

# THE **Enrichment** RECORD

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## COMMUNICATING ABOUT ENRICHMENT

Explaining Enrichment Engagingly

Environmental Enrichment  
for *Xenopus laevis*

Kidding Around in the Laboratory  
Animal Facility—Goat Enrichment

Environmental Enrichment  
in Chinese Research Facilities

Doggy Door for Macaque  
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### WE'D LOVE TO HEAR FROM YOU!

We welcome your comments, observations and contributions to *The Enrichment Record*. Contributors include lab animal veterinarians, principal investigators, animal care staff, animal behaviorists, animal technologists and members of the bioscience community who promote the 4 Rs: reduction, replacement, refinement and respect.

Share your story ideas with Rhoda Weiner, Editor at  
[rmbw19@verizon.net](mailto:rmbw19@verizon.net)

Guidelines for authors can be accessed at  
<http://enrichmentrecord.com/contribute/>

### Please give credit where credit is due.

Outstanding animal care is truly a team effort, and we ask you to credit colleagues, published reports, articles, and other reference materials that have contributed to your enrichment article. Great ideas don't happen in a vacuum, and we encourage you to list all sources of inspiration.

**The Enrichment Record is not a peer-reviewed journal. However, the Editorial Board of this E-Zine is composed of dedicated volunteers who have extensive experience and expertise in the care of laboratory animals. Members of the Board are involved with all aspects of this publication.**

The *Enrichment Record* is published in October, January, April and July. If you are interested in advertising in *The Enrichment Record*, please visit:  
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Jayne Mackta, *President & CEO*

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## **The Enrichment Record**

is a quarterly E-Zine/Forum for:

- Discussing environmental enrichment in the optimal care of laboratory animals
- Documenting best practices and approaches for addressing challenges of implementation & assessment at every level
- Sharing data on the impact of environmental enrichment on the science
- Building the case for integrating enrichment into research design

If you are interested in advertising in *The Enrichment Record*, please visit: <http://enrichmentrecord.com/advertise/> or contact Jayne Mackta, Publisher: [mackta@enrichmentrecord.com](mailto:mackta@enrichmentrecord.com)

### **ADVERTISING DEADLINES**

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is an 8.5" x 11" format.

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Recently, I've been thinking about all the ways we are trying to share information about the value of environmental enrichment for laboratory animals. It's a communications challenge to find the right medium as well as credible messengers, who can get the attention of skeptical professionals who populate our community. In these times of tight budgets and short attention spans, we must leverage every opportunity to get people to listen and learn about a subject still dismissed by some as a "distraction."

The many posters and presentations that addressed EE at National AALAS in November inspired us to expand our stable of writers, and the eager response to our outreach has been overwhelming. Authors are excited by the opportunity to give their posters expanded visibility through the online Poster Repository as well as to share their abstracts in print with our global audience. Content experts have agreed to write articles for future issues of *The Enrichment Record*. And we tapped the most compelling speakers to present at "The Enrichment Extravaganza," which we sponsor each Spring in different venues.

In the **Meeting Up** section of this publication, volunteers summarize highlights from other conferences and symposia held in different parts of the country, so our readers get an idea of who's talking about enrichment and what they are saying. We'd like more in-depth coverage of these high quality programs and welcome early communication on the part of the organizers so we can help publicize upcoming events and report on programs in a timely way.

### **Be sure to stay in touch in the New Year!**

Communication is a circle with a constant exchange of information flowing in and out. We are doing our part, but success really depends on you—our readers. Keep us vibrant and vital by sharing your EE ideas, programs and research. Then make sure to spread the word by sharing *The Enrichment Record* with colleagues, friends and members of the broader caring community.

A handwritten signature in black ink that reads "Jayne Mackta".

Jayne Mackta, Publisher  
President & CEO, Global Research Education  
& Training, LLC (GR8)

**To facilitate informed discussion about environmental enrichment, we have joined the LinkedIn Group called **Laboratory Animal Sciences.****

This group allows members of the laboratory animal science community and our readers to interact over a web-based platform to compare ideas and methods. To participate, you will need to create a LinkedIn account and then join the Laboratory Animal Sciences Group.

**It's easy! It's free! It's a safe and secure place where you can say what's on your mind.**  
**Click here to get started.**

## ***Meeting Announcement Submission Form***

Please submit the following information to Rhoda Weiner, Editor [rmbw19@verizon.net](mailto:rmbw19@verizon.net)

ORGANIZATION \_\_\_\_\_

CONTACT NAME \_\_\_\_\_

PHONE \_\_\_\_\_

EMAIL \_\_\_\_\_

DATE OF EVENT \_\_\_\_\_

TIME OF EVENT \_\_\_\_\_

EVENT LOCATION \_\_\_\_\_

TYPE OF EVENT

Conference \_\_\_\_\_ Workshop \_\_\_\_\_ Lecture \_\_\_\_\_

Meeting with featured speaker \_\_\_\_\_

BRIEF DESCRIPTION OF THE EVENT\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



**We're always looking for new ideas, concepts and articles! Please share your thoughts with Rhoda Weiner, Editor at [rmbw19@verizon.net](mailto:rmbw19@verizon.net)**


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## Upcoming Meetings

### **LABORATORY ANIMAL SCIENCE BIOCONFERENCE LIVE February 13-14, 2013**

This is a virtual conference open to the research community at no charge. Includes Enrichment Track  
See website [http://www.bioconferencelive.com/events.php?event\\_id=2](http://www.bioconferencelive.com/events.php?event_id=2)

### **21ST IAATE ANNUAL CONFERENCE INTERNATIONAL ASSOCIATION OF AVIAN TRAINERS AND EDUCATORS February 27-March 2, 2013 Lowry Park Zoo, Tampa, FL**

Topics include avian behavior, training, husbandry, conservation, education, enrichment, and show presentation and production.  
<http://www.IAATE.org>

### **MSMR LABORATORY ANIMAL ENRICHMENT SYMPOSIUM Friday, March 15, 2013 Starr Center, Boston, MA**

Hosted by Schepens Eye Research Institute  
For more information, go to <http://www.msmr.org>

### **ENRICHMENT EXTRAVAGANZA AT ELI LILLY April 10, 2013 Indianapolis, IN**

To exhibit or submit a poster abstract, contact Denise Bianco at 908-228-2203 or Email: [bianco@enrichmentrecord.com](mailto:bianco@enrichmentrecord.com)

### **ENRICHMENT EXTRAVAGANZA AT RUTGERS IN NEW JERSEY May 22, 2013**

To exhibit or submit a poster abstract, contact Denise at 908-228-2203 or Email: [bianco@enrichmentrecord.com](mailto:bianco@enrichmentrecord.com)

### **SHAPE OF ENRICHMENT WORKSHOP June 9-13, 2013 Omaha, Nebraska**

**Henry Doorly Zoo and Aquarium**  
This 4-day workshop consists of lectures, discussions, and hands-on activities designed to encourage participants to develop and maintain goal-oriented, holistic, individual, and assessed enrichment plans.  
<http://www.enrichment.org>  
[http://www.enrichment.org/miniwebfile.php?Region=International&NotFlag=1&File2=index\\_sb.html](http://www.enrichment.org/miniwebfile.php?Region=International&NotFlag=1&File2=index_sb.html)

### **11TH INTERNATIONAL CONFERENCE OF ENVIRONMENTAL ENRICHMENT (ICEE) October 15-18, 2013 Dinokeng Game Reserve Kwalata Game Ranch in the Dinokeng Conservancy South Africa**

This will be the first ICEE to be held in the field, 45 km from Pretoria.  
[http://www.enrichment.org/miniwebfile.php?Region=ICEE&File=11icee.html&File2=11icee\\_sb.html\\_sb&NotFlag=1](http://www.enrichment.org/miniwebfile.php?Region=ICEE&File=11icee.html&File2=11icee_sb.html_sb&NotFlag=1)  
<http://www.nzg.ac.za/icee2013/>

## **REMEMBER:**

Please send notification of your Upcoming Meetings to Rhoda Weiner at [rmbw19@verizon.net](mailto:rmbw19@verizon.net)

## Resources



### **REEC**

<http://www.enrichment.org/miniwebfile.php?Region=REEC>

*Many organizations do not have money in their budgets to send animal management staff to International conferences, but it is important that they are involved in current research, have access to information on enrichment, and share their enrichment experiences. We can all learn from each other as, in the end, we are all doing this to improve the welfare of our animals.*

REEC stands for **Regional Environmental Enrichment Conferences**. These meetings stem from conversations among delegates at the International Conference on Environmental Enrichment held in New York in 2005. A group came up with the idea of forming regional committees (SHAPE\*—Regionals) to organize meetings in different regions of the world, with the purpose of interesting people from all aspects of the animal-care industry in the discipline of environmental enrichment.

The mission of REEC meetings is to provide a venue for animal carers from smaller regions of the world to meet and discuss environmental enrichment. A primary goal is to encourage more people to attend enrichment meetings, speak at the International conferences, and publish their work in proceedings and *The Shape of Enrichment*.

To date, conferences have been hosted by UK & Ireland, Australasia, Brazil and Sweden.



\* SHAPE = Scientific Holistic Approach to Positive Enrichment!

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**Marcie Donnelly, Sr. Scientist**, Clinical Services  
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puzzle feeder, etc.,  
along with a brief narrative.*

*List the species that  
it is intended for,  
describe how the device  
is used, and include  
a short statement on the  
durability, cost, pros and cons.  
How much time is invested  
in preparation, and how  
does that compare with  
the time invested by the  
animals? If you have  
performed any behavioral  
evaluations and a  
cost analysis, include  
that as well.*

*Please send your ideas to:  
Genevieve Andrews-Kelly  
at [genandr@aol.com](mailto:genandr@aol.com)*

*Thank you!*



One of our Non-Human Primate's (NHP) favorite enrichment devices is a hanging rope toy. The toy is made up of natural jute rope—12 to 14 inches in length and 3 inches in girth. The rope is secured by non-toxic glue into a PVC cap on each end, with a hook allowing you to place a clip for hanging either inside or outside of an animal's cage. We use them primarily on the outside of our cages, where eventually the animals pull the rope completely apart. It's been a great destructive enrichment for the monkeys. They spend approximately 1 week working on pulling the rope apart, at which time we throw it out. We have also used this enrichment device inside of our gang housing play cage, where the animals have been observed using it as a swing.

This device can be used for both Rhesus and Cynomolgous monkeys; the cynos seem to enjoy this device more than most of the rhesus. Because cynos really seem to enjoy playing with various toys and being busy, this is a perfect device for them. They often spend hours pulling the rope slowly apart to form a nest in their cage, which we will leave in place for 2 to 3 days. We are lucky to have an understanding care staff that allows them to enjoy the "nests" they create with pieces of rope for a few days before removing them. So far, we have not had any clogged drains.

The benefit of the device is the amount of time the animals spend utilizing it. Since the animals spend hours focusing their attention on pulling the rope strands, this "destructive" enrichment component has been very effective for hair pullers and others with behavioral issues. Added benefits are no extra calories, as they would get from food treats, and, when finished, the device is simply tossed in the garbage. The impact on staff time is minimal: washing the ropes through a hot water only cycle, placing clips on the hooks, and hanging on the cages. The only negative aspect of the device is the price, approximately \$22.00 per rope. But, when the animals work the rope for approximately 5 to 7 days, this makes it a better value, and when used with other non-destructive enrichment, the cost is not as high as you might think. We usually give these ropes out once every 1-2 months, so cost versus benefit is worth it for us.

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There's an old saying that "You can't dance at two weddings at once." You also can't attend all the meetings and conferences taking place that offer the latest information in the field of laboratory animal science.

**Meeting Up** will provide summaries of panels, workshops and symposia covering topics relevant to Environmental Enrichment. If you want more information about any of the presentations described or want to contact the presenters, let us know and we will be happy to connect you: [rmbw19@verizon.net](mailto:rmbw19@verizon.net)

## **Innovative Environmental Enrichment Symposium**

*By Jennifer Camacho, LVT, LATG*

*Karen Froberg-Fejko, LATG, VMD*

The 6th Annual Enrichment Symposium was held on Sunday, November 4th, 2012 satellite to National AALAS at the Hilton Hotel in Minneapolis, Minnesota. The meeting is hosted by The Massachusetts General Hospital and the purpose of this symposium is to highlight innovative animal enrichment and conditioning programs and to identify interesting leads for further investigation that may improve enrichment strategies in the laboratory research environment. The following were highlights from the speakers' presentations.

### **Studies on rat empathy: implications for animal husbandry**

*Peggy Mason, University of Chicago*

In rats, empathy develops from the dam understanding what pups need and researchers theorize this is the beginning of empathetic behavior. The question posed by Dr. Mason is: Can a rat feel the distress of another and can a rat do something about it? Her study paradigm was to observe if a free rat would liberate a trapped rat. Her studies found that helping another rat in distress is a biological mandate and that not helping requires suppression of this biological inclination. The implications upon husbandry routines should be considered, since witnessing the restraint of a rat is a clear stressor to the other animals.

### **Facial expression of pain in laboratory rodents**

*Jeffrey Mogil, McGill University*

Dr. Mogil developed a facial grimace scale in mice using digital video and cropping the area so that only the face of the mouse is seen. A grimace scale was developed from 0=grimace is not visible to 2=grimace is visible, and it was tested to be a reliable means of evaluating pain in mice. His paradigm appears to be reliable in rats and may be a means of assessing pain in other species.

### **Effects of social environment and housing conditions on the brain, physiology, behavior of laboratory animals: friend or foe**

*Scott Wersinger, Buffalo University*

Dr. Wersinger led his presentation by defining the German word for "unwelt" as thinking about (the animals') sensory experience. He gave examples of how the environment can have an effect upon behavior and physiology. For instance, taking a rubber stopper off a tube can be perceived by some species that hear in the ultrasound range as a very loud noise. There is no consensus definition of what defines an animal's social behavior and he encouraged the audience to think of social behavior as an art or a concept. The environment influences social behavior and he demonstrated several examples of how the social isolation can negatively affect social behavior.

### **Monkey emotion: theoretical and practical approaches to understanding animal well-being**

*Eliza Bliss-Moreau, UC Davis*

In this presentation, what makes

for a good animal model was discussed in the context of behavior. "Good" animal models being those that present in "good" behavioral states defined by their affective state of emotion, represented by complex, dynamic behaviors. This speaker described affective states of emotion and reviewed behaviors exhibited by non-human primates in these perceived states supported by biological and physiological data parameters. Practical applications of care, social housing and operant conditioning were also described as processes that can increase the animals' affective state and quality as a laboratory animal model.

### **Is Environmental Compensation The Keystone of Welfare Reform for Primates?**

*Paul Honess, Ph.D. Bioculture Group*

This presentation reviewed the use of enrichment, cage complexity and space—defined as "environmental compensation" as a component of a behavioral management program specifically for a group housing scenario in a breeding facility. The presentation highlighted data to support enrichment validations encouraging best practices and avoid a 'reinvention of the wheel' at the end-user location. With an increasing emphasis on social housing, this speaker highlighted the efforts that are applied at a vendor location to support laboratory housing location: keeping animals in normal social structures and exposed to environmental enrichment in response to undesirable behaviors.

# Explaining Enrichment Engagingly

*As a fellow advocate for enrichment I know well the powerful advantages it offers both animal care and animal research. And so I feel the same frustration you do when I encounter those who dismiss enrichment as a trivial or non-productive endeavor.*

*However, as a long-time research communicator, I've developed strategies that you can use to overcome such resistance. Here are some of the most useful precepts I've followed, based on my experience, and drawn from my book *Explaining Research*.*

## **Acknowledge, don't argue.**

It's tempting and natural to become adversarial when you encounter, say, an old-line vet who's dead set against enrichment, claiming that it interferes with cost-effective animal care. A better strategy is to take time to acknowledge those beliefs, even reciting their own arguments that favor their position. Then you've set the stage for a more benign "transformative explanation," as one of my communicator colleagues terms it.

For example, you'd say something like, "Yes, I can understand how enrichment has been seen as adding to the budget and requiring more time for technicians. That's an issue we've addressed, too." But then you can proceed to say "Those are certainly valid concerns. But what we've seen is that labs that launch the programs have seen advantages

in that the enriched animals end up having fewer pathologies, which can lower veterinary costs."

**Frame the issues.** A related technique is to "frame" the discussion with people who oppose enrichment in a way that resonates with their values. For example, rather than framing an enrichment discussion as "improving animal welfare," you would emphasize "achieving an optimal research environment to promote the best research."

This frame might include raising the question: "Is an animal a valid scientific model if it exists in a stressful, unnatural environment?" Another question might be "Given the fact it's not possible to anticipate as-yet-unknown future experiments with an animal model, isn't it wisest to maintain them in an optimal behavioral environment?" After all, such factors as stress and unnatural environments are proven to have developmental, physiological and behavioral impacts. Future experimental protocols may *depend* on observing normal nest-building, exploration, foraging and other behaviors.

## **Accentuate the positives.**

When faced with a negative charge, your first inclination is to deny it. But the best strategy is not to deny, but to *confirm a competing positive idea*. A denial only works in the short term, and people still remember the negative. The best example of this strategy comes,

oddly enough, from the Obama presidential campaign. He was falsely accused of being a Muslim, but social scientists aiding his campaign advised him not to deny it, but rather affirm by statement and deed that he is a Christian. For example, he would end his speeches with "God bless America," and his campaign made sure there was coverage of his church attendance. It worked, and the accusation faded from the public discussion.

In the case of enrichment, a negative charge might be "You just want to throw some toys in the cage." Rather than deny that, you might positively discuss the multiple components of enrichment, including providing bedding, social interaction, and food variety that an animal care professional would likely agree are valid additions to an environment.

**Cite authority.** Those who minimize the significance of enrichment can hardly take issue with its endorsement in the latest edition of the *Institute for Laboratory Animal Research Guide*. The *Guide* cites studies in mice that indicate "housing conditions can be enriched without compromising the precision or reproducibility of experimental results," and states that "it has been shown that conditions resulting in higher-stress reactivity increase variation in experimental data. Because adequate environmental

enrichment may reduce anxiety and stress reactivity...it may also contribute to higher test sensitivity and reduced animal use."

Besides these general communication strategies, there are also specific techniques that help you persuasively tell the story of enrichment's value:

**Show quality visuals.** Simply using text, charts, diagrams and drawings to depict doesn't engage the brain's powerful visual processing machinery. Always try to accompany any article or talk with quality photos and video of enrichment in action. If possible, hire a professional photographer or videographer to make the visuals most compelling and attractive. Even stock photos help. When you're talking about enrichment for a particular species, show images or video of that species, even if they don't portray the animals you're talking about.

**Tell stories.** When you write or talk about enrichment, don't just communicate in the abstract. Tell anecdotes about labs that launched enrichment programs and that achieved successes. And make those stories vividly descriptive, concrete, and personal. Neurological studies have shown that such stories engage audiences on more than an intellectual level. MRI scans of people reading stories have found that the stories activate brain regions associated with the story's content. For example, reading about action switches on the motor cortex; reading

about an aroma switches on the olfactory cortex. These studies revealed that your audience is "building" a minds-eye model of your story in their brains. You're engaging their imagination.

In the end, your strategy with all these techniques is to emphatically convey the message that enrichment is an accepted, integral component of quality lab animal care. And any facility that has not implemented enrichment is neglecting

its responsibility to foster the best possible science.

#### References:

Nisbet, Matthew C., and Mooney, Chris, "Framing Science," *Science*, April 6, 2007, Vol. 316 no 5821, p 56 (subscription required)

Academic 'Dream Team' Helped Obama's Effort <http://www.nytimes.com/2012/11/13/health/dream-team-of-behavioral-scientists-advised-obama-campaign.html?pagewanted=all>

Paul, Annie Murphy, "Your Brain on Fiction," *New York Times*, March 17, 2012 <http://www.nytimes.com/2012/03/18/opinion/sunday/the-neuroscience-of-your-brain-on-fiction.html?pagewanted=all>

**Dennis Meredith's** career as a science communicator has included service at some of the country's leading research universities, including MIT, Caltech, Cornell, Duke and the University of Wisconsin. He has worked with science journalists at all the nation's major newspapers, magazines, and radio and TV networks, written well over a thousand news releases and magazine articles, was a creator and developer of **EurekaAlert!**, working with AAAS to establish an international research news service, which now links more than 4,500 journalists to news from 800 subscribing research institutions, and is the author of: *Explaining Research—How to Reach Key Audiences to Advance Your Work*

Research success depends not only on conducting incisive experiments and publishing in top journals but on explaining a researcher's work clearly and engagingly to important audiences: colleagues, potential collaborators in other disciplines, officers in funding agencies and foundations, donors, institutional leaders, corporate partners, students, legislators, family and friends, journalists, and the public. *Explaining Research*, published by Oxford University Press, is a comprehensive guidebook describing tools and techniques for scientists, researchers and engineers to reach all these audiences effectively.

His next book, *The Rainbow Virus*, a science fiction adventure, will be published in January.

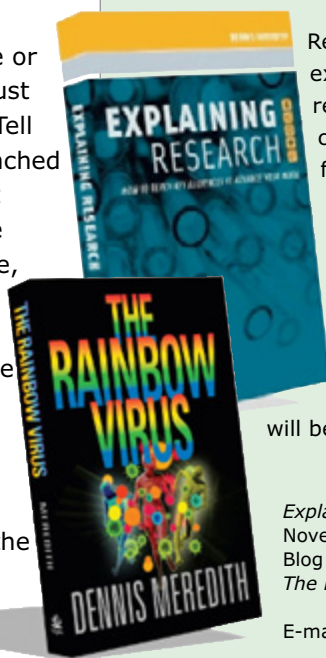
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*The Rainbow Virus*

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## Environmental Enrichment for *Xenopus laevis*



Environmental enrichment has become an important aspect of animal care in research facilities over the years. It is easy to come up with enrichment for mice, rats, and other mammals; however, what do you get for enrichment for aquatics such as *Xenopus*? This is the question we were trying to answer at our Vivarium.

We tried to think of things a *Xenopus* would have in their natural environment, but would also be practical in a controlled lab setting. First we started with rocks. We found that the frogs liked to hide in the rocks, but when they would kick up food along the bottom they would get the rocks in their mouth

and spit them back out. We then tried bigger colored rocks which they liked to play with, but eventually ignored.

Looking for better ideas, we came across floating plastic plants and squares of plastic plants that sat on the bottom of the cage. We checked carefully to make sure there were no sharp edges the frogs could cut themselves on, and nothing about the plastic that could harm our frogs in any way. We noted obvious changes in the behavior of the frogs after adding the plants to the tanks. The frogs changed from always hanging out in the back of their cage to coming up to the front wanting food from the technicians as they

entered the room. A couple of the frogs have even started to eat kibbles out of the tech's fingers when being fed which they would never do before the plant enrichment. We interpreted this to mean the frogs felt safer and were willing to interact more with animal care staff.

Our next step was to find a food enrichment of some kind we could feed once a week to enhance their natural hunting skills. We tried 2 different types of food enrichment, frozen blood worms and live crickets.

The frogs readily eat the blood worms and seem to enjoy them. Some would eat the whole frozen



block at once, some would wait until it was thawed and then scurry around the bottom scooping them into their mouth and others would wait until the tech left and eat all their blood worms. No matter the case, there were never any bloodworms left in the cage when we came in the next day to change the room. We even have one frog that gets so excited for food that she will eat the blood worms straight out of the container. You have to be cautious of them eating out of the container so they don't get a hold of the plastic and try to eat it too!



The crickets we found to be a little more challenging. Crickets are difficult to get out of the cage to put in with the frogs and not have them jumping out. The last thing we want are loose crickets in our Vivarium. They were also difficult to feed to the frogs. If you try to hold the crickets with tweezers, you run the risk of potentially injuring the frog. Crickets don't drown easy and could possibly get out of the frog cage depending on the setup. Most of our frogs did not pay attention to the top of the water so they didn't see any crickets floating on top.



All in all, we did manage to find environmental enrichment for our frogs that they loved. With the plants there is a noticeable difference in their behavior and how they interact with the technicians. The blood worms are just an added bonus treat they get once a week. This just goes to show that no matter the animal, there is some type of environmental enrichment to improve their life in a lab setting.

## Kidding Around in the Laboratory Animal Facility— Goat Enrichment



Goat enrichment can be incredibly rewarding, not only for the goat, but for personnel as well. In our facility, we often refer to goat enrichment tasks as technician (or vet!) enrichment. Somewhere in the evolutionary development of *Capra hircus*, curiosity and play drive emerged as positive forces for survival, and this is in evidence in the domesticated laboratory animal as well as in wild goats.

Goats used in laboratory animal medicine are most commonly meat or milk breeds, often culled from livestock herds, and not usually bred specifically for research.

As a result, their individual behavior in response to humans will most often reflect handling practices within the herd of origin.

However, much of the behavior of the domestic goat reflects that of the wild goat. Goats flee to escape predators, and will flee from human contact if feeling threatened. Goats are browsers in nature, and investigate their world through oral contact, mouthing what they can, and subsequently eating or rejecting items. Smell is also an important sensory input to goats, and a goat may sniff a food item and reject it without mouthing.



Goats will greet each other by sniffing mouths and noses, and frequently attempt to interact with humans the same way. Due to the potential for zoonotic transmission of pox virus (soremouth), this should be discouraged. (No kissing the goats.)

As befits browsers, goats are excellent climbers, and explore their environment on more than one level, also using height advantage to establish dominance. Goats are hierarchical herd animals, establishing structure through familial relationships in a herd, and play and fighting, and will engage in social grooming. Fighting behavior, or head butting, can be intense in close confines. Goats of higher status will bully others, and not hesitate to pursue and head butt lower status animals to control movements and access to feed within a herd. But the social nature of goats truly demands that they not be kept alone. Goats require housing with other animals—if not in a herd, then within sight and sound of other goats or sheep. Domestication has resulted in animals who are generally very tame, amenable to handling, very trainable and who enjoy being groomed.

Expect goats to mouth all objects put into their pens or stalls. Multiple species enjoy toys, and goats are no exception. Plan to move toys on a weekly or biweekly basis to stimulate investigative behavior, and

use toys made from hard metals and unbreakable plastics materials to avoid consumption of pieces of toys. For auditory and oral sensory stimulation, try hanging unbreakable metal toys or hard rubber dog/pig toys from pen doors or walls to provide opportunities for mouthing and noise making. Many goats will shake toys, banging them against surface, often rubbing the toys up and down on bars and flipping them around with their noses to produce quite a racket. Metal bucket handles can be removed from the bucket and attached to fences to provide more items to bang—but be certain to use handles that the goats cannot get their heads through. Empty paper bedding bags (staples removed) and cardboard boxes will be mouthed, torn, stepped on, laid upon, hidden behind, and dragged around. Watch carefully to ensure that goats do not eat paper items—some animals will, though small amounts are generally tolerated well.

Dog and horse toys, specifically designed to stimulate foraging behavior with slowly released treats, can be used with goats as well. But foraging toys can also be very cheaply made. PVC pipe pieces drilled with holes to insert food objects are popular with some goats. Large clean plastic jugs (such as used laundry detergent bottles) can be substituted, and, even without

food treats inside them, will be batted around for hours. If possible, put toys at all different height levels. Goats will stand on their hind legs to investigate bottles hung on ropes from the ceiling, or get down on their knees to work on items attached to gates and walls at low levels. Toys do not have to be attached to anything to be useful: clean empty water cooler bottles or milk jugs with small amounts of grain, crumbled gingersnaps, peanuts (in the shell, unsalted) or other small pieces of fruits and vegetables are a favorite. Goats learn to tip and roll them to obtain treats—and then may continue to throw around and try to climb on the empty containers for hours at a time. Try placing small amounts of hay in hay nets hung from walls at or above head level on all sides of the pen to encourage browsing like feeding behavior. Similarly, for goats who destroy hay nets, try stuffing hay in 'squirrel proof' type cylinders or spheres used to surround bird feeders—the small holes will encourage the goats to work at pulling out the hay for hours. A bale of hay or straw bound with a nontoxic twine placed into the pen will stimulate feeding behavior as the goats try to break it apart. And, the goats will spend a great deal of time jumping on and off the bales. Because dominant animals will guard attractive

*continued on page 16*

food sources, be certain to provide multiple enrichment items at a time for group housed animals to avoid increasing social stress.

A healthy goat is an active goat. It is important to provide ample opportunity for exercise. Give as much room to the animals as possible, and, if possible, house goats with access to outdoor enclosures. Group housed animals will play king of the mountain and fight over milking stands, plastic stools or steps placed into enclosures. In small pens, try placing a half-barrel or upside down bucket in the pen. Wooden packing crates and wire spools make inexpensive toys as well, although there is the potential for toxic materials to remain in the wood. A simply made balance beam—an untreated, but disinfected 6 foot long 2x4 placed in between two bales of hay or concrete blocks provides an inexpensive climbing structure. Better yet, old childrens' plastic play huts, play houses, teeter totters, or slides (all of which can be easily disinfected) will be used regularly. If space is limited, take goats for walks in hallways on a daily basis to encourage activity and condition animals to human contact.

The use of 'furniture' in the pen is not limited to exercise. By breaking up the spaces in the pen with visual barriers, social structure can be influenced. Bullying behavior is often decreased, with lower ranked animals given an opportunity to escape others behind pen furniture.

Shy animals will hide behind or place furniture in between themselves and humans to decrease anxiety when approached, or when cleaning occurs. Furniture provides opportunity for grooming as well. Hang clean plastic scrub brushes, broom heads (some goats will try to eat these), or specially made 'scratch boards' (hard plastic boards with short bristles, marketed for horses and livestock) from walls and gates to encourage goats to engage in comfort behaviors of scratching and self-grooming.

Contact with humans can be a very valuable form of enrichment. Goats are easily trained with positive reinforcement. This can take the form of a food reward (we use cereal, cookies, nuts and grapes) or grooming reward. Just as with pigs, dogs or monkeys, shaping behaviors through positive reinforcement decreases stress, increases productivity and ease of performing procedures on animals, and reinforces ethical animal treatment. For example, training goats to run to a scale and jump on for weekly weights with gingersnaps, or to jump onto a milking stand for blood draws by providing a bucket of grain, is easily accomplished in just a few training sessions in most cases. Two zoos have recently even taught goats to paint using positive reinforcement techniques. And, the positive reinforcement provided by interaction with a healthy, normally behaving goat is good for technicians and scientists alike.

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## Doggy Doors for Macaque Dam/Infant Pairs

At the Oregon National Primate Research Center, we have a substantial population of breeding non-human primates, mostly rhesus and Japanese macaques. While most of our animals live in small groups, we do occasionally need to house dams and infants in cages either due to injury or illness, or to have a procedure. In other cases, infants need to be separated from their dams in their home cages for illness or injury. The reasoning for this decision is so that the dams do not eat the diet or medication intended for the infant. However, this can add stress to both the infant and the mother. We have found this to be especially true with Japanese macaques. The stress from this separation can exacerbate the medical problem which prompted the separation in the first place. Further, for animals on research protocols, this added stress can also affect study results. We have come up with a simple solution which allows the infant to spend time with its dam in the cage, and also allows it an area where it can get to its medication or special diet.

Where separation is necessary, we utilize "doggy doors." Dam/infant pairs are housed in double cages, per USDA rules. These are two 4.5 cubic meter cages placed next to each other with the joining walls removed and a removable slide placed between them. This slide can either be solid steel, a mesh steel slide, or a grooming contact slide, which allows animals to groom



and touch each other without being able to move from cage to cage, or can be removed altogether.

We have made a slide we call a "doggy door." We cut a doorway in a ¼" Plexiglas cage divider, which came from caging we no longer use, but fits our current caging. The doorway is an arched "mouse hole" shaped opening, about 6" tall by 4" wide, small enough that the infant can move to either side of the cage, but prevents the dam from doing so. The slide is clear, so the dam and infant can see each other, which is important because it allows the dam to maintain constant visual contact with her infant. The slide allows the infant

to be fed or medicated on one side of the cage without the dam being able to get the food or medication. At the same time, the infant can go to its dam at any time. We used a jigsaw to cut the plastic. Because the friction of the blade will eventually melt the plastic, rather than cut it, we had to go slowly, a couple inches at a time. The rough edges were then filed off.

When we initially introduced the slide to our first dam/ infant pair, we were not sure whether the infant would leave its mother to get food placed in a pan on the other side, but it readily went to the other side of the cage to eat its diet.

## Environmental Enrichment in Chinese Research Facilities

The phrase "Environmental enrichment (EE)" is defined in many ways. As early as 1925, Robert Yerkes introduced the concept, saying: "The greatest possibility for improvement in our provision for captive primates lies with the invention and installation of apparatus, which can be used for play or work." However, environmental enrichment has only recently become a popular topic in laboratory animal facilities in China. Progress is largely due to the increasing international collaboration of new drug discovery and development between China and western countries. With more and more research projects being outsourced to China, and an increasing number of facilities getting AAALAC accreditation, the environment of laboratory animals is being enhanced. This article tracks the progress of environmental enrichment in China's laboratory animal facilities.

Investigators who use animals in biomedical and behavioral research have an obligation not only to conduct high-quality research but also to promote the health and well-being of their animal subjects. "Regulations for the Administration of Affairs Concerning Experimental Animals (RAACEA)," China's first legislation for the research animals, was issued by the State Council in 1988. It regulates the basic animal welfare protection standards such as facility construction, diet, drinking water, housing space, microbiology, nutrition, etc. Although there is little description in RAACEA about



environmental enrichment, the physiological and psychological needs of the research animals are taken into account when the facility is designed and the management program for animal housing and handling is prepared. Over the years, there have been substantial efforts to improve the housing conditions of laboratory animals.

The first item introduced to research facilities was the perch for non-human primates, which was followed by the stainless steel mirror. Primates are no longer housed in barren living quarters in the majority of research laboratories. Sensory enrichment such as television, background music,

and videotapes have appeared in some canine and primate facilities. Some facilities provide canines with a common playground where the animals have the freedom to get out of primary enclosures and move around for a half-hour of daily exercise.

The importance of animal-animal and animal-human interactions is being recognized. Research technicians understand that the positive relationships that develop between facility personnel and laboratory animals may result in an overall reduction in stress for the animals and may serve to buffer the potential stress of certain experimental situations resulting from the novelty of the procedure area, disease conditions, or certain experimental procedures. Conversely, they are beginning to see that rough handling is stressful for animals. Canines and non-human primates recognize individuals and become frightened of those who handle them aggressively.

Recently, the boom in drug discovery and development in China has accelerated animal study technology as well as animal welfare protection. The impetus comes from the global pharmaceutical companies establishing R&D centers in China. Equally important, thousands of Chinese researchers who have been trained abroad are returning with state-of-the-art research techniques grounded by the concept of

humane treatment of animal subjects. Importantly, more researchers and management are adopting international standards and best practices. In 2005, the laboratory animal facility of Nanjing Medical University School of Public Health was the first research facility accredited by AAALAC in China. By end of 2011, the number increased to 36, and more than 50 other facilities are applying or have a plan to apply as soon as possible. International conferences and training programs are increasingly relevant to improving laboratory animal welfare. Exposure to programs like the AALAS Learning Library and GR8's introductory course in laboratory animal care and use motivates technicians to pursue a career path in a profession that is young but highly promising in China. Both the animals and the people engaged in research are benefitting.

Today in China research facilities support 5 kinds of enrichment programs:

1. Social enrichment, which can involve either direct or indirect (visual, olfactory, auditory) contact with conspecifics (other individuals of the same species) or humans.
2. Occupational enrichment, which encompasses both psychological enrichment (e.g., devices that provide animals with control or challenges) and enrichment that encourages exercise.
3. Physical enrichment, which can involve altering the size or

complexity of the animal's enclosure or adding accessories to the enclosure such as objects, substrate, or permanent structures (e.g., perches, nest boxes, bio-huts, etc.).

4. Sensory enrichment, or stimuli that are visual (e.g., television), auditory (music), or in other modalities (e.g., olfactory, tactile, taste).
5. Nutritional enrichment, which can involve either providing varied or novel food types or changing the method of food delivery (e.g., vegetable, sunflower feeds).

The IACUC plays an increasingly important role as environmental enrichment is introduced into a facility. They are developing standard operating procedures (SOPs) detailing every aspect of the process from choosing the appropriate device to evaluating its impact on the animals and the science. Studies are being conducted to evaluate the animals' physiological and psychological status with and without EE, and findings are being published.

Although progress has been made in the last decade, there is still a long way to go to improve the housing environment of research animals in China. For instance, in some of primate facilities, cages are stacked on top of each other in double-tiers to accommodate a maximum number of animals in windowless rooms. Non-human primates, intelligent and social

creatures that need compatible companions for emotional well-being and behavioral health, are suffering from boredom and depression in a monotonous, relatively unchanging environment. Rodents are social animals too; however, in some toxicity studies, they are singly housed without even bedding in the cage. Reasons for such deficiency can be summarized as following,

1. Lack of local regulations governing environmental enrichment for laboratory animals in China.
2. Lack of management support. Facility management does not routinely consider housing conditions and other animal welfare issues. The budget for laboratory animal husbandry is always inadequate.
3. Lack of adequate training. Animal welfare training lags behind the advance of the facility construction and research capability growth.
4. The lack of data tracking enrichment usage in Chinese local facilities.

Serious efforts are being made to overcome these challenges. Documentation of enrichment usage is accumulating, and more researchers are realizing the benefits of using enrichments to promote animal welfare and advance science. As more researchers are exposed to environmental enrichment, we can expect a dramatic improvement in research animal welfare and in the husbandry environment as well.

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## Szczepan Baran, V.M.D., MS

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*Environmental Enrichment plays a significant role in research because it is important to eliminate the non-experimental variables, variables such as stress that can potentially impact our studies. To do that, we need to provide the best possible species-typical environment.*—Szczepan Baran

Professor, author, researcher, trailblazer, gifted facilitator, dedicated volunteer and skilled rough-houser, Szczepan Baran has over a decade of experience in the field of laboratory animal medicine and research. During this time, he has facilitated the development of numerous surgical and bi methodology training programs in academia and industry, encompassing numerous species. An important goal is to provide an environment that leads to less stress and consequently better results, ultimately increasing animal welfare and decreasing the number of animals in a study.

Dr. Baran earned a Bachelor of Science degree in Animal Science from the University of Delaware, a Veterinary Medical Doctorate from the University of Pennsylvania and a Master of Science degree from the University of Washington. As a student at the University of Pennsylvania School of Veterinary Medicine, he was inspired by faculty member Harry Rozmiarek, DVM, Ph.D., DACLAM, currently Director and Attending Veterinarian, Fox Chase Cancer Center Laboratory Animal Facility, and Laura Conour, DVM, DACLAM, Director, Laboratory Animal Resources, Princeton University, whom he met while serving an externship at GlaxoSmithKline.

Dr. Baran's research interests include embryonic stem cells, the development and validation of online surgical training programs, and the development and validation of rodent laparoscopic procedures. He established a freezing protocol for Nonhuman Primate Embryonic Stem cells, which has increased their survival from 5% to over 90%. Additionally, he was a contributing team member in the development of one of the first canine embryonic stem cell lines and has pioneered new territory by demonstrating the effectiveness of online surgical training in the laboratory animal medicine field.

Current work centers on the refinement and development of gastrointestinal and laparoscopic rodent procedures and the development and implementation of surgical efficiency and surgical competency and proficiency assessment

programs. He has also demonstrated various refinements, which have led to increasing rodent surgical procedure efficiencies. As of October 2012, he has published or contributed to over 25 papers and abstracts and one book chapter, and has delivered approximately 75 special presentations at various academic institutions, and national and international meetings. Dr. Baran serves as a consultant to the biotechnology industry and other institutions of higher education, and has served as reviewer of several journals and book chapters. Currently, he is writing a rodent laparoscopy and colonoscopy book, which will be the first one of its kind.

On the side, for the past three years, he has studied micro facial expressions, which can be incorporated into any type of interview and assist with decoding the candidate.



### **Mission**

**Implementation of the three Rs (Replacement, Reduction, Refinement) into Laboratory Animal Sciences Education and Training to improve animal welfare and research.**

A leading provider of cost-effective and highly efficient Internet-based technical and surgical-methodology resources, VBI, established in 2008, is an innovative company that is changing the future of experimental surgery and veterinary training. Specializing in the art and science of surgery and bioethics while emphasizing the responsible use of animals, VBI provides online and hands-on surgical and biomethodology training to the global research community. VBI's training programs

meet regulatory and industry regulations and fulfill continuing education requirements.

Beyond training, VBI has developed a unique, comprehensive and objective competency assessment program and related scoring system that is an adaptation for the biomedical community of the validated system used in human medicine and surgery. In addition, VBI is the first educator for the biomedical community that successfully utilizes a validated human model for knowledge transfer: online surgical training followed by hands-on training. The company's comprehensive approach results in more competent surgeons, better surgical outcomes, improved animal welfare and better scientific data.

Originally headquartered in Harleysville, PA, VBI recently partnered with Preclinical Surgical Services (PSS) at Wake Forest Baptist Medical Center's Office of Research to produce educational materials for veterinary and biomedical personnel and institutions. Surgeons and staff members from PSS and resources such as surgical suites, imaging services and laparoscopic training facilities will be featured in instructional videos and other products that will be developed, produced, marketed and distributed by VBI. In addition, the PSS-VBI collaborations will include online courses, webinars and seminars for clinical and research veterinarians, biomedical research faculty and technicians, and instructors and students in pre-veterinary, veterinary and veterinary technician programs.

VBI is dedicated to raising the bar on continuing education standards and implementing the three Rs.

Under the leadership of Dr. Baran, VBI is revolutionizing the standards of surgical excellence and continuing education for the biomedical community.

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### **Thoughts on the Future of Environmental Enrichment**

*The future looks great. Until recently there was very little data. Now, the field is growing and environmental enrichment is something everyone is talking about.*

*At many institutions, when an enrichment program is in place, the investigator has to show why an enrichment device should be **eliminated**. This policy is the opposite of a couple years back, when you had to show why it should be **implemented**. That's fantastic!*

*In addition, meeting or seminar space on environmental enrichment sells out immediately, demonstrating there is much in interest in this topic.*

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*I first became aware of Szczepan at a LAWTE meeting where the quality of his materials caught my eye. When we finally met in person, all the positive qualities I saw in his brochures came to life: dedication to the highest standards of laboratory animal welfare; professionalism; enthusiasm for teaching and helping others to improve their skills; and a passion for expanding the community of caring and compliance. Szczepan is one of our brightest and best, and we are lucky to count him among the emerging young leaders of the animal research community.*

—Jayne Mackta, President/ CEO,  
Global Research Education and Training, LLC (GR8)

## Enrichment Record Poster Repository

In 2010, Szczepan Baran, President and Chief Operating Officer of the Veterinary Bioscience Institute (VBI) and Jayne Mackta, Publisher of *The Enrichment Record* and President & CEO of Global Research Education & Training, LLC (GR8) perceived the need in the Laboratory Animal Science community to expand communication to a broader audience.

To meet this need, *The Enrichment Record*, together with VBI, introduced the **Enrichment Record Poster Repository**, an open access repository that provides a structured and safe environment for the deposition of enrichment posters and abstracts.

Often, enrichment information presented as posters at conferences is not published and is lost once a conference is over. If it is published, it is published at a much later date. This repository provides Laboratory Animal Science community members with access to early enrichment information presented at conferences while allowing authors to maximize the value of their posters by dramatically increasing availability and by helping to prevent lengthy delays before others can benefit from their new enrichment research.

**The Enrichment Record Poster Repository** is subdivided into categories by species, making it easy to locate information for the viewer.

The submission process is simple and has safeguards in place to ensure applicability and maintain quality standards. After a poster is submitted, there is a 24-hour delay, which allows time for review of submitted information to confirm that it is appropriate for the site.

The Enrichment Record Poster Repository is an open access repository, meaning that anyone will be able to view these posters. We believe open access promotes transparency and supports outreach efforts that help educate both internal and external audiences. Sharing is the optimal way to distribute information to the Laboratory Animal Science community and beyond. You can post anonymously as long as you provide your authorship information to *The Enrichment Record*.

We are looking forward to your submissions and feedback.

Visit the site: <http://www.vetbiotech.com/posters2.php>

### POSTER ABSTRACTS

#### Developing an Institutional Enrichment Program

Joleen K. Adams, DVM, Chris L. Carter, LVT, LATG, Jane C. Czarra LATG, William A. Hill, DVM, MPH, DACLAM and Patricia N. Coan, DVM, PhD, DACLAM  
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Providing an enriched environment with which the animal can interact is a critical component of our institution's animal care and use program. The *Guide for the Care and Use of Laboratory Animals* states that "the primary aim of environmental enrichment is to enhance animal well-being by providing animals with sensory and motor stimulation, through structures and resources that facilitate the expression of species typical behaviors and promote psychological well-being." In accordance with recommendations set forth in the eighth edition of the *Guide*, a main objective of our enrichment program is to afford the expression of appropriate species-specific behaviors by our research and teaching animals. Group-housing methods are the default method of housing our social species. Rodents are encouraged to engage in foraging and nest building behaviors. Our dogs and cats are provided with manipulanda that encourage physical and/or mental activity. Items used for enrichment are also on a rotation schedule in order to ensure the novelty of the enrichment item. As with any aspect of the animal care and use program, there is a balance between animal welfare and the needs of research, a principal that applies to environmental enrichment as well. The *Guide* reiterates this principle in recommending that the enrichment program be reviewed by the IACUC, researchers, and veterinarian. We adopted this approach in the development of our revised environmental enrichment program. The Office of Laboratory Animal Care in conjunction with animal care staff and management developed by SOP for environmental enrichment for our research and teaching animals. These SOP were then distributed to investigators for review and comment before being sent to the Animal Care and Use Committee for further discussion and final institutional approval. Having all those who have a stake in the animal care and use program provide input in the enrichment program helps ensure that the enrichment strategies employed are both beneficial for animal well-being and consistent with the goal of animal use.



## Staff-Directed Environmental Enrichment Program

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The eighth-edition of the *Guide for the Care and Use of Laboratory Animals* states that the IACUC, researchers, veterinarians, and animal care personnel should be involved in reviewing and evaluating the institution's environmental enrichment program. Our IACUC annually reviews the enrichment SOP; however, we wanted to actively include our animal care staff in planning and evaluating our environmental enrichment program. We had our staff complete an online environmental enrichment training course in addition to courses on the behavioral biology of each species we house. Staff members volunteered to write environmental enrichment SOP for the various species housed. Staff then devised a schedule to rotate enrichment objects in animal rooms to vary the type of enrichment the animals received with each cage change. Staff members also developed a checklist to complete each time they changed cages, to evaluate the use of each enrichment object by the animals. On the sheet, they note which environmental enrichment object is in the cage, the species and strain of animals in the cage and if animals are using the object in a species-specific manner. We review these check-off sheets on a regular basis to assess the effects of our environmental enrichment plan to animal well-being. In addition, the investigators communicate regularly with our staff about which enrichment objects are acceptable for their study animals. These activities ensure that our animal care staff participates in an ongoing process to review and evaluate our environmental enrichment program.

## Refinement of Swine Enrichment via Customization of Foraging Balls Results in Increased Duration of Play

Rebecca Glock, Shannon R Balsler, Stephanie Lewis  
University Laboratory Animal Resources  
The Ohio State University  
Columbus, OH

Providing research animals with appropriate environmental enrichment helps to encourage species-specific behavior. In swine, this includes behaviors such

as rooting and foraging. One of the ways to achieve this goal for swine is to place food enrichment into a foraging ball—a hard, hollow, plastic toy which has pre-drilled holes in it to engage the swine in removing the food. Many of the commercially available foraging balls for swine have multiple small holes throughout the surface. This requires the use of small food items, which poses the problem of food falling through the grated, elevated flooring that swine are housed on in our facility. There are also commercially available foraging balls that have few extremely large holes in the surface, and in our experience, they do not present enough of a challenge for the swine. In an effort to provide the best possible enrichment for our swine, we created customized foraging balls from herding balls—a hard, hollow, plastic ball with no holes. The herding balls were customized by drilling, varying size and numbers of holes. This allowed larger food enrichment choices, which would not fall through the flooring, but still provided a challenge for the animals. The swine were observed playing and investigating the foraging balls for longer periods of time, approximately 30 to 45 min while there was food in the ball. These customized foraging balls create a more challenging experience for our swine, thus extending playtime and providing a better enrichment experience in our facilities.

## New Hire Training and Environmental Enrichment Building the Foundation for a Lifelong Commitment

Michael Savidge  
Huntingdon Life Sciences, East Millstone, NJ

Enrichment is of paramount importance in work involving animals, which should not be a surprise to anyone working in a laboratory animal environment. Presenting an animal with a treat reward or a pat on the head and a reassuring “good dog” go a long way in strengthening the bond between technician and animal. But how can we ensure that newly hired individuals are aware of the importance of providing enrichment? The approach used by our institution is to educate new hires in the benefits of enrichment and couple all technical- and husbandry-related training with enrichment training. By incorporating enrichment into our institution's training program, we instill in new hires that every interaction with an animal is a time to provide enrichment. The requirement to provide enrichment is routinely reinforced and ultimately mandatory for all personnel

working at our institution. By enriching the lives of our animals, we strive for sound science. Minimizing any stress our animals experience helps to keep the animals in good health, producing better research models.

## Audio-Visual Enrichment Preferences Noted in Captive Cynomolgous Monkeys (*Macaca fascicularis*)

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One of the more commonly used forms of environmental enrichment for laboratory nonhuman primates (NHP) is the provision of audio and visual stimuli in the form of animated or live action video programming. Studies have demonstrated that NHPs prefer to watch video programming rather than be exposed to nothing at all. However, much is still unknown about this form of enrichment. At our facility we have a robust enrichment program that includes the use of CDs and DVDs. We show a variety of DVDs; however, preference for certain types of programming has not been previously demonstrated. We monitored our colony to determine if any preferences or adverse reactions to various types of programming could be detected. DVDs were chosen from our collection at random. Observations were made on 7 to 8 NHP (*Macaca fascicularis*) per session, depending on availability, using scan sampling at time intervals of 3 min following an initial assessment for baseline behavior and an acclimation to the presence of the observer in the room. A total of 27 DVDs, including 12 live action DVDs, 12 animated DVDs, and 3 DVDs with a mixture of live action and animation were assessed. Preferences did not appear to have a sex or age predilection. There was a clear preference for live action or the mixture of live action/animation over animated DVDs. Of the top 50% of DVDs that held the NHP interest, only 2 were fully animated. Interestingly, the 3 mixed DVDs (which are aimed at toddlers or very young children) all ranked in the top 5. Anecdotally, it was also noted that some animals with a history of exhibiting stereotypic behavior decreased the amount of time spent performing stereotypies when DVDs were playing. As a result of this study we were able to adjust our DVD collection to include only the DVDs that have been shown to be frequently observed and well received by the NHPs.

## Effects of Cage Density, Sanitation Frequency, and Bedding Type on Animal Well-being and Health and Cage Environment in Mice and Rats

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<http://aalas.publisher.ingentaconnect.com/content/aalas/jaalas>

The objective of the current study was to evaluate the effects of cage density, sanitation frequency, and bedding type on animal growth and welfare. At weaning, Sprague-Dawley rats and C57BL/6 mice were allocated to treatment groups according to sex, bedding type (shredded aspen, cellulose, or a 50:50 mixture), and cage density and sanitation frequency (in-house cage density standards and sanitation procedures measured against *Guide* recommendations) for an 8-wk period. Body weight, feed disappearance, cage ammonia, ATP

concentrations, behavior, morbidity, and mortality were assessed weekly; fecal corticosterone, microbiology, and lung histopathology (rats only) were evaluated at the culmination of the trial. In both rats and mice, parameters indicative of animal health and welfare were not significantly affected by cage density and sanitation frequency or bedding type. Occasional effects of feed disappearance and cage ammonia concentrations due to density and sanitation guidelines were noted in rat cages, and bedding type affected cage ammonia and ATP concentrations. Periodic spikes of cage ammonia and ATP concentrations were recorded in mouse cages maintained according to in-house compared with *Guide* standards and in cages containing aspen compared with cellulose or aspen-cellulose mixed bedding. Ongoing studies and historical data support the finding that deviations or exceptions from the cage density and sanitation frequency standards set forth

in the *Guide* do not negatively affect animal health, welfare, or production parameters at our institution. These parameters appear to be credible measures of animal health and well-being and may be useful for evaluating performance standards for animal husbandry.

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