACE. NO ONE HAS BEEN INJURED YET, BUT IT DOES MAKE ME NERVOUS AND I KNOW THERE HAS TO BE A BETTER WAY. WE WILL BE ENGAGING THESE MALES IN A FORMALIZED TRAINING PROGRAM, BUT WE WERE HOPING TO COME UP WITH A GOOD STANDARD PRACTICE, ESPECIALLY BEFORE WE MOVE THESE ANIMALS TO THEIR NEW BUILDING WHEN IT GETS COMPLETED LATER THIS YEAR.

Definitely, everyone must be using the SAME commands or cues to get them to go outside. We clicker train our monks and every tech or vet staff uses the same word for whatever is being asked of a monkey. Clickers are a wonderful training tool.

You definitely want the net to be a very last resort, as the monks will no longer fear

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it and things could become dangerous. But also you want to avoid scaring them into the environment they should enjoy—when the weather is nice.

It is my experience that chasing macaques with a net is the worst thing that could be part of a training program. Any person who ever chased these animals with the net should not be allowed to continue working with them. The animals do remember! Once trust is gone, it's gone and replaced with fear and defensive aggression.

Before I started a long-term ethological study of a pen-housed rhesus breeding troop, the attending care staff had consistently used nets to chase the animals into a holding area. It was a terrible situation; it made the animals very nervous when any human was present.

In order to collect normal behavior data, I banned the attending staff from the animal quarters, took care of the animals myself, and trained them to voluntarily shift into the holding area to allow for cleaning. What a difference it made! No chasing with nets, no shouting, just quiet cooperation. The animals were no longer nervous when I was around, so I could finally start to make my observations.

Shifting macaques from one area to another requires evaluating the entire situation. Through extensive observation, you can typically identify the reason(s) they wouldn't want to move over. Those reasons can vary, and you will do whatever it takes to eliminate them.

We don't use nets because of the negative effects we experienced many years ago. We have nets but would use them only in an emergency situation, for instance if a building was on fire and a macaque was going to die if we didn't quickly catch the animal with a net. I'm going to guess here because I don't know exactly how you are set up. But first and foremost, our macaques will rarely transfer outdoors during cold winter months so we can clean. They hate being cold. Since we can't change the temperature outside, and since we aren't willing to force them out by scaring them, the only alternative we had was to make it possible for them to transfer into adjacent enclosures indoors.

The difficulties you are having are not unique and those are the reasons we started constructing all of our enclosures with built-in shift gates that lead to an equally comfortable area for the monkeys indoors. As soon as they learn (and they learn quickly!) that on the other side there is a reward waiting for them, they will move over for you. If you develop strong bonds, they will want to please you, so building bonds is key. But even if the bond isn't strong, if the reward is very attractive, and if they are not afraid, they will move over. You will need to invest some time in patiently observing the animals and then patiently teaching them what you want them to do. If the weather isn't cold, and they still don't want to move outdoors, you might try leaving the shift door open so they can come in and out at will, for a while. During this time, place their food outdoors only. Don't ever quickly

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shut the door behind them once they are outside! Leave it open, even for a few days. Then gently, slowly shut the door while they are outside. If they charge at the door trying to get back in, let them back in! You don't want them to feel like they have been trapped or tricked! So regardless how they react to the door being shut the first time, re-open it within just a minute or so.

It's very important to have everyone working with the macaques use the same verbal cues to make them move over. Each time we reward them, we all refer to any reward as "candy." It's a unique sounding word and I always say it with enthusiasm. Anytime I say "Come get your candy!" they all know that something they will enjoy a great deal is waiting for them on the other side—not real candy of course, but whatever is a favorite to the monkey(s) we're working with. Just last night as I was approaching the special needs barn I overheard one of our new staff members saying "Come get your candy, Tyler" and I chuckled, knowing she would be so pleased at the way Tyler would move for her.

Kudos!

Thank you for your amazing sharing of how to work with and FOR macaques and how to get macaques to work WITH you. You are setting a wonderful example for all of us!

I just wanted to say thank you, as I am currently training some of my first naïve cynos and had a setback. Your elaboration is very helpful.

MY RHESUS MACAQUES ARE HOUSED IN PENS WITH HOME CAGES ATTACHED. AT THE MOMENT I HAVE A FEW ANIMALS WHO HAVE A DIFFICULT TIME SHIFTING FROM THEIR PENS TO THEIR HOME CAGES IN THE MORNING, EVEN IF I'M NOT TAKING THEM TO WORK OR TRAIN. I WOULD APPRECIATE ANY HELPFUL SUGGESTIONS.

We have several primates in pens, both cynos and rhesus, and I have run into the same issue with animals becoming less cooperative over time. Even the best-trained monkeys regress from time to time.

You definitely want to look at the social dynamics in the room. Even if they are singly housed, if a monkey feels intimidated by other monkeys in the room he or she may be less likely to move for you.

If you use reinforcement, you want to make sure that the animals are motivated enough (i.e., hungry) to work for you when you try to shift them. When I shift-train, I don't restrict food, but I do control the time when they get their food so I know I will have a motivated monkey to work with. For instance, if they get all their biscuits in the morning, they will not be interested in working until early to late afternoon. So we train first, then they get their biscuits and any extra treats or enrichment. Throughout training, I also make sure that all preferred food items are only offered in the holding cage.

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Make sure that their holding cage has more positive than negative events associated with it. Several monkeys we have in pens right now are only locked into their holding cages for pen cleaning every two weeks. But every day, we go through the motions of moving them into their holding cages so that, when the lengthy lock-in occurs, it's not such a big deal since the cage has been associated with lots of treats and enrichment.

And one last tip: avoid creating sneaky monkey behavior. That's where you try to offer them their favorite snack/toy to entice them to move and they develop lightening quick reflexes and get the item before you can close the door behind them. Set clear expectations for the primates and try to stick to them. They have to earn the reward by doing the right behavior, not by finding ways to trick the human.

FOOD COMPETITION BETWEEN CAGED MACAQUES

HOW DO YOU AVOID FOOD COMPETITION BETWEEN PAIR-HOUSED MONKEYS?

We haven't had any issue among our cynos with their regular food; paired partners do share pretty well. I'm actually impressed because this was not so with the rhesus I used to work with. I ended up separating most rhesus for feeding once they reached the age of about 6 years.

My experience is the same; paired cynos don't compete over their daily biscuit ration, while paired rhesus very often get into a conflict over access to their food boxes.

In order to avoid food competition I use co-feeding stations and found the technique very effective for rhesus pairs and for cyno pairs.

First, I place two stationary targets at a reasonable distance from each other on the cage front, one for the dominant and a second for the subordinate partner. The two targets remain always at their initial locations.

Once the stations are in place, I work with the dominant animal at his/her targeted station for 2–3 minutes before working with the subordinate animal at his/her target station for about 2–3 minutes. If the dominant partner tries to interfere with my working with the subordinate partner, I'll redirect the dominant animal back to his/her station. After going through this exercise a few times, I will ask the

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dominant animal to stay put at his/her station while I work with the subordinate partner at his/her station. The dominant partner's cooperation always yields a jackpot treat reward.

It doesn't take long for the dominant partner to figure out that the co-feeding station strategy is more lucrative than the policing strategy. The two goals of the training are achieved and reinforced with rewards (1) when the dominant animal allows the subordinate animal to receive food, and (2) the subordinate animal is brave enough to accept and consume food in the presence of the potentially aggressive, dominant partner.

The regular food, for most cyno pairs, does not trigger competition, unless you have an animal who loves the primate biscuits. We had one adult male cyno who loved ALL food! So no matter what it was, he had to be separated from his buddy during feeding time.

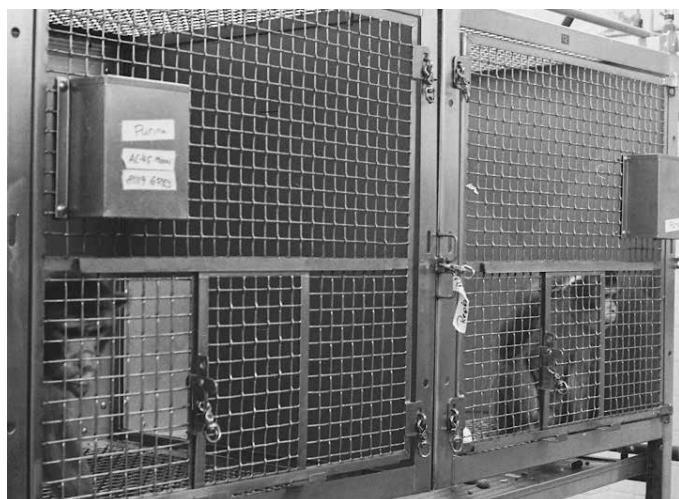
Even in the most bonded pairs, there always seems to be a little competition when it comes to the good stuff like raisins or fruit. In some cyno pairs that don't handle treat feeding well, I have been using the cooperative feeding techniques. This works well, but the training can take a bit of time. When you are in charge of a large number of monkeys, cooperative feeding isn't always as convenient as temporarily separating paired partners so they can enjoy their food enrichment treats in peace.

When working with rhesus monkeys, I saw a lot of food-related aggression. Animal care used to separate pairs for daily biscuit feeding

but noticed in many pairs that the submissive monkey either would not eat at all even when separated or would be attacked after being reintroduced with the cage mate. I then trained these pairs to cooperate during feeding and found this technique to be very effective in eliminating food competition; the dominant partner now allows the subordinate partner to get his or her proper share of biscuits or treats.

I had to deal with about 300 rhesus and 22 stump-tailed pairs. Access to the food boxes at regular feeding times and access to supplemental produce feeding in the afternoon created aggressive food competition and food monopolization issues in approximately 15% of the pairs, both in the rhesus and the stumps.

In order to get the issue of food competition fixed once and for all in every double cage, I had privacy panels installed in all the double cages of pair-housed animals.



NON-HUMAN PRIMATES

The panels are regular cage dividers in which we cut a comfortable passage hole in the back (not in the front!) of the cage; if one half of the double cage is equipped with a squeeze-back system, the dimensions/level of this passage are adjusted accordingly. With the privacy panel in place, the two paired animals can access either one of the two feeders and eat without seeing each other.

Once we got the privacy panels implemented, there was no longer any report of food competition between cage mates. It was a pretty simple and inexpensive refinement for a large macaque colony.

DOUBLE-TIER CAGING OF NON-HUMAN PRIMATES

WORKING WITH MACAQUES ON A REGULAR BASIS, WOULD YOU SAY THAT THE GENERAL BEHAVIOR AND THE REACTION TOWARD ATTENDING PERSONNEL DIFFERS IN TOP-ROW CAGED ANIMALS FROM BOTTOM-ROW CAGED ANIMALS?

I have to say that it really makes a difference. One of my strongest memories is of quarantining a large group of pigtail macaques for a sister institution while they finished construction at their field station. There was a very large male who had for some reason been put in a bottom cage at the wall end of a row—it was dark and cramped near his cage. At feeding time he would always, and I do mean ALWAYS, rush to the front of the cage and knock or try to knock the food scoop out of your hand. When it came time to change out the cage banks, I asked if I could move him to the top and put his unit at the aisle. His attitude completely changed. He'd still posture at people but he no longer lunged and no longer knocked at the food scoop.

It's my experience that macaques who are kept on the bottom tier tend to be more timid, less willing to interact with human handlers. We rarely have our animals only in bottom cages. If they must be housed singly they get the bottom AND top cage.

Back in my import/export days it was noticed that if you put adult male macaques in bottom-row cages on arrival they would often become depressed—poor activity, poor appetite and withdrawn. Move them up top and they would snap right out of it. Height is status.

Some of my monkeys are very aggressive toward the other monkeys and the animal care techs when they live in a top-row cage.

NON-HUMAN PRIMATES

Being in a top position makes them perhaps feel bigger, more dominant, always ready to show off with aggressive displays.

DEALING WITH SUTURE PICKING IN NON-HUMAN PRIMATES

WE HAVE A RHESUS WHO KEEPS REMOVING HER SUTURES FROM SURGERY. WE'VE TRIED ALL KINDS OF ENRICHMENT TO DISTRACT THE ANIMAL BUT HAVE HAD NO SUCCESS. WHAT DO YOU DO TO PREVENT SUTURE PICKING?

What about a piece of thick hemp rope that she could pick at and groom instead? I know some facilities have used this for animals who engage in overgrooming. Maybe it would serve a similar purpose in your case? You could attach it to a clip and hang it on the cage. What type of sutures does she have? We had animals who picked at them as well;

now we always use a buried suture so there isn't anything easily accessible. It helps tremendously.

If you have a suture picker, he or she can be one tough customer, and 9 times out of 10, no amount of enrichment will do the trick. When I had post-op macaques, I learned there were a few ways to take care of this. First, and this is the easiest method: subcutaneous closure. However, some will find the teeny tiny knot buried at the one end and go to town anyway. Second, and this is the solution I always used with the "problem children": Wrap the bloody daylight out of the area if you can (limbs, feet, etc.). Make it with LOTS of layers of gauze, tape, vet wrap, more tape, so they just pick at that and not the sutures. Heavy duty tape takes some doing to come undone, and once they have a piece stuck to their fingers, it's hours of enjoyment. If they get through that in a hurry (and some will) there is one sure-fire way to get them to stop: a simple interrupted closure using a stainless steel suture. It doesn't behave as nicely as other sutures, but I promise they will only pull on it once.

Our vet uses blind sutures followed by Nexaban skin glue to close any surgery site; the monkey can't see any sutures. In addition we always place "decorations" (distractions) away from the surgery site, on the palm of the hands, the forearms, etc. before the patient wakes from surgery. The forearms and palm of the hand seem to be the most successful placement for surgery site distractions.

NON-HUMAN PRIMATES

Distractions we've successfully used are things like random sutures in the palm of the hand and/or forearms, or a small clump of Nexaban skin glue randomly placed that dries before they wake up. They spend hours fussing with it and picking it out of their fur; sometimes we just make a flour/water paste to rub through the fur on their forearms and dry it with a blow drier while they are still sleeping. It dries flaky and they spend a lot of time picking it all out of their fur. Keep those monkeys occupied! :O)

TREATING DEPRESSION IN MACAQUES

WE HAVE A 10-YEAR-OLD MALE CYNDO WHO SPENDS MOST OF THE TIME SITTING ON HIS PERCH (USUALLY IN THE FRONT OF THE CAGE) WITH HIS FEET UP, GRASPING THE FRONT OF THE CAGE AND HIS HEAD DOWN BETWEEN HIS LEGS TOUCHING THE FLOOR OF THE CAGE. HE DOES GET OUT OF THIS POSTURE WHEN FORAGE IS PLACED IN HIS PUZZLE FEEDER ATTACHED TO THE FRONT OF THE CAGE.

I GUESS MY QUESTION TO YOU ALL IS: HAVE ANY OF YOU EVER SEEN THIS OR A SIMILAR BEHAVIOR AND DO YOU THINK THAT THIS MAY BE A DEPRESSED MONKEY OR IS IT POSSIBLE HE JUST LIKES SITTING IN THIS RATHER BIZARRE POSTURE? WOULD IT BE A GOOD IDEA TO PROVIDE THE MALE SPECIAL ENRICHMENT TO BREAK THIS HABIT?

The male had many veterinary exams done, all were consistently within normal limits. We even did a CT [computer tomography] scan of his brain to rule out any pathological process that might cause this strange behavior. He doesn't give the impression of being in pain; when he walks he doesn't favor a limb.

I should perhaps add that he is caged without a social companion because he is assigned to an infectious study that precludes contact with another conspecific.

If he's allowed to have a soft item—such as a piece of fleece or a stuffed animal—try it and see what he does. I've had more than one singly housed monk take to a piece of fleece or a stuffed animal, grooming it and cuddling with it.

I have seen depressed monkeys sit in such a posture for hours on end. They get up and are able to ambulate without any signs of an issue, but only if presented with the motivation to do so, for example to get food or to drink.

NON-HUMAN PRIMATES



I have attached a photo (left photo) of a rhesus macaque who shows the behavior of the male cyno you are describing.

This 33-year-old female had been single caged all her life. The hunched chronic posture was for me a clear sign that the animal was suffering from severe depression. The solution to this miserable situation was simple: I paired her (right animal in the right photo) with another previously single-caged female. Rather than kind of hiding from life, this aged lady embraced life again and eagerly interacted (mutual grooming) with her companion, and once and for all stopped taking the now-forgotten weird hunched posture.

This photos breaks my heart, and I wish we would be able to pair-house him.

Since he cannot have a social companion for research-related reasons, you could substitute for such a companion, at least temporarily, by visiting him often, talking to him, giving him treats and perhaps even grooming him through the bars of the cage. It has been my experience that single-housed macaques who have learned that they can trust me enjoy it when I groom them. They will actually press their chest, a shoulder or a thigh against the bars of the cage, inviting me to stroke and scratch them.

I have several years of experience working with mature cyno males. One in particular reminds me of your exact case. Herbie was a 7-year-old male who was single-housed due to incompatibility issues with his previous cage mate. He would come to the front of the cage and sit with his legs and feet up, resting his

NON-HUMAN PRIMATES

head on his legs. He looked sad, best way to describe it. The second I would approach him, however, he would stop and pay attention to me. He was very treat motivated so I started working with him on a daily basis, giving him a job to do. I started doing PRT with him, initially just cooperative feeding to gain his trust, and went into clicker training/target training and eventually introduced a laser pointer. He enjoyed doing this and would get excited every time I entered the room; his sadness was gone, at least for now. In conjunction with his PRT I started also adding new forms of enrichment in his Euro cage. I made swings for him, gave him a pool and other manipulanda. I tried giving him a stuffed animal, slowly introducing it by leaving it outside his cage first; he was scared of it and once in his cage he would just destroy it immediately. He was definitely more interested in my company than any of my inanimate enrichment attempts.

Finally, I decided to attempt pairing Herbie because it was obvious that his depressed behavior started soon after he became single-housed. I slowly introduced him to Budgie, a juvenile male cyno. Within a week the two were paired and he no longer showed signs of being depressed. They were best friends right from the beginning; he would even carry Budgie around. I, of course, wound up falling in love with them and eventually raised funds and retired them to a sanctuary where they still are today. Herbie is the alpha male of a group of five but still has his best buddy by his side at all times.

What a story! Thanks for sharing.

DOLLS FOR SINGLE- CAGED MACAQUES

I HAVE A FEW RHESUS MACAQUES WHO ARE KEPT IN SINGLE CAGES FOR RESEARCH-RELATED REASONS AND WONDER: WOULD THEY ACCEPT A STUFFED MONKEY DOLL AS A SUBSTITUTE FOR A REAL SOCIAL COMPANION?

With our single-housed macaques, we attempt to give them a stuffed monkey doll. It's about 50/50 whether they destroy the doll or make it their "lovey" and carry it around and groom it. Watching a monkey cuddle with a doll is ADORABLE.

We had one girl named Buttercup who would set the doll upright next to her on the perch. She would also put the doll inside the Prima-Hedron and spin it; like a mom pushing her kid on a swing, LOL!

NON-HUMAN PRIMATES



We have a really aggressive single-housed male named Hodor. I would have bet a million dollars that he would attack the doll on sight and therefore didn't try it for a while, until I started noticing how much his demeanor changed when baby macaques were on the TV. He didn't take his eyes off the screen and would occasionally lip-smack; so I did the usual acclimation process with the doll in the room for a week, carrying it around myself and grooming it, before finally holding it up to Hodor's food hopper opening. He lip-smacked like crazy and gently petted and groomed the doll, so I gave it to him. He's had it for a month now, and God HELP anyone who goes near it.

He "cleans" it regularly and carries it around. It's so cute to see such a large intimidating male be so gentle and sweet.

That is an amazing story!

How are you sanitizing a monkey's doll? Also, do you have issues with the animals ingesting parts of the plush?

We don't sanitize the doll. It stays in the cage together with the monkey until it is deemed gross—which takes months because it is getting groomed/cleaned very often—and then it is replaced with a clean one.

We have used stuffed animals with macaques, pigs and cats. These toys were always kept intact and there were never issues with ingestion of the stuffing causing troubles. We re-used the toys by either washing them in a washer—with towels and drapes—or by hosing them and then running them through the rack-wash cycle. As long as they are kept flat while washing in the rack washer and then dried either flat or in a dryer, they hold up remarkably well.

We did always remove any eyes or other decorative additions from the toys since those could be easily removed by an animal and then inadvertently (or purposefully) ingested.

When we first tried the dolls, we removed the stuffing because of ingestion concerns. Then we had a more adventurous vet who was willing to try them stuffed. It worked out

NON-HUMAN PRIMATES

just fine. In many cases monkeys remove the stuffing. I've seen them chew it for a while and spit it out eventually.

I used to give my single-housed guys stuffed “friends” all the time. Some would tear them up; but others would carry them about their cages, cuddle with them and keenly groom them. I had one monk who would take his little friend along to the testing booth. If he forgot to bring it along, he wouldn't do the test! I would have to go back and fetch the friend for him. After a few times I learned to just make sure we had the friend before leaving the main room; it was easier that way. :)

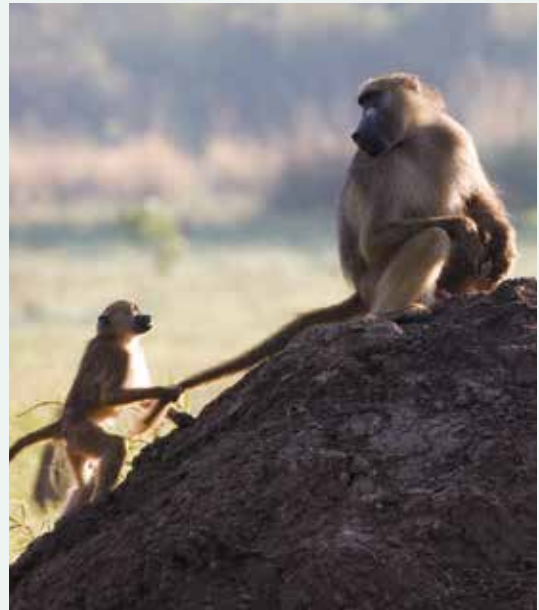
TEASING AMONG MACAQUES

THOSE OF YOU WORKING WITH/FOR MONKEYS WILL AGREE THAT JUVENILES CAN BE MISCHIEVOUS AT TIMES. WHEN SUCH A LITTLE CRITTER HAS DONE SOMETHING AGAINST SOCIAL ETIQUETTE, SUCH AS PULLING THE TAIL OF AN ADULT GROUP MEMBER, DO YOU

THINK THAT THE KID KNOWS THAT HE/SHE HAS DONE SOMETHING THAT IS NOT RIGHT AND CAN HAVE ADVERSE CONSEQUENCES?

I think it's usually an “Oh, whoops!” situation when the adult animal turns around and chastises the little one—never seriously.

Kids who tease adults definitely know they are taking a risk; before pulling a tail of an adult, they nervously scan the group to check if anyone watches them and possibly disapproves of their intention. If they take the risk and do get a little slap, they scream and run like hell



NON-HUMAN PRIMATES

from the scene of the crime. I think many times they are reactive and aren't thinking of the future consequences, but there are other times when they are purposely breaching etiquette in a sneaky manner. They probably just want to see if they can get away with disrespectful behavior toward a dominant group member; it's a way of testing their social status.

I wanted to share the absolute funniest thing I have ever seen! I wish I had been recording this event between two of our primates, because I know I can't even come close to describing adequately what I saw!

I provided fresh mango with the monkeys' breakfast as that is one of their most cherished foods. With Holly being paired with little Louise, I wanted to make certain there was plenty for both. Louise hasn't been here very long and only had mango once before, and that was before she was paired with Holly. She was beyond crazy about it! I cut the mango into smaller pieces and put several pieces in each food bowl. But as soon as I put their food bowls in front of their enclosure, little Louise ran down and quickly like a thief in the night grabbed every single piece of mango from both bowls, shoving them into her mouth with lightning speed! Holly, still on the ledge above, made a quick and single leap to the ground, landing almost on top of Louise. With a profoundly annoyed look on her face like none I have ever seen, she reached out and grabbed Louise by her ear, giving her a quick pinch and a little assertive jerk to the ear. She was angry and looked at the little mango hog with piercing

eyes while keeping hold of her ear; Louise, looking back at Holly with the most pathetic innocence, slowly opened her mouth and let several of the mango pieces fall to the ground, while maintaining eye contact with Holly.

The funniest part of this whole thing was the look on Louise's face that I just can't describe well enough! When she opened her mouth to spit out the mango, her tongue was sticking out of her mouth and the mango pieces just sort of rolled off her tongue onto the floor. She knew exactly why she was getting her ear pulled! It was one of those special moments that I will always cherish! I waited until I went outside and then laughed myself silly.

LOSING A FRIEND

DO ANY OF YOUR FACILITIES ARRANGE SOMETHING SPECIAL FOR YOUR MACAQUES WHO ARE APPROACHING THEIR ENDPOINTS? WE CURRENTLY HANG CAGE TAGS ABOUT ONE MONTH BEFORE THEIR DEATH, JUST TO LET EVERYONE KNOW THEIR END POINT IS APPROACHING. WE ALSO SPOIL

NON-HUMAN PRIMATES

THEM WITH FOOD GOODIES THE NIGHT BEFORE.

WE HAVE HAD SOME LONG-TERM ANIMALS RECENTLY REACH THEIR END AND IT HAS BEEN QUITE EMOTIONAL, ESPECIALLY FOR OUR HUSBANDRY STAFF. I WOULD LOVE TO HEAR IDEAS ON HOW YOU GUYS MANAGE THIS!

Whenever a monkey is at the end of a study, we tell the husbandry techs the date of the perfusion. The enrichment team then asks if anyone would like to do something special for that monkey. They ALWAYS say they do. For the week of the perfusion, we select days to give the animal special treats and enrichment. We make sure the husbandry staff and the veterinary technician staff are involved as well. We buy the monkey sweet food, or make a present and wrap it up in gift paper.

We typically do the same as well and will spoil endpoint monkeys with food treats. Especially if they're some of our long-term friends, we will bend the rules and bring in goodies from home such as cake and ice cream. We'll also make sure they get lots of extra time playing cognitive puzzles or using the iPad. Sadly, I always know all the end dates in order to make sure animals don't end up alone for too long. Only about half of our staff likes to know when the end dates for their animals are approaching. The others know they're on terminal studies but find it too difficult to

know the exact date ahead of time. I notify the staff that like to know in advance, and for those that don't want to know I just take extra special care of those animals myself!

The first time I ever worked with endpoint macaques, the lead caretaker always brought in ice cream for the animals who were "leaving," so he could say goodbye and watch them have fun. After that, I always made certain to let folks into the loop when any of my animals came to their end. We would always get something very special specifically for each monk—something we all knew the individual animal enjoyed more than anything.



PIGS

PIG HOUSING

WE ARE LOOKING INTO OPTIONS TO POSSIBLY FARM-STYLE HOUSE OUR PIGS. RIGHT NOW WE HAVE THEM IN ELEVATED PENS. DOES ANYONE ELSE FARM-STYLE HOUSE PIGS? WE FARM-STYLE HOUSE OUR SHEEP, WITH SHAVINGS ON THE FLOOR, AND THE STAFF LOVE IT, BECAUSE IT'S NOT AS MUCH HEAVY-DUTY CLEANING. WE HAVE 10-30 PIGS AT A TIME AT OUR INSTITUTION.

IF YOU DO FARM-STYLE HOUSING FOR YOUR PIGS

- **HOW DO YOU GROUP-HOUSE THEM? LARGER PIGS IN ONE ROOM, SMALLER PIGS IN ANOTHER ROOM?**
- **HOW OFTEN DO YOU CLEAN THE ROOM AND HOW OFTEN DO YOU REPLACE THE SHAVINGS?**
- **DOES THE FARM-STYLE HOUSING AFFECT THE ENRICHMENT YOU CAN GIVE THE PIGS IN A POSITIVE OR NEGATIVE WAY?**
- **TAKING PIGS OUT FOR SURGERIES: HOW DO YOU SINGLE THEM OUT?**

I used to work at an institution where we had our large female farm pigs free range in an open room. It was AWESOME! We grouped the pigs as long as possible; some lasted in compatible groups for the duration of their stay with us, others began fighting and tearing each other's backs/ears up so we kept them in the same large room but put in a stainless steel divider so they could still have nose-to-nose contact. Our model shop fashioned the divider for us; it was secured to the wall and could be easily removed for cleaning or re-grouping. All pigs were housed on the open floor in this way, with deep aspen shavings and long-stranded paper for nesting—which they LOVED. We spot cleaned the room daily and did a full removal of bedding and sanitized every two weeks—more often if there were several pigs in a room. The room stayed surprisingly clean, as the pigs chose one general area to eliminate in.

The enrichment benefit was wonderful.

The pigs ran around and played in the shavings—without ingesting them. We would put forage/rooting materials and foodstuff in the shavings and it would keep them busy for quite a while. Most importantly, the open-room housing helped the animals trust us and bond with us much quicker; positive human interaction was a huge part of the program. I also clicker trained them to sit—which did not take longer than a few sessions—when we opened the room door, as once they started getting really big and would excitedly greet us, it got a little dangerous walking into the room and being bombarded by several 200+ lb pigs.

PIGS

One thing I would recommend: If your pigs are large, I would put thick stall mats under the floor shavings; it helps them avoid slipping—once they get so big it's hard for them to get back up.

We have an SAPO4 [Specified Animal Pathogens Order] high containment facility and undertake a range of infectious disease studies (e.g., African swine fever, swine flu, Porcine Reproductive and Respiratory Syndrome) using pigs.

We house pigs in pairs or groups in rooms with solid floors and bedding boxes filled with straw. They're provided with a range of enrichment items (fruit, vegetables, toys, etc.), which are frequently rotated. The rooms are cleaned every day.

When we had pigs many moons ago, we kept them in separate groups. They came from local farms; if four arrived in a group together and we had a place big enough for them, they stayed together under the condition that they were the same size and same sex. Our pens were separated by chain link, so different groups could socialize with one another. If individual pigs were removed for research from different groups, the remaining members of these groups could usually be combined with no issue.

That is my experience as well. We keep pigs (around 250 lbs) on solid floor with lots of shavings, scattered treats and cardboard to shred. New pigs are first familiarized with each other in a protected contact housing arrangement, then released for socialization,



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and when they have no overt aggression issues are housed together as pairs or groups.

We let the pigs out in the hallway to exercise; they love meeting staff walking through the hallways!

That's a great idea!

That is WONDERFUL you let them walk the hallways! It's something I always wanted to do but our facility simply doesn't allow for it.

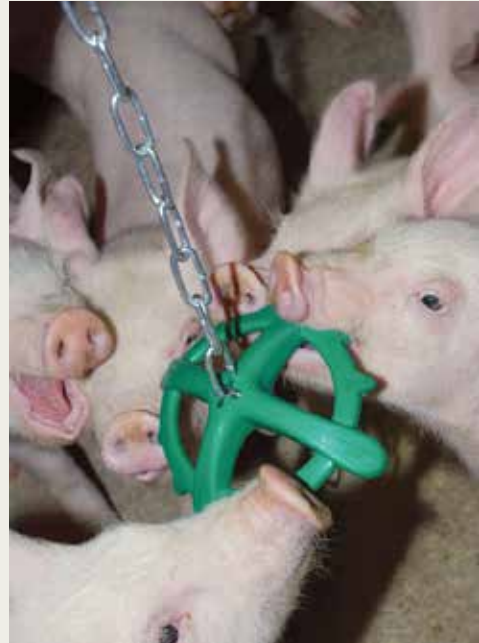
ENRICHMENT FOR PIGS

HOW DO YOU ENTERTAIN PIGS?

Our animals like Porkyplay toys and scratching boards.

I will give a hardy YES to Porkyplay toys; pigs love them! Also, any large ball with a rattle inside typically is an instant hit. Pigs go crazy for a suspended chain that is embedded in frozen fruit cocktail.

Ours too love Porkyplay toys!



Our pigs got Buster Food Cubes (designed as toys for dogs), which dispensed treats when moved around. Because they were not round it was a bit more difficult to move them around and get treats, but pigs are persistent when there is food involved, LOL. Ours were entertained for hours with these toys. They also enjoyed playing with rope toys that were long enough to play tug of war with another pig or—and that was even more fun—with a human playmate. You might think these rope toys are hard to clean: You just throw them in the washer and then autoclave them; no big deal! Small bowling balls are great! Pigs like rooting them around. You can make them particularly attractive by smearing peanut butter on them.

PIGS

I used to make rooting troughs with big rubber feed dishes. I would place small metal bowls in them upside down with treats under them. Our feeders were pretty deep and I could fit about five bowls in each. The pigs would get very excited and root all the bowls over to get the treats; it was real fun to watch them! We also used disposable cardboard boxes filled with shredded paper or hay and added mini marshmallows. I can tell you, nothing makes a pig happier!

Pigs enjoy the company of humans; to be scratched by a person or playfully interact with a person is perhaps the most favored environmental enrichment for a pig.

We exercise our pigs in the corridors; they love chasing bits of kibble rolled down the hall. Anything that can hang as rattles provides great entertainment for pigs. Scattering food into the bedding also creates lots of fun.

We freeze Jolly Balls into the food bowl with water mixed with apple juice or herbal teas. The pigs will then tug, root or do whatever it takes to get the ball out of the bowl and then drag or push it around.

If there are a few enrichment gadgets, there is no real reason for aggressive disputes, maybe a little snout shoving but it doesn't go any further than that. If a group of pigs is provided with only one new enrichment item, chances are that a dominant pig would guard it in the beginning.

Our group-housed pigs always had access to several identical toys and a few different toys. I observed the animals quite often and never noticed any aggression over the toys. Occasionally one tried or succeeded in taking a toy away from another pig, but this never involved any overt aggression, perhaps some snout shoving but I would not consider that to be aggression.



PAIRING UNFAMILIAR FEMALE DOMESTIC PIGS

WHAT'S THE SAFEST WAY OF PAIRING NEW-ARRIVAL FEMALE PIGS FROM DIFFERENT LITTERS?

We housed new pigs in such a way that they could see, smell and touch each other. I would know they were ready to be tried together in the same pen when they were lying beside each other even though there was chain-link fencing between them. When they were put together they had access to a few feeding and watering places; this made it harder for one pig to hog those spots.

Yes, keep them side by side so they're able to see, smell and touch snouts. Straight pen bars also do the trick. They'll figure it out and start sleeping up against the bars when they're ready to be full buddies. Just make sure to give them space and their own

bowls, as well as things to play with, once they're together.

We follow the same protocol. New pigs first get access to one another through roll bar fence panels before we try introductions. It is important to first let them establish a social relationship with each other; this may take some time but it is necessary to let them figure out who is alpha and who is beta before they are introduced in the same pen as a new pair. The success rate using this method is pretty high but not absolute; I witnessed rare instances where potential partners simply are not amenable to pairing.

Our new pigs are transported all together in a truck, so we have no idea which pigs are littermates. The vendor has worked with us to mark the pigs that come from the same pens, and that is very helpful. We basically just put the animals together as pairs upon arrival in quarantine. Our technicians find that the main factor for compatibility is to pair pigs of similar size. It's common that they will scuffle for dominance but we let them work it out. Occasionally two pigs engage in prolonged fighting; when this happens, they are separated to avoid serious injuries and tested with other partners for compatibility. Most of our pigs are domestics, and we have very good success with getting them together without overt aggression and keeping them together as compatible pairs. The situation with Yucatans is very different; they have a strong sense for being dominant, so they are

PIGS

unwilling to tolerate the presence of another conspecific; aggressive interactions are almost inevitable. Most of the Yucatan pigs we get end up being singly housed.

GIVING BITTER MEDICATION TO PIGS

I'M HELPING OUT WITH A PROJECT THAT REQUIRES GIVING 30 MG/KG CYCLOSPORINE ORALLY TO GROWING PIGS. THE LAB HAS TRIED MIXING THE DRUG WITH ALL SORTS OF FOODS WITH NO RELIABLE SUCCESS. THE PIGS WERE INTRODUCED TO VARIOUS TREATS, WHICH THEY ALL ACCEPTED DURING THEIR ACCLIMATION, BUT ONCE WE STARTED TO MIX IN THE CYCLOSPORINE, THEY LOST INTEREST. IN ADDITION, NOW THAT THE PIGS ARE LARGER, THE DOSE VOLUME IS ABOUT 15 ML, WHICH IS TOO LARGE TO FEASIBLY MIX INTO A MEATBALL-TYPE TREAT.

ONE THING WE HAVEN'T TRIED YET IS TO TRAIN THEM TO TAKE LIQUID MEDICATION VOLUNTARILY FROM A

SYRINGE. I'M THINKING OF GETTING THEM HOOKED ON SOMETHING STRONG LIKE LEMONADE, WHICH MIGHT BE BETTER AT COVERING THE FLAVOR. APPARENTLY CYCLOSPORINE DOESN'T TASTE ALL THAT BAD AT FIRST, BUT THE AFTERTASTE SEEMS TO BE AWFUL.

DOES ANYONE HAVE ANY IDEAS OR MAGICAL SOLUTIONS? I'M ALL EARS.

I have gotten marmosets to reliably take bitter-tasting doses from a syringe once a week for up to four weeks. We mixed the drug with 10% Splenda solution, maple syrup or raspberry syrup and changed the flavor mask with each treatment. Marmosets love sweet things!

Years ago I had to give crushed pills to pigs daily. I mixed the powder with Karo syrup and they consumed it readily. I suspect that many animals are sensitive to bitter tastes and are going to avoid them. You don't indicate what you've tried but it definitely has to be sweet enough to hide the bitter. For other animals, I've had success with flavored Kool-Aid packets to hide bitter tastes. Some people have used mini marshmallows for procedure training, so marshmallow fluff could perhaps work for your project. You'll need to ensure the drug is completely mixed so that there are no bitter edges.

Have had good luck with getting pigs hooked on Karo syrup and then adding the meds.

PIGS

Our pigs have to ingest about 12 tablets twice daily. In the beginning they took the pills mixed with something sweet without much ado, but quickly got smart to our shenanigans. We did outsmart them all by making use of numerous different sweet goodies to which we first had acclimated each one of them. The tablets are then crushed and mixed with a different flavor mask for each treatment. Our pigs cooperate with this scheme very well; they seem to really enjoy yogurt (Stonyfield Banilla, Vanilla), grape jelly, vanilla pudding, Nutri-Grain bars, Fig Newtons and canned dog food. Some also like molasses, applesauce, apple juice and Boost Plus (chocolate, strawberry and vanilla).

We also tried a lot of different flavors to make the pigs swallow a bitter substance, and our best result was with biological tomato juice.



TRAINING PIGS TO COOPERATE DURING PROCEDURES

WE ARE LOOKING INTO TRAINING OUR YORKSHIRE PIGS TO VOLUNTARILY COME TO A PERSON FOR A BREATHING TREATMENT (BREATHING MASK) INSTEAD OF SEDATING THEM EACH TIME WE NEED TO GIVE THEM MORE OXYGEN. HAS ANYONE SUCCESSFULLY DONE THIS?

Yes, I have. Pigs are easy to train for a food reward. I have used a trail of whipped cream to teach them to walk to the OR and get a mask put on.

Do not rush. Keep it positive; give the pig a treat before and after the procedure. Eventually fade the first treat but never forget to give a second treat as a positive reinforcing reward.

PIGS

Pigs also really enjoy Fig Newtons, Nutri-Grain bars, dog food and marshmallows. There are so many treats you could use!

Yorkies are very food motivated and follow pretty much any treat that is moving away from them, i.e., in the direction of the treatment area. Play to their sweet tooth and you're golden. If they're reluctant to accept the mask, you can take an empty one gallon container and cut out the bottom to use it as a mask. It's wider than a standard mask, and the pigs are less wary of putting their snout in it.

WORKING WITH JACKETED PIGS

**HAS ANYONE SOCIALLY HOUSED
JACKETED PIGS? THERE IS AN
INVESTIGATOR WHO WILL BE
JACKETING HIS PIGS WITH EXTERNAL
DEFIBRILLATORS ATTACHED.**

Sadly, no; we've tried without success. The pigs root and chew at the jackets and end up tearing into them and/or causing damage to the equipment. We've tried to keep them in adjacent pens for tactile contact, but the same thing happened (we have wide bars between the pens). I hope others have not had the same experience, but I fear it's a universal attribute of piggies; they love rooting anything that's not too heavy for them to move around.

I've had the same experience when our pigs were jacketed. This was just overnight for a catheter extension into their port, so they would be ready for a PK study the next day (when they would be kept separate).

We just recently had eight jacketed pigs; we had to keep them all single-housed due to the pulling/biting of each other's jackets. The bars of their pens were close enough to allow snout-to-snout contact only, but some did manage to pull at each other's jackets. Not wanting to frustrate them too much, we offered them supervised open-floor play with each other a few times a week so they would be able to satisfy their social needs at least occasionally. During these social outings, we'd scatter treats such as forage pellets and cereal all around the floor and hide bits of food in hard-to-reach places in order to distract the animals from snuffling around at the jackets. The pigs were so intent on finding the food that they forgot all about the jackets. I even had two pigs work together to flip over an upside-down kiddie pool to get at the treats underneath.

PIGS



We made an attempt at supervised time, but all of our animals are way too curious about the jackets and equipment—lots of pockets with interesting good stuff inside! Nothing is quite like seeing a \$5,000 piece of equipment turn into a piece of enrichment; yikes! So instead, we allow one pig out at a time to roam the floor, and if she so desires, make visits with the other pigs. The front doors of the pens have the same wide bars as the sides, so they are able to have some snout-to-snout contact if they choose. Once they're used to the system, they're very cooperative, and some become quite excited during play time. It's always a delight to watch them trot toward their favorite friend, wagging their tail while happily oinking down the run.

YOUR MOST SUCCESSFUL ENRICHMENT IDEA

I'VE SEEN SOME WONDERFULLY INVENTIVE ENRICHMENT IDEAS ON THE LISTSERV OVER THE YEARS (FERRET BOWLING!) AND AM INTERESTED IN HEARING ABOUT WHAT YOU WOULD CONSIDER TO BE YOUR MOST SUCCESSFUL ENRICHMENT IDEA. HAVE YOU HAD A TROUBLING CASE WHERE YOU HAD TO WORK WITH A PARTICULAR ANIMAL OR SPECIES? HAVE YOU WORKED AT A FACILITY THAT DIDN'T REALLY HAVE A ROBUST ENRICHMENT PROGRAM THAT YOU WERE ABLE TO PROD INTO ACTION?

When I was working as a care tech, I was assigned to five rabbit-housing rooms and the rabbits had no enrichment—other than the timothy hay they were given a couple of times a week. As a result, we had some pretty aggressive rabbits (lots of stomping and rushing). I asked if I could use my own money

to try to find something they'd play with and was given the go ahead to purchase canning jar lids. They were a huge hit! If you picked one up and dropped it in a cage, pretty soon the whole room would be a cacophony of tinkling jar lids. By the end of my rotation, most of the aggressive behavior in the rabbits had disappeared, except for one who would get aggressive if you tried to take his jar lid.

It took another decade to really push the idea of more enrichment for all of our species, but the success of the jar lids was definitely a point I could use to prove that it made a difference. Now, when you walk into our rabbit rooms you'll see a variety of toys in all of the cages, plus a playpen. The rabbits even recognize the papaya tablet container and will all perk up if you pick up the container.

Thinking back over the past 15 years, I would have to say that introducing more destructibles (sheet and shredded paper, banana leaves, muscadine vines, edible herbs and flowers) is something I have considered one of my most successful enrichment ideas. Monkeys love dynamic environmental enrichment!

I would have to say introducing iPad play for my rhesus and cynos is the most successful of my enrichment ideas.

I second the iPad idea! It was a huge success introducing iPads to our rhesus macaques.

We just added TVs to all our primate rooms and have rotating DVD collections, so each

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month the primates [non-human and human primates!] get a different batch to watch. Not only do the animals seem to enjoy watching movies, but the research staff also get really excited when the movies get rotated. And when staff enjoy something, they are more likely to use it for the animals! It has been a win-win across the board.

Putting the enrichment into the hands of our researchers has been an excellent idea we've implemented at our facility. Instead of vivarium staff offering special enrichment (fresh browse, destructibles, Jello and pinecones), I prepare the enrichment for all the primates and deliver it to the monkey rooms for the research staff to hand out. Even the labs who weren't interested at first now offer suggestions for what we could offer next. It makes my heart happy to see them buy into the whole enrichment business.

I love that you've put the enrichment into the hands of the research staff. What a great way to get them more involved!

It was a rather shocking experience when I saw the animal quarters of my new work place for the first time. More than 700 rhesus macaques were housed in barren cages, alone without another companion. Each of these monkeys was in desperate need of at least one social partner to live with and interact with.

Upfront, it became my priority to address the social needs of these animals. Textbooks, scientific articles and primatologists warned me that macaques have to be housed in

individual cages because they don't get along with each other when placed together in the same cage. When checking the literature, I couldn't find any data in support of such recommendations and statements, but I soon found out that individual caging was the standard housing arrangement for macaques in other primate research facilities as well.

I was lucky because the director of the primate center was open-minded and gave me the green light to challenge the traditional belief that social caging of macaques is not a realistic option in research labs because the animals are too aggressive. Applying basic ethological principles, I developed and tested a simple pair formation protocol for previously single-caged adult female macaques in 1987. The results demonstrated that little risk is involved when individually caged females are carefully socialized with each other and then housed together in a double cage.



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These preliminary findings with females were so encouraging that I used the same protocol with adult males who had the reputation of being particularly vicious and, therefore, unsuited to be pair-housed.

I was relieved when the first pair, 12-year-old Moon and 11-year-old Peter, got through the pair formation procedure without any overt aggression; I have attached a photo of the two. As it turned out with numerous subsequent pairs, male rhesus macaques are not less suitable to be transferred from single-housing to permanent pair-housing than females.

As a result of these pilot studies, pair-housing was tacitly accepted and in one case

explicitly promoted by the primate center's research staff. When I left the center in 1994, 92% (668/728) of the rhesus macaque colony lived in compatible pairs, each pair in a double cage equipped with a privacy panel, two high perches and two gnawing sticks.

Yes, I would say that introducing pair-housing of macaques in research labs was my most successful enrichment idea ... not only for the animals but also for the scientific research methodology applied to these social animals.

Thanks for sharing a perfect example of how times (and conditions) have significantly improved.

IMPLEMENTING A NEW COMMERCIAL ENRICHMENT ITEM

**WHEN YOU INTEND TO IMPLEMENT
A COMMERCIAL ENVIRONMENTAL
ENRICHMENT ITEM, WHAT ARE YOUR
EXPECTATIONS? DO YOU FIRST CHECK
FOR YOURSELF IF THE ITEM PROMOTES**

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THE EXPRESSION OF SPECIES-TYPICAL BEHAVIORS BEYOND ITS NOVELTY EFFECT OR DO YOU SIMPLY TRUST THAT IT WILL MEET YOUR EXPECTATIONS?

We almost always ask for one or several sample items. We need to be certain not only that it is going to meet the enrichment need of the animals, but also that it can withstand the washing process. Will it go through our automated system without falling through the disposal grate so that it can be retrieved? Does it have small grooves or crevices that will be difficult to clean? How many times can it be autoclaved before it starts to show signs of stress?

After we have observed that the animals use it appropriately, we have to ensure it doesn't create a nightmare for our cleaning or care staff.

I can't think of any item that we just took at face value, not because we were concerned the animals wouldn't use it, but because that piece of enrichment is going to become part of our entire process so we need to be certain we can truly incorporate it.

At our facility there generally is a meeting with animal care, sometimes research staff as well, to discuss the pros/cons of the enrichment item. When there is consensus that the new enrichment item is likely to be attractive for the animals and promote species-typical behaviors, is reasonably durable, and is easy

to clean, we will get one sample and test it with a select population and see how the animals react to it. If the test sample meets all our expectations, we will implement the new enrichment object as part of our environmental enrichment program.

We just implemented a process to get items approved. Whoever wants to propose a new enrichment item must submit a request form to the enrichment committee. The form asks for a description of the item, what species it's for, what behavioral effect is expected, ease of cleaning/setting up, potential risks, and cost. The proposed new enrichment item is then presented to the committee; if the committee approves the item, approval will also have to be obtained from the AV and the PI. After that the proposed enrichment will be thoroughly tested with animals and the findings subsequently evaluated at the next quarterly committee meeting. If the enrichment item meets the committee's final approval, it will be added to the enrichment master list.

Every new enrichment item I've introduced at my facility required my testing it in a pilot study with a few animals and summarizing my findings in a written report along with a written proposal for the suggested enrichment's implementation. If approved by the director, I had to write an SOP and/or guideline for the new enrichment item's use.

NECESSITY VERSUS ENRICHMENT

GOING THROUGH COMMENTS POSTED ON LAREF FOR THE PREPARATION OF THIS LAREF VOLUME, IT REPEATEDLY SURPRISES ME WHEN NESTING MATERIAL FOR MICE IS CATEGORIZED AS ENVIRONMENTAL ENRICHMENT. THIS IS NOT HELPFUL WHEN WE TRY TO IMPLEMENT TRUE ENVIRONMENTAL ENRICHMENT, E.G., WOODEN STICKS/ BLOCKS FOR GNAWING OR ANOTHER COMPATIBLE MOUSE. FOR A MOUSE, NESTING MATERIAL IS A NECESSITY RATHER THAN A LUXURY/ENRICHMENT.

I think of it more as a jacket in a chilly environment.

A mouse cage without a nest is not complete; nesting material needs to be categorized as a basic component of any mouse cage. A barren mouse cage is, in my opinion, not acceptable, for both ethical and scientific reasons.



It is so true. Nesting material for mice should be standard; it is not an enrichment.

I was talking to someone just the other day about this. Maybe our terminology of the word “enrichment” is out of date. It suggests we’re doing something more or positive when what we’re really doing is providing a necessary resource for the animal. I am concerned that this gives us a false sense of security that we have truly enriched the environment.

I wonder if some of that is just historical labeling and doesn’t represent the true state of thinking? Sort of like how many of us still call copy machines Xerox or facial tissues Kleenex? It definitely dates us and perhaps we should work harder at adjusting our terminology to match the reality.

In our program we still have the tendency to call nesting material/huts enrichment even though it is required and any project that

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would want to exclude those materials has to include specific justification in the protocol.

I think your logic regarding Kleenex is spot on. We now talk about nesting material as environmental enrichment even though it is largely considered standard everywhere. Most facilities require scientific justifications when an investigator wishes not to provide nesting material to the mice in his/her research project.

Such facilities will probably not consider and require any other enrichment beyond nesting material, and investigators who do provide nesting material will be free not to give his/her mice gnawing sticks, sunflower seeds or running wheels in addition, because environmental enrichment is already in place.

Thanks for posting your comment on nesting material. I am so used to calling nesting material environmental enrichment since for so many years working in research, we never routinely provided this at all! Now facilities do provide some type of nesting material to mice and it has enriched their cage environment. The *Guide* refers to nesting material as “environmental enrichment” for mice.

I agree, nesting material should be standard, as it is a necessity for these nest-building rodents. Perhaps [and hopefully] with the changing of times and more attention being given to research animals’ needs, nesting material will become a mandatory necessity, and only other items such as chew sticks will be considered optional enrichment.

Please don’t mind if I extend our present discussion to include an issue that pertains to non-human primates.

The 1991 Animal Welfare Standards Final Rule (*Federal Register* 56(32): 6426-6505) lists the “social needs” of primates as part of a mandatory “environment enhancement plan” but correctly make it clear that “provisions to address the social needs” are not merely a generous enrichment: “The environment enhancement plan **MUST** [emphasis added] include specific provisions to address the social needs of nonhuman primates” (page 6499). I like this wording because you cannot easily wiggle out, keeping primates socially deprived in single cages.

The problem, for me, comes when the standards give examples of environmental enrichment and include perches in this list (page 6500). All non-human primates commonly found in research facilities are biologically programmed to spend much/most of the day up in the arboreal dimension of their environment and pretty much all night up on high branches, cliffs or other high structures in relative safety away from ground predators. Access to the arboreal dimension does not “enrich” their home environment; it is a basic welfare and safety necessity for primates not only in the wild but also when they are kept in cages.

I feel that every monkey cage should be furnished with a high [not just a few inches!] perch or platform to address this biologically inherent need to retreat to a safe

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place. Therefore, the provision of a perch for monkeys should not be categorized as enrichment, similar to nesting material for mice. A perch should be a basic item of furniture in every enclosure in which a monkey is kept. A barren cage does not provide species-appropriate housing for a non-human primate. It is my hope that in the course of time, an elevated resting surface will become mandatory furniture for the standard non-human primate cage, as it is already mandatory for the standard cat enclosure; why only cats?



DEALING WITH WOODEN ENRICHMENT OBJECTS

WHEN YOU GIVE YOUR ANIMALS WOODEN ENRICHMENT OBJECTS, HOW DO YOU CLEAN AND WHEN DO YOU DISCARD THEM?

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Our rats destroy aspen blocks within two weeks. Some rats really enjoy chewing, and their aspen blocks turn into little balls within three days. We discard the blocks after several days when they have become too small for proper chewing, or no later than after two weeks.

We have an SOP that states, “discard/replace if significantly soiled or if remains of wood block are smaller than sufficient to last until next cage change.”

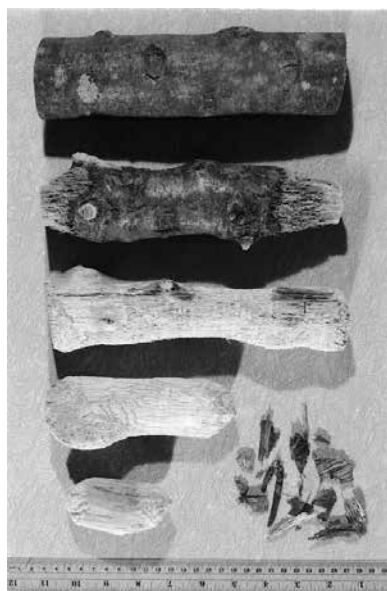
We use hardwood blocks for our rats and guinea pigs and yes, we save and autoclave them. We let them air dry before storing to make sure there are no mold issues.

We use these gnawing blocks for our rats and mice. Some strains use several blocks per week per cage. The blocks simply vanish and no shredded leftover material needs to be discarded.

Our macaques get manzanita sticks; these rarely need to be tossed because they are very hard and are used by the animals not so much for gnawing but for playing and carrying around. We clean the manzanita sticks in a cage washer.

When we gave dry red oak branches for perching and dry red oak branch segments for gnawing to our macaques, we hosed and sanitized them together with the cage. The branches typically lasted a few months before we discarded and replaced them. The

branch segments were mainly used as gnawing objects, but the animals also played with them. There was one stump-tailed macaque who used her gnawing stick also as a chin rest.



We tossed the branch segments and replaced them after one to three months when the

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animals had worn them down so much that they were almost small enough to pass through the mesh floor of the cages. The shredded flakes were so small that even large quantities passed through the sewer drains without causing clogging problems.

We also use wood blocks and manzanita branches for our monkeys and we reuse and cage wash them.

SOCIAL STRESS BUFFER

IT HAS BEEN DEMONSTRATED IN SEVERAL SPECIES THAT THE PRESENCE OF A COMPATIBLE COMPANION CAN BUFFER STRESS. DO YOU MAKE USE OF THIS EFFECT WHEN AN ANIMAL IS EXPOSED TO A POTENTIALLY DISTRESSING SITUATION?

When I worked with group-housed pigs many years ago and had to inject one particular animal, I would always perform the procedure

in the group so that the pig who needs to be injected doesn't get stressed but can remain calm in her familiar home environment, with all the other group members providing psychological support during a potentially distressing handling procedure. It made it a bit trickier to inject the one that needed to be treated, but it was much better for all concerned because trying to separate one from a group would have been stressful to all the pigs.

I have found that sheep are much more likely to voluntarily transfer from one area to another when they are together with another sheep. In one research project, we studied exercise physiology and ran sheep on a treadmill. Our test sheep would happily leave the pen and get on the treadmill if she had a pen mate accompany her; everyone was much less stressed. The buddy sheep got to hang out and eat hay and grain, and did not seem overly bothered by her pen mate running next to her.

We typically don't separate cage mates for oral dosing and blood collection; this applies for dogs and for macaques. The animals are removed from their cages as pairs; while one partner is dosed or bled, the familiar buddy remains present in a nearby cage. It helps the animals having their cage mate along with them. They focus on their buddy during the procedure and relax more than if they were out alone.

At my previous work setting, if one monkey was chaired during a test, definitely the cage companion would also be chaired close by to

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provide psychological support to the partner who was tested. These animals had no cranial implants.

When I was in charge of about 60 female rhesus macaques who were all assigned to neurophysiological studies requiring cranial implants, it was clear to me that these animals should be pair-housed with one another, not only for ethical reasons, but also to buffer the stress/distress resulting from long-term chair restraint during testing.

The PI wasn't happy with my proposal, arguing that cage companions will damage each other's implants, and that companions can get local infections around the head caps while grooming each other. I have attached a photo of two juvenile rhesus, each with a clean, intact cranial implant sharing a handful of treats in their home cage.



It took me some time, and it required a few convincing test samples before the investigator gave me the green light to pair all the animals assigned to her project and have the compatible cage companion always come along in a mobile cage when the partner was chair restrained in a test room.

This new arrangement was a great success. I overheard a conversation when the PI recommended the pair-housing of animals with head-cap implants because “the animals are doing much better with a companion, they don't lose weight, they are less nervous and the margins of the cranial implants remain impeccably clean [thanks to the companion's meticulous grooming] and the implants don't get damaged at all.”

While I don't disagree with this as a way to reduce the stress of the animal receiving

the treatment, what about the animal who is watching? Maybe I am anthropomorphizing, but are you creating unnecessary distress in the onlooker?

The given situation of removing an animal from his/her companion is tricky; I agree, there is no perfect solution. I do believe that having the partner removed can also be a cause of stress for the animal who remains in the home cage alone. When this animal comes along with the partner, for example to a test or treatment area, the magnitude of this stress reaction may be less; it can pay off in a buffered stress response in the other partner who is going to be treated/tested/restrained.

I know that's all a bit theoretical. One would have to directly observe the animals and record their behavioral reactions.

There's definitely no perfect solution; I agree, when you take the cage mate out, the one left behind is quite upset.

I've had to have one monkey in the chair with a urine catheter, ECG, and IV catheters, which is quite the task to get them to accept, but having a buddy next to them was very important for support of the animal being tested. They had distractions with toys and TV in the room as well as favorite people to interact with. The buddy was also chaired and placed beside the test monkey; they really did well in the same room together. We ran several successful studies this way.

RE-HOMING RESEARCH- RELEASED ANIMALS

RE-HOMING OF ANIMALS IN RESEARCH HAS BEEN RECEIVING INCREASED ATTENTION BOTH IN AND OUTSIDE THE LABORATORY. IN THE UNITED STATES, A HANDFUL OF STATES HAVE PASSED LAWS ENCOURAGING IT.

IF LEGISLATION IS PURSUED, HOW DO YOU THINK IT CAN BEST BENEFIT THE ANIMALS?

I worry that mandating re-homing for dogs will create pressure to euthanize dogs rather than deal with shelters or other organizations the biomedical companies may view as hostile or cumbersome. I would worry that the already overtaxed shelter systems would euthanize other animals to take these mandated dogs.

For non-human primates, mandating funding for re-homing would be the best way to help adoption; every time an investigator sets up a primate experiment, part of the expenses would include cost for the animals' retirement.

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You are right, I also worry that mandating the retirement of research-released animals may have unintended consequences, especially within the current animal shelter systems that often struggle to find suitable homes for thousands of animals each year. Mandating the retirement of research-released animals would create funding nightmares for many biomedical research institutions.

We should definitely encourage adoption and retirement of our lab animals and I'd be okay with legislation that encourages it as well. But having legislation that requires it? I think that would be the wrong answer to the problem. We would end up with facilities that don't/can't take the time to find suitable homes and so end up taking the first one that walks through the door, regardless of whether the new home is suitable or not. Not long ago, we struggled to find suitable homes for some rabbits. We had the luxury of being able to pursue several options and take the time to keep trying when some of the options fell through. But there are many facilities that won't have those luxuries and as a result our animals could end up worse off.

At a facility where I previously worked, I was responsible for the adoption program. Prior to my arrival, a presentation was given to stakeholders of the company to explain the benefits of retiring animals, not only for the animals but also for the company. We adopted out internally and externally; there was even sometimes a waiting list. The program was very successful. We retired over 300 animals

in the course of three years; this includes rabbits, guinea pigs, rats, mice, beagles, pigs and primates.

Legally mandating the retirement of research-released animals could easily be counterproductive, because many facilities would feel pressured and would wind up euthanizing rather than taking the time to retire the animals or creating a retirement program.

WITH CONCERTED EFFORT AND GOOD WILL, IT WOULD PROBABLY BE POSSIBLE TO RE-HOME THE MINORITY OF ANIMALS RELEASED EACH YEAR FROM RESEARCH. BUT WHAT ABOUT THE GREAT MAJORITY? DO WE WANT TO DISCRIMINATE AGAINST RATS, MICE AND COLD-BLOODED ANIMALS AND DENY THEM, FOR CONVENIENCE AND ECONOMIC REASONS, THE "PRIVILEGE" OF BEING CONSIDERED AS ANIMALS? IT SEEMS TO ME THAT ALL THE CREATURES IN RESEARCH LABS ARE ANIMALS WHO DESERVE EQUAL CONCERN FOR THEIR WELL-BEING. THE QUESTION THEN IS, HOW REALISTIC WOULD IT BE TO PUSH FOR THE RE-HOMING OF 50,000,000+ ANIMALS EVERY YEAR?

I would love to see most animals be re-homed but there must be sufficient suitable homes for them, and that may be the problem. I think when re-homing animals outside research

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facilities, it is easier to find homes for the dogs and cats because they are more thought of as pets compared to rodents. Personally, I have had rodents for pets and find them just as enjoyable as the so-called companion animals, but not everyone has had the pleasure to experience just how sweet rodents can really be. I think the best chance that rodents have is within the research community, but the large numbers of these animals make it an unrealistic goal to find homes for all of them, unfortunately.

For the people I work with, I don't think the issue is that they don't think of adoption/retirement as an option but simply that the numbers are against us. We currently have more than 23,000 cages of animals. Let's assume that 5% could be adopted in any given

year. That's still more than 1,000 cages, which for us is going to equate to roughly 2,800 animals (based upon our average per cage census). And we're just one facility in the area. Now spread those numbers across all of our facilities and I think it's easy to see that this isn't a simple matter at all. I also think that's one of the reasons that facilities initiating adoption and retirement programs start with the larger, longer lived species like primates, dogs and cats. It's not that rodents or fish are less valued. It's simply that if I'm faced with adopting five dogs or 900 rats, which am I going to attempt first? Having a pet rat might be a whole lot cheaper, but it's still going to take me far longer to be able to adopt out all those 900 rodents. Whereas with five dogs, chances are good that I can adopt them out simply among the staff working at the facility.

ALLEVIATING DISRUPTION IN ANIMAL HOLDING AREAS DURING CONSTRUCTION/RENOVATION

WHAT STEPS DO YOU TAKE TO REASSURE ANIMALS IN YOUR CARE WHEN THERE IS DISRUPTION CAUSED BY CONSTRUCTION OR REPAIR?

It is a hard situation, but when our facility was being renovated we moved animals around where we could, moving the ones that would be affected the most to other less affected areas of the facility.

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We use music as a way to calm the animals and I find it to be especially helpful with rabbits, as they are very sensitive to loud noises. We play classical music at a low volume to help mask the noise of construction.

We cut the foam mats that are used at the changing stations in the room into square pieces and place them under the wheels of static racks to buffer the vibrations to the cages on the rack. I have heard investigators say that they have noticed that the vibrations caused breeding issues in mice when no foam was in place, but that the mice maintained a regular breeding schedule when foam was placed under the cage racks.

When construction is going on we play classical music or white noise in the rooms of our rabbits and we pull the cage racks away from the walls so that they are exposed to less vibration.

GENERAL

TALKING TO ANIMALS

BEFORE ENTERING AN ANIMAL ROOM, DO YOU LET THE ANIMALS KNOW THAT YOU ARE ABOUT TO ENTER? DO YOU TALK TO THEM WHEN YOU ARE IN THEIR ROOM?

When I started caring for macaques, I very quickly learned not to barge into the animal rooms—and have them all freak out—but to calmly enter while talking to the animals. Once in the room, I would continue talking like, “Hi guys, I have to take a few blood samples; no big deal. When we are done, each one of you will get raisins and an apple.”

When entering an animal room I am also chatty. It may not always be the best approach for the dogs, but I can’t help myself. We all get revved up together. The rats, hamsters, guinea pigs, rabbits, primates, pigs, goats, snakes and bats ALL definitely like to hear me enter. The mice, I am never sure if they really care.

I “hoo” in the hallway outside to let all the animals in my charge be aware that I’m here and will enter their room. I talk incessantly to

them, and usually in a fairly high, soft pitch. I also sing songs to them—a lot—usually opera or folk songs. They probably identify me by my talking and singing: “Here she is ... she’s gonna sing ... yup, there she goes!”

In one case, I was introducing a monkey doll to a singly housed, young male rhesus. I would groom the doll and say “gentle” in a soft voice. After about a week of acclimation and reinforcing any nonaggressive exploration, I gave him the doll and he immediately started grooming it! A week later, I noticed that if I said “gentle” in that soft voice, the little guy would immediately put his back to the bars so I could groom him.

I have always talked to the animals I work with—heck, I even say “Hello” to the zebrafish and *Xenopus* upon entry to the rooms. I use different intonations and different types of speech for different species, and always announce to the group what I’m there for, whether it be “I am really sorry, but we have to take blood samples today” or “Hey, guess what? It’s goodie time!”

For rabbits, I tend to keep my words soft, but when I say, “It’s time to get out the hay,” I will perk up. Also, I tend to sing (albeit somewhat poorly) bunny parody songs I’ve created (“Tiny bunnies, in the wine ...”).

With rodents, I’m straight up “Hey guys, how ya doing?” unless someone brings a sick/distressed rodent to my attention. Then, I get out my “poor little fella” calm voice.

With swine, I always enter their room with a “Hey” or a “Yo, ladies, how are ya?”

With sheep, dogs and cats, I always say “Hello” upon entering, and then assess their stance and see what’s needed for that particular entry point. Fearful animals and fractious cats require completely different language and intonation than excited happy-to-see-you critters.

With monkeys, it was always a “Hey guys, what’s up?” and we would go from there. I’d have individual conversations with each, once I learned their personalities, and even discovered with one group of Mauritius cynos that speaking French was the way to go. By entering with a sing-songy “Bonjour, petits garçons,” they instantly knew it was me, and I would get some “hoots” right back. I really miss my monkeys—they were some of my greatest confidants.

I often ask permission of the animals before I treat them or take a sample. I had one research tech actually ask me last week what I would do if the rat looked at me and said “No!” This is something I’m going to have to deeply consider. And with that, I’m going to go ask a rat if I can have a look at her tumor.



MUTUAL TRUST RELATIONSHIP WITH ANIMALS

IT IS MY EXPERIENCE THAT MUTUAL TRUST IS A KEY FOR SAFETY WHEN DEALING WITH AN ANIMAL, BE IT A LABORATORY ANIMAL, A WILD ANIMAL OR A PET.

HOW DO YOU KNOW WHEN AN ANIMAL TRUSTS YOU? AND, HOW DO YOU KNOW WHEN YOU TRUST THE ANIMAL?

I was always taught when I worked in zoos that you should never fully trust animals who have not been domesticated. With enough love and mutual understanding and respect I can build a strong relationship with such animals, but I don’t trust them 100%. After all, unlike domesticated animals, wild animals haven’t been selectively bred to have a body-contact relationship with humans.

I absolutely agree, you should never 100% trust an undomesticated animal; however, I have come pretty close. One particular rhesus

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I used to work with would lie down in his cage, of course not close enough so that I could reach him. He was inviting me with his look to pet him, but I'd have to reach my entire arm through the feeder hole into the cage to do that. I was hesitant because I would not be able to pull my arm out quickly enough in case he intended to bite me. I wasn't yet quite sure if I could really trust him.

It's hard to explain what finally made me fully trust him, but one weekend after many visits, he just was lying there so still that I felt a strong connection with him; there was no separation between the two of us—just a deep feeling of oneness that is hard to put into words. From that day on I trusted him enough to reach my arm into his cage and give him belly rubs. He loved it, and I loved it; it became our afternoon thing. He was, and still is, my most favorite rhesus I ever worked with.

Trust and respect go together not only when dealing with wild animals but also with pets. I “know” without being able to explain how I know that I cannot trust a relationship when there is a trace of fear in me and/or when I feel that the animal has a trace of fear; just a little bit of fear makes the relationship unreliable, i.e., unpredictable, hence potentially dangerous. It is my experience that animals are very sensitive and read my emotional state spontaneously and correctly; there is no cheating possible! When I am afraid that a male macaque could bite me, I will stay away from making attempts to handle the animal in any way; he feels that I am afraid, and this

will create anxiety and a readiness to defend himself. Such a situation can be very risky! It can also become risky when I am not fully present and/or when the animal is not fully present. When I trained potentially dangerous macaques with whom I had developed a mutual trust relationship, I consistently made sure that no environmental disturbances would distract me or the animals. Lunch breaks, weekends and holidays were always the best times for training sessions.

I think you are absolutely right, you just know when that trust is not there, on both sides. I would never truly trust a wild animal because I think they are harder to read than our domestic friends. We know a lot more about the behaviors, gestures and emotions of our pets.

I worked with a particular *Mauritius* male cyno for a large chunk of my career. His name was Jordan; he was a beautiful boy and I used him as my training monkey for new employees to learn on/from. He was perfectly pole/collar/ chair trained (I had spent many years getting him there) and would almost put himself into the chair with no pole needed—he knew my every cue and we had a very special bond and high level of trust.

One day, when I was five months pregnant, I was chairing Jordan as I did so many million times before. He climbed into his chair, anxiously awaiting the treat I always gave him, and got settled. As I tightened his collar in place I noticed a tuft of his hair had gotten stuck in the track of the neck yolk; I reached

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down to adjust him, again, as I had done so many, many times before, and next thing I knew he snapped and there was a 2 inch canine sunk completely thru my middle finger. My hand was pinned to the yolk of the chair by his tooth; neither one of us could move/ unHINGE ourselves.

Long story short, a pregnant lady ended up with a very serious injury, a long hospital stay due to what became a blood-borne infection, a central line placed, two+ months of IV antibiotics, several rounds of extremely painful debridement and hand surgery, a year of physical therapy to get my hand working again, and a permanently mangled finger with crushed bones and severed nerves along with loss of all sensation that will never work the same again.

I've been in this industry for 20+ years, and I have loved, bonded with and trusted more animals than I can ever count along the way—I still do, but that particular day taught me a very serious lesson about what I perceived as trust, and definitely brought me to a new level of combining trust with caution, and respect. Any little thing can spook even your best buddy animal, so please be careful!

Thank you for sharing this very important, albeit sad story.

I am reading between the lines that this very nasty experience has not closed your heart toward the animals you have worked with and work with now.

Absolutely not!

I worked for many years at a humane society and as an animal control officer for some of that time. Many calls involved wildlife in distress, requiring careful handling. Some situations required assisting wild animals who were injured or maybe stuck in something. It is a rather profound experience when you approach a wild animal that is terrified—realizing that they cannot get away from you. It's a highly primitive sensory experience because there are sights, smells and a danger that we don't normally encounter. Of course, it is also a very stressful situation and you are acutely aware that you are at risk of injury even while using safe handling practices.

There were multiple occasions where the animal appeared to have some notion that we were helping and not harming. This was especially true for animals caught in something, like hockey nets—Canada, of course. Once they started to feel the restriction lifting, instead of struggling further, they sometimes just went limp and relaxed until you were finished cutting them free. These are animals like possums, skunks, foxes and raccoons. It didn't always happen of course, but when it did, it felt clear: The animal did not use fight or flight—and I would not call it learned helplessness either; the animal appeared to make a conscious effort to surrender to what was happening, and then would simply bolt away once he or she realized they were free, often without looking back. I don't ever remember being concerned that they would turn around and become

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aggressive later, because their cooperation was unquestionable.

I feel these situations happened because of many factors; probably the animal's temperament played a role, but also how we were behaving: calm, slow, low, soothing voices, gentle but firm restraint. There were just times when the combination was ideal for the rescue to occur with cooperation from the animal.

One example with primates stands out in my memory. He was an adult male rhesus macaque who had been wounded by a social partner. He had some sutures on his back, in an area he could not reach as they healed, and I'm sure they were itchy. We already had a good relationship, and he offered his back for grooming by pressing it against the bars of the cage. I was able to groom and gently scratch his itches, as he would guide where he needed touch by reaching his hand around and just holding the area. If I got the right spot, he would lean in and I could scratch it for him. It was definitely an exercise in trust for both of us because I had never had that much physical contact with him.

I think just being aware that they (any species) are individuals who are perceiving their world in a way that may differ from ours helps to keep our own self-preservation in our mind, knowing that we can't predict what could trigger a fearful or aggressive response. Yet, mutual trust can still occur and is so important to maintain.

I'd like to answer the current question about trust, using my experience with birds,

specifically African grey parrots.

When birds' feathers molt out and new feathers grow in, they tickle and itch. Birds can turn their neck to an astonishing degree in order to preen their feathers with their beak, but they can't reach their head or high up on the back of their neck. Bonded birds will invite a partner to preen them by bowing their head. When my African grey bows his head while on my arm, I know this is an invitation to scratch or tickle his head and neck. This posture indicates a lot of trust on his part. He's vulnerable in this position.

Even while preening the rest of his body, a bird is vulnerable. His head is buried in his feathers and he's very intent on what he's doing. When my parrot preens while perched on my hand, I consider it an honor!

Whether wild caught or captive bred, parrots are genetically wild. This means that if anything startles or scares them, no matter how tame they may seem, they're going to react defensively—that is, by biting. Therefore I never allow my parrot to perch on my shoulder. One has no control when the parrot is up there—and one's eyes are very close to the parrot's beak!

I have been lucky enough to have many stories of mutual trust, but this one is my favorite: I adopted a small (spayed, I thought, LOL) female barn cat who was about 6 years old. Try as I might, I could not transition her to an indoor-only cat, although she was very friendly and was happy in the house. She was just too much of a hunter and would take

every opportunity to escape. One day she was adamant that I follow her up the stairs into my son's room. She hopped into his dresser drawer and pulled up a giant kitten. Only one, but he was huge and all wet—she had just had him. She was showing him off to me. So I figured, after the kitten was weaned I would have the mother spayed. Well, the kids let her out once again ...

One night as I was watching TV, she jumped onto my lap and was very lovey-dovey. Next thing I knew, my hand was all wet and she was starting to give birth. I could not believe she was doing this on my lap. She had three kittens and I could tell she appreciated my supportive belly rubs and such. Three healthy kittens and they all found homes the week they were weaned.

I operated a daycare at the time, and people were constantly coming and going and no one paid attention to the cat. So she escaped again and was missing for over a month.

When she came back, I could tell she was pregnant again, ugh. So again, one night watching TV, she jumped on my lap and wanted to have them on my lap again. She was talking to me and she would push the babies over to me while she had another delivery and cleaned up the new one, then she would have them nurse. It was amazing. I felt so blessed she chose to share this with me. So up to my bedroom she went with her babies and was securely locked up until we got her to the vet for her spay. On one hand I was very glad we were no longer adding to the cat population

problem. On the other hand she was the best momma I have ever seen and I know she missed having them and so did I.

FEELINGS IN ANIMALS

DO ANIMALS HAVE FEELINGS?

The eyes of macaques are windows into their psyche. Because they can't speak English, or tell us in our own spoken words their life experiences and how they feel, many scientists think they have no feelings at all, at least nothing like humans have. But they can still effectively tell us through their expressions that they do have feelings, and their feelings should matter. They matter for the same reasons our feelings matter to us.

Physical expression is the strongest form of communication, even stronger than speech. It is universally recognized by every culture, in every language in every corner of the world. Spoken words can be misunderstood or misleading, but there is little mistaking what is spoken through expressive eyes and body language. I dream of that time when animals

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are recognized for the sentient beings they are, and whose feelings matter.

The expression of certain feelings—for instance, anger—can be the same in different species, hence correctly understood by different species, including humans.

Who are we to say that creatures “below” us humans are unable to have feelings and express them? They are more than capable through body language, eye expressions, and vocalizations. Yes, there will always be a school of thought that hinges upon anthropomorphism, but there are times when you simply cannot argue the fact that an animal is expressing joy, contentment, curiosity, fear, depression, disgust or aggression.

I remember a female stump-tailed macaque, Kelly, whom I had successfully trained to

present her right leg through the partially opened cage door so that I could take blood samples. We had developed a strong bond based on mutual trust; I would often visit Kelly, talk to her, make her smile (left photo) or even laugh (right photo) by tickling her under the chin.



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Assuming that smiling and laughing are expressions of enjoyment and happiness, Kelly's response to being tickled suggests that she experienced the same feelings.

AND COLD-BLOODED ANIMALS, DO THEY ALSO HAVE FEELINGS?

I don't have much experience with cold-blooded species but I have seen frogs express fear by hiding, splashing, etc. to avoid hand capture for tank changing. I also once had to care for a pet iguana while the researcher was doing field work. The iguana clearly enjoyed the occasional water spritzing I would do with the spray bottle. He would angle his head and body to have me spray different sections. I also had to do occasional health checks on several large western diamondback rattlesnakes, but I have an extreme phobia of snakes, so the only behavior I really noted was that they would start rattling their tails as soon as you put your key in the lock.

I've had some experience with reptiles—mainly snakes and lizards. From what I experienced, I would say that they do have feelings of fear, frustration, curiosity, etc. Veiled chameleons come to my mind first—they can change their color depending on their mood, and when they feel threatened or are trying to hide, they will do a little dance that mimics a leaf blowing in the wind.

Snakes are extremely expressive—the classic S-shaped curve of the neck is a sign of fear and anger; a tail twitch reflects anxiety or aggression, depending on the intensity of the twitch.

It is my experience that all animals I have worked with on a one-on-one basis have feelings that are expressed in simple movements, behaviors, reactions and responses, in sounds/vocalization and in the eyes. This does not only apply to non-human primates but also to rodents, ruminants, pigs, birds and frogs; maybe also to fish and insects? I would argue that the better you know a particular animal species, the better you are equipped to read their feelings.

The fact that so many scientists are reluctant, even unwilling to admit that their animals for research have any feelings may be related to their conditioning. Fathers have been conditioned by their fathers and grandfathers not to have feelings, so they teach their sons also not to have feelings. If you are a real male you have to suppress your feelings. Well, with such a mindset, you are probably unlikely to concede that the animals you do research with—and in the end will kill—have feelings such as fear, anxiety, joy and frustration. Thanks to regulatory pressure, most scientists finally acknowledge that the animals they do research with have the capacity to experience pain; at least one first step in the right direction.

CRYING AT WORK

IS IT UNPROFESSIONAL/UNACCEPTABLE TO CRY WHEN ONE OR SEVERAL OF THE ANIMALS IN MY CHARGE HAVE TO BE EUTHANIZED?

It is certainly not unprofessional/unacceptable to cry when the animals in your charge have to be euthanized. All caregivers should be encouraged to express their grief however they wish. If these kind of emotions are bottled up they can seriously affect an individual's mental health.

I don't usually have to euthanize animals unless they are very ill. The research staff takes care of the euthanization at the end of the animals' experiments, but for me it still is frustrating and a very sad situation when I walk into the animals' room and find them gone.

Usually we know when the end point of animals in our care will arrive. Having time for goodbyes is very important and it should be made available to anyone who has developed affectionate bonds with animals in their care. I think all facilities should have a plan so that employees know that their

feelings and emotions are accepted and that there is someone they can talk to and who listens with compassionate understanding. Managing a facility is way more than making sure operations run smoothly; it is also about people and their emotional well-being. If people are trying to deal with emotions that are left unresolved, they cannot be productive. Every manager/supervisor should be aware of this and be able to handle such circumstances.

I don't think that crying is unprofessional or unacceptable at all. We are all human and wouldn't be human if we didn't have emotions. It is never easy to euthanize any animal, be it a companion animal, a farm animal or a research animal. And at times, especially when animals have been in our care for a long time, we do get attached and feel grief when we have to let them go. In our profession, compassion fatigue is a HUGE problem. Yes, you shouldn't be a blubbing mess all of the time; that could become a work issue. But if the occasional tear or meltdown happens, that needs to be accepted, and support should be provided to deal with the situation in a compassionate manner. I belong to a few Facebook veterinary groups and it seems like almost weekly there is another post about a technician or vet who has committed suicide; it always breaks my heart. We need staff to know that it is okay to have emotions and express them and that there is somebody to turn to if they need help and need to talk about their experience and feelings. More has to be done to support our people as well as to recognize the sacrifice of the animals.

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I don't think there's anything MORE professional in this profession than crying when a beloved animal is euthanized. Crying is a healthy way that our species uses to process grief, and grief is a part of our job. I'm always available to support coworkers when they are grieving and am not at all bothered when they cry. It shows me they are doing their job well, and processing their grief well.

Our caring and love for the animals in our charge is a strength and not a weakness, and because of that there are times when we have difficult days and cry at work. I have worked for 14 years in lab animal care and I have shed many tears.

I have cried a lot at work and do think it's a matter of conduct concerning how you handle it. I can euthanize an animal I have loved while crying at the same time. If you are going to be out of control, you need to ask for space and not be present in situations that you already know will upset you emotionally. If your employer doesn't support your request you need to look for a new job at a different institution.

We don't consider crying to be unprofessional, but we do recognize that people often aren't comfortable crying at work or in front of others. We try to give staff privacy to grieve, but we also give them the option of not being directly involved in the euthanization procedure.

I'll just add that it's the same in small-animal practice. Having to euthanize someone's pet is often difficult and we always tried not to cry while we were in the exam room. But as

soon as we got into the back of the clinic we'd usually completely break down.

Our caring for the critters can get the best of us emotionally, but we should be able to express our feelings (within reason of course) and know that it is natural and normal to feel that way. I have shed many tears over monkeys, rabbits, rats and pigs, but the worst was two years ago, the day before one of the greatest dogs in the world was scheduled to leave me. I had worked with countless dogs prior to her and it had never happened to me before, but she was MY dog, and knowing she was on a project that required sacrifice at the end was more than my heart could bear. The day before the procedure was due I sat with her and cried for probably about an hour while she licked my face. The PI had already told me I wouldn't have to be present for the surgery and that he would handle everything. It was a gift I didn't have to do the deed, but not being there for her was very hard.

When I worked in an academic setting, it was acceptable for staff to cry and share their feelings about the animals we had just lost. Now mind you, I'm always sad when we lose an animal, but I don't cry for everyone.

My last employer was a contract research organization and we had quite a few macaques who stayed around for many years. As they continued to hang around they got bigger and clients didn't want to use them, so they continued to hang around. I spent a lot of time with these guys and it was only natural that I was quite bonded to them. Two of

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them eventually were assigned to an invasive transplant study. One declined very rapidly, as most of the animals on the study do, and the other died due to human error during surgery.

I worked with both of these animals for almost three hours a day, so you can imagine that I was quite sad and, yes, crying in the vivarium when they passed away. On both occasions I excused myself and left the vivarium to go sit in my office and grieve in private. On both of these occasions I was called into the human resources department to talk about my “unprofessional behavior” in the work place. I was told that no one should be crying and especially someone in my position, as the other staff looked up to me and I was setting a bad example for them. I will leave out my response.

I can't begin to count the tears we've all shed over the past 22 years over monkeys we've lost with whom we had developed such incredibly strong bonds. Those tears are a healthy release valve for heartfelt emotions to flow; they protect us from mental distress. Tears simply means your heart is in good shape!

I worked in a facility that shamed individuals for showing emotions. The following were things that were said: “This is research,” “You are too emotional,” and “She is too soft.” Emotion was definitely treated as weakness. There were no on-site resources for compassion fatigue or grief. We were told to contact counseling outside of work, but good luck finding therapists who were trained in animal-related compassion fatigue, and it

was at our own cost! My supervisor was very understanding, but the overall management attitude was very old school. It's exhausting and futile to hold back healthy emotions of sadness and grief. Research facilities should be required to provide helpful outlets for their staff to express and deal with these emotions.

Animal care technicians began to come to me in private to express grief, cry or talk about animals they loved but who had to be euthanized. They came to me simply because I not only cared about the animals but I also cared about the technicians' emotional well-being. Caring is what matters for the animals but also for the technicians who work with them!

After nine years, I left the facility this past May; it was a torturous decision to leave. I am now at a sanctuary for primates retired from research. I did not realize how healing this could be.

DEALING WITH COMPASSION FATIGUE

**WHEN WE WORK WITH/FOR ANIMALS
(THIS INCLUDES RATS, MICE AND**

COLD-BLOODED ANIMALS) ON A DAILY BASIS, CHANCES ARE THAT SOME OF US GET ATTACHED TO THEM. WHEN THIS HAPPENS WE ARE LIKELY TO DO OUR VERY BEST TO PROVIDE OPTIMAL CARE FOR THE ANIMALS AND MAKE SURE THAT THEY DON'T SUFFER. THE PROBLEM WITH THIS ATTACHMENT—WHICH HAPPENS SPONTANEOUSLY—IS THAT WE ALSO HAVE TO FACE THE FACT THAT ANIMALS, EVEN THOSE WITH WHOM WE HAVE DEVELOPED AN EMOTIONAL BOND, WILL BE DESTROYED. HOW DO WE DEAL WITH THIS SITUATION WITHOUT GETTING FRUSTRATED (DISTRESSED) AND POSSIBLY EXPERIENCING BURNOUT?

This is a great subject and one that I have surely encountered in my 32 years of hanging around in the research field. I almost left a few times, especially when we used to have dogs. It's not that I think dogs are a higher species and more deserving than rodents; it is just that they were here for longer periods of time and required more intensive nursing care in many situations. I spent more time with these dogs than my own one at home and of course would get very attached to them. It was hard to say goodbye when the time came, but I knew that it had to be and that it was for a greater good. This didn't stop the crying and sadness, but I looked at that as an intrinsic part of the whole process. I

have been fortunate to never pass over the line of the natural grieving process and always bounced back again to continue serving the critters who have given their lives for the biomedical research endeavor. It was clear to me that I had made a difference in their lives by giving them the best care possible while they were with us.

It's hard, especially when it's an animal like a dog or a primate whom I have cared for every day for many months and got emotionally bonded with. I keep telling myself that all these animals are purpose-bred, which implies that they are here to contribute to research studies that typically end with their death. I must admit that this rationalizing doesn't really cover up the frustration and emotional pain that I feel when one of these animals is terminated. It helps to talk to my coworkers who have the same feelings as I do. In our enrichment kitchen, we have a whiteboard with the brass ID tags and heart-shaped name cards from some of our euthanized monkeys perched on top; we don't forget these animals. I remind myself also that while these animals were here, it was good for them that I cared so much about them, doing my best to make sure that they had the best life possible while they were used for a presumed greater purpose. It's better when someone like me, who gets emotionally attached to the animals, is taking care of them than someone who couldn't care less about the animals and is just doing the job for a paycheck.

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I've definitely had to deal with this rather disturbing situation too. As a person who deeply cares and is passionate about animal welfare, I think it's very natural to feel some sort of sadness and/or compassion fatigue when animals are euthanized after they have served a scientific research purpose. Unfortunately, it is looked down upon in some facilities when you show signs of sadness when such animals are killed. You get hit with "Well, that's part of the job" or "These are research animals, not pets" or even "Take your emotions out of it!" All these are extremely insensitive and disheartening statements and judgments about healthy human feelings.

To make the researcher gently aware of his or her insensitivity and its negative impact on staff morale is one possible way to change the situation—provided the researcher is not arrogant but willing to listen.

Unfortunately, I don't have the solution to this problem. All I know is that it would be fair and reasonable if researchers and administrators of biomedical research facilities could at least make an attempt to be a little bit more sensitive and acknowledge the fact that the people who work day in and day out with and for their animals do have human feelings and humane concerns and emotions.

That is one of the hardest things in what we all do, isn't it? Getting those in charge to STOP and THINK for a minute and try to see things from a different perspective.

I know colleagues who have quit because they could no longer deal with their sadness and helplessness when animals with whom they had worked for an extended period of time were put down. Maybe support groups could be established to help us cope with these feelings.

I started a peer-based compassion fatigue support group at my facility. We meet once a month and allow people to express their feelings and help with self-care tips and ways to cope. We also work closely with the counseling department in our university and have a few counselors who are specifically earmarked for help with laboratory animal compassion fatigue.

JOB SATISFACTION

WHAT EXPECTATIONS MOTIVATED YOU TO MAKE A LIVING AS ANIMAL CARE TECHNICIAN IN AN ANIMAL RESEARCH FACILITY? DO YOU FIND THAT YOUR EXPECTATIONS ARE BEING MET OR HAVE BEEN MET?

I always wanted to be with animals. Working with wildlife in the field at Parks Canada was in

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my mind, but I ended up in an animal research facility because I needed a job at the time. When I got here 35 years ago, I realized that research was a place where I could help make a real difference in the way animals are cared for, and needless to say, today I still feel the same. It has been a tough journey at times; I thought of leaving at one point because of the emotional aspects of the job but moved past those.

I have witnessed a lot of positive change and have been very fortunate to be a part of that, but with all the scientific results that are out there, especially those pertaining to environmental enrichment, I expect that we should do much more to implement truly species-adequate living conditions for all animals in research laboratories; this includes mice and rats and all cold-blooded animals.

My very first job was actually at a small animal clinic. I needed a job and didn't really like working with people so thought working with animals was a better option. My expectations were that it would be hard work but ultimately rewarding. Unfortunately those expectations were not met. The practice was not the most ethical, which is just a long, ugly story. When I quit, I still wanted to work with animals rather than people and, by sheer chance, came across a job ad in the paper to work at a primate research facility. Being very new to research, I was apprehensive about what I'd see when I went for the interview, but the staff and veterinarian were wonderful people. I was hired to work with a colony of marmosets and a very small colony of tamarins. Yes it was a very

physical job and at the end of the day I smelled horrific, but I loved those little guys with their expressive faces and grabby little hands.

It's been decades since I last worked with primates, and now I work entirely with people—the drawbacks of advancing in my career. I am now the training program coordinator and have been working in research for 30 years.

I'd say that more of my expectations about the care of animals are met today than 30 years ago. Back then, enrichment was still hit or miss while today it's very standard and the ideas revolve more around the question "How can we improve the enrichment?" rather than "Do we need to provide enrichment?" As with all things, there is room for improvement but I think the culture has shifted so that people do not instantly think "NO" when a change or addition is proposed. I still do miss those very smelly marmosets though!

I'd like to have shorter work days, but unfortunately that's never going to be a reality, I'm afraid.

I always wanted to work with animals and I was always interested in medical science. I fought to get in the vet tech program.

The past 25 years have been very rewarding and I have seen great changes. The idea that we can work cooperatively with the animals in our care has grown to be standard. With patience, skill and dedication, the animals we work with learn what to expect from us, so they aren't as frightened of the procedures we

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must do with them. Even the way we house the animals has changed—very much for the better—from when I started, and we thought we were “advanced” back then.

I’m mostly administrative now and I miss working with the animals, but I’m confident that the techs taking up the reins will learn things I never dreamed of—keep learning!

I began my veterinary career in general practice (four years) with companion animals, then specialty medicine (five years). I joined the research field about six years ago. My expectation was that it would be more ethically challenging. It has turned out to be LESS ethically stressful for me, at least when compared to specialty medicine! It has definitely scratched that science itch. My work in the research field is far more about the animals’ welfare. I thought I would have to fight more for animal welfare in research medicine, but the current climate at my open-minded institution is very supportive, so it hasn’t been anywhere near as combative as I expected.

I started as an animal technician back in 1968 and have never regretted my choice. I originally was going into agriculture but very quickly realized that, at that time in agriculture, there wasn’t really a career path for a woman. Working with animals had been my dream since I was a small child; it didn’t matter which animals, so long as they were not spiders.

Yes I’ve been frustrated in the job, never with the animals or the work but with some people along the way, but show me a job that

doesn’t involve that blot on the landscape! I have the satisfaction of knowing I’ve done my best for all the animals who were in my care.

As I have moved from one research facility to another, the names and faces of most of my coworkers are lost to the passage of time, but I still remember the numbers of the animals who didn’t have names but were in my care. I can remember MF41 as though I saw her just yesterday, but I couldn’t for the life of me tell you the name of the researcher whose protocol she was on. Not sure just what that says about my own social skills.

Here is a quote from a researcher that fits with your comments very well: “I was encouraged not to assign names to the many rhesus monkeys in my charge. I was admonished that the animals are research subjects, not pets. The concern was that having names for the animals might blur this distinction between a research subject and a pet. It did not seem possible to remain distant—emotionally isolated—from the animals. In fact, the inevitable closeness that resulted from those intimate interactions was precisely what made us capable of doing what we were asked to do. Eventually, we all came to know that F49 was Sam, A12 was Rosie, and Z13 was Curious. Such attachments are the results of compassionate people doing their job right” (Wolfe, TL 2002 in *ILAR Journal* 43: 1–3).

I could not agree more. The employees looking after our macaques were discouraged

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by the PI from giving the animals names. It was reasoned that the research team does not want the caretakers to be attached to animals who will eventually be sacrificed. The girls gave their animals names anyway. To deny or discourage attachment between technical staff and monkeys is a futile exercise, doomed to be unsuccessful. To be attached to experimental animals, and to feel ill at ease about their fate is just part of the responsibility we have to embrace when we decide to work with animals used for human purposes. And, as a matter of fact, this attachment has a positive effect on the level of care provided by the staff to those animals.

YES! I run into that mentality all the time! “Don’t get too attached!” I usually respond by saying “I’m a big girl, I can handle it.” I also point out that it is my job to get attached! I don’t

believe I would do my job well at all without the attachment to the animals in my care.

I’ve been in my current job for almost 10 years. Before working at this facility, I was a zookeeper for 15 years. When I applied for my present job, I had almost no expectations other than I would be doing primate enrichment and social housing. Then sometime during the first week of this new and unfamiliar job something completely unexpected happened: I was called to look at some abnormal mouse behavior! WHAT???

Then I saw this mouse in the barren cage with nothing but a white square of so-called nesting material; that made me realize I had a lot to learn about helping research animals. Ten years later, I’m on the IACUC and in charge of rodent breeding here! Who could have predicted I’d be making mice and rats happy?!



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