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# THE **Enrichment** RECORD

International Laboratory  
Animal Science BioConference  
Live

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The Role and Responsibilities  
of the Enrichment Coordinator

Getting On the Same Page:  
Using a Checklist to  
Communicate Environmental  
Enrichment

There's No Place Like Home

Social Housing—  
The Gold Standard  
of Enrichment

Challenges  
& Opportunities  
of Implementing  
EU Standards for  
Social Housing  
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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

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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.

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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

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*"If I could store any character quality in a cookie jar, I'd store patience. Chocolate-chip patience cookies. And I'd eat them all at one sitting."*

—Jarod Kintz, *This Book is Not for Sale*

It is hard to wait. It sometimes seems like forever before new ideas, innovative methods or even common-sense reforms can be implemented, especially on the job. Part of the problem is inertia.

Part of the problem is fear of the unknown. And a large part of the problem is reluctance to move outside one's comfort zone.

Happily, acceptance of environmental enrichment is gaining real momentum. The inclusion of EE in the 8th *Guide* has certainly helped. We like to think that *The Enrichment Record* is also playing some small part in the acceptance of EE as a refinement that not only increases animal welfare but improves the science as well.

Programming focused on EE in North America is steadily increasing. Trainers and enrichment coordinators are submitting unsolicited articles to us. Articles published in this EZine are being cited in other articles published elsewhere. Significantly, after several tries to generate discussion among members of various LinkedIn groups and list-servs, we finally got some buzz going when we widely posted the following comment from Dr. Patricia Turner: *"There are trends to call basic cage furnishings 'environmental improvements' instead of EE, to further emphasize that these items should be considered standard and not 'add-ons'. This would include solid bottom cages with substrate, nesting material, and a shelter for mice, for example."*

The topic is hot, and we can't wait until there's less talk and more action. Of course, when EE is universally considered standard of care for all laboratory animal species and no longer an "add-on," we'll put ourselves out of business. What a great way to have your cookie and eat it too.

A handwritten signature in black ink that reads "Jayne Mackta". The signature is written in a cursive, flowing style.

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

## Challenges and Opportunities of Implementing EU Standards for Social Housing of Rodents

The EU Directive on the protection of animals used for scientific purposes specifically states: "Animals, except those which are naturally solitary, shall be socially housed in stable groups of compatible individuals." Even "In cases where single housing is allowed...the duration shall be limited to the minimum period necessary and visual, auditory, olfactory and/or tactile contact shall be maintained." This is a more stringent stand than previously, where "rats and mice *should* be group-housed" (emphasis added). Effectively, the new Directive requires social housing for social species as a default condition. The Directive takes a more active stance on the promotion and implementation of refinement, one of the 3Rs, stretching refinement to include husbandry and care of animals, and not just limiting it to scientific procedures. The assumed stress experienced by social species in isolation is factored in when assigning the severity of a procedure, elevating the importance of providing a behaviorally relevant environment to a level on par with alleviating pain.

Short-term deprivation of social partners or short-term solitary caging of adult rats or mice of sociable strains is considered mild severity. Complete isolation for prolonged periods of social species (dogs & primates are specifically indicated in the Directive, but this could be inferred to all species) is to be considered severe, on par with inescapable electric shock or forced swim or exercise tests with exhaustion as the end point.

### The Opportunities

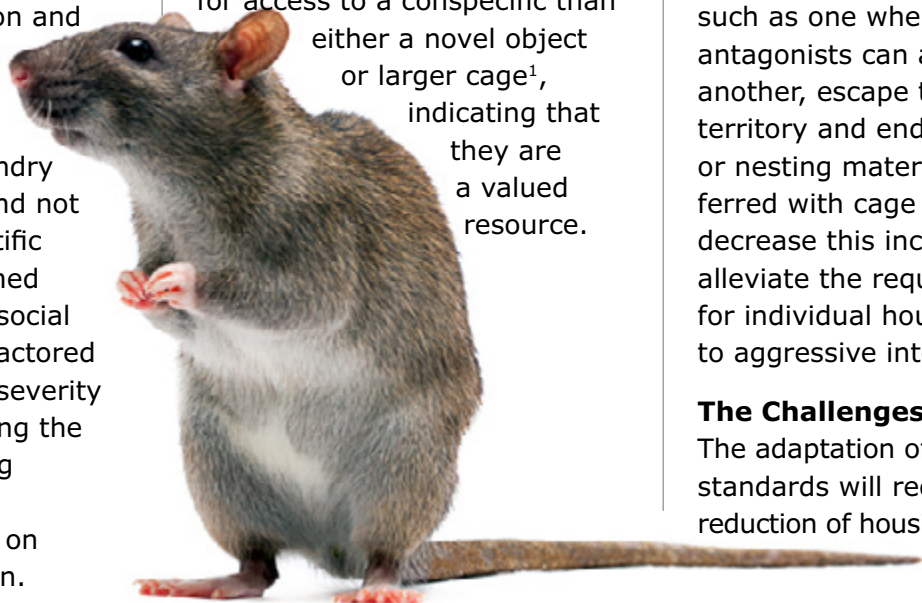
The opportunity to provide a socially enriched environment is valuable to the welfare of any social species, including rodents. Rats will work harder for access to a conspecific than either a novel object or larger cage<sup>1</sup>, indicating that they are a valued resource.

Rats housed alone had higher heart rates and arterial blood pressures than those housed in a group, indicating that the solo rats were stressed<sup>2</sup>. There is evidence of social support, increased coping to a chronic stress, in female rats<sup>3</sup>. Social housing also affords rats the opportunity to engage in normal play behavior. For mice, the benefit of social housing is not always so clear, as certain strains are aggressive. In general, however, mice are also a highly social species that actively seeks the comfort of conspecifics<sup>4</sup>, even preferring the company of a dominant to no company at all<sup>5</sup>. The provision of an enlarged or more complex environment, such as one where the antagonists can avoid one another, escape to their own territory and end the chase<sup>6</sup>, or nesting material is transferred with cage change<sup>7</sup> may decrease this incidence and alleviate the requirement for individual housing due to aggressive interactions.

### The Challenges

The adaptation of new housing standards will require either the reduction of housing densities

*continued on page 4*



from current standards or a significant capital outlay in order to purchase larger caging. Either way, the housing capacity will be reduced, and per diem cost increased proportionally. On the plus side, the Directive allows a significant transitional period (institutions have until 2017) to comply with the new housing and care standards. Studies may be delayed or blocked by the transition, but that isn't a measure of the efficiency of execution: it's about better welfare. Balancing what is desired, necessary & achievable will require the consideration of animal welfare and human and animal health and research needs.

There are a couple of excellent caveats that are specifically stated in the European guidelines regarding space allowances. One is that in long-term studies, if space allowances per individual animal fall below those indicated, priority shall be given to maintaining stable social structures. In other words, rather than break up the socially stable group because the animals have outgrown their space allowance, the physiologic and psychological benefits of remaining in an established, stable social group outweigh engineering standards. This appropriately acknowledges that space allocation is not as

important as the influence of a stable social group on the animal. The second caveat is that weaned stock can be maintained at higher housing densities for the short period between weaning and sale, provided that "the animals are housed in larger enclosures with adequate enrichment, and these housing conditions do not cause any welfare deficit such as increased levels of aggression, morbidity or mortality, stereotypes and other behavioral deficits, weight loss, or other physiological or behavioral stress responses." This allows for an evidence-based rather than engineering-based standard, and gives producers the opportunity to validate their stock paradigms. In the end, while the implementation

of regulatory change is never simple, the goal of improving animal welfare while acknowledging the validity and acceptability of evidence-based standards should lead to an agreeable end.

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## Getting On the Same Page: Using a Checklist to Communicate Environmental Enrichment

Multiple species, study protocols and user needs make it difficult to develop a one-size-fits-all approach to standardizing enrichment. Fortunately, it turns out that there is a very simple solution to the complex issue of getting everyone on the same page—literally! A one-page enrichment checklist can be used to indicate enrichment strategies for each study protocol. This checklist indicates to Principal Investigators (PIs) which enrichment options are available, encourages them to make decisions based on animal behavior, and communicates to the animal care technicians on which enrichment strategies may be provided to the animals in a particular study.

While working in a large diverse pre-clinical research company, agreeing on standard practices and communicating changes was challenging (sound familiar?). In my previous position as Behavioral Management Specialist, I was tasked with coordinating enrichment practices for rats, mice, guinea pigs, hamsters, dogs, swine, and nonhuman primates. Our studies ranged from metabolism and pharmacokinetics,

Keeping everyone  
in a vivarium informed  
and in agreement  
on enrichment practices  
for laboratory animals  
can be a bit like  
herding cats.

In other words,  
next to impossible!

to GLP toxicology, surgery, and cardiovascular and metabolism disease models. Some groups allowed for only very specific, limited enrichment options, while others were happy to give as much enrichment as possible. Allowable enrichment varied by species, type of study, and Study Director discretion. These rules were unwritten and passed on to new techs verbally, which made them difficult to adhere to, and difficult to monitor. The challenge was to capture this information for each study, in a manner that created the least impact on work practices, but was readily available to technicians providing enrichment.

The *Guide for the Care and Use of Laboratory Animals* describes reasons for providing enrichment, possible unintended consequences of enrichment, and a short list of examples of enrichment strategies. It does not, however, prescribe specific enrichment strategies. Ultimately, decisions on environmental enrichment must be agreed upon and reviewed by the IACUC, researchers and veterinarians<sup>1</sup>. Since all study protocols need to be approved by the IACUC, this was a good place to get everyone on the same page. After meeting with the IACUC and receiving their support, we decided to create a standard list of suggested enrichment options, so that PIs were not required to write up their own. Prior to setting standards for environmental enrichment, literature searches were performed to develop lists of species-specific behaviors, and then enrichment was assessed on the ability to promote these behaviors. From that, checklists were created for each species, listing enrichment that was approved by the veterinary staff.

*continued on page 6*

Enrichment was divided into categories, and the PI was required to select at least one item from each category.

**Approved Rodent Environmental Enrichment**  
**Study: \_\_\_\_\_ Room: \_\_\_\_\_**

Check the boxes for any enrichment that can be provided. At least one option should be selected from each category.

<b>Gnawing Object</b>	Nylabone®	<input checked="" type="checkbox"/>
	Gnawpuck	<input checked="" type="checkbox"/>
	Kong®	<input checked="" type="checkbox"/>
	Gumabone® (mice only)	<input checked="" type="checkbox"/>
	BioServ® manufactured rodent treat	<input checked="" type="checkbox"/>
	raisins	<input checked="" type="checkbox"/>
<b>Nesting/Housing</b>	Nestlet™	<input checked="" type="checkbox"/>
	polycarbonate hut or tunnel	<input checked="" type="checkbox"/>
	PVC tunnel	<input checked="" type="checkbox"/>
	Gnawpuck®	<input checked="" type="checkbox"/>
	polypropylene Cozee Pad®	<input checked="" type="checkbox"/>
	polycarbonate Rest Stop	<input checked="" type="checkbox"/>
<b>Social Interaction</b>	paper or cardboard huts	<input checked="" type="checkbox"/>
	group housing	<input checked="" type="checkbox"/>
	Pair housing	<input checked="" type="checkbox"/>

Study Director signature/date: \_\_\_\_\_

If no options in a category were acceptable, the PI needed to justify the omission in the animal use protocol. For example, the rodent checklist offered options for gnawing behaviors (listing different devices and materials which promoted chewing), nesting behaviors (various substrates to build nests and solid structures such

as tunnels and huts) and social behaviors (pair or group housing).

The PI could select as many options as were allowed in each category, and could add a specialized item in the "Other" box. These forms were signed by the PI and submitted to the IACUC along with their animal

use protocol. The IACUC served as the gatekeeper, ensuring that a checklist was provided with each submission, and that each category had a selection or justification for not selecting. These forms were then posted to a shared online site that was accessible to animal care, veterinary staff and investigators. A copy of the IACUC approved completed form was then posted on each animal room door.

Once the checklists were created, the process became self-sufficient fairly quickly. PIs were not opposed to the extra work, as the form only required checking a few boxes, adding a name, date and protocol number. The trade-off was the confidence that animals were receiving only enrichment appropriate for their particular research. The animal care staff located the checklist online, printed it, and posted it to the animal room door. This was often faster than leaving a message for a PI asking which enrichment was allowed, and waiting for a response before setting up caging. It was certainly more efficient than guessing which enrichment was allowed, setting up, then having to go back through 800 mouse boxes and remove nesting material that was not allowed for



### Approved Nonhuman Primate Environmental Enrichment

Study: \_\_\_\_\_ Room: \_\_\_\_\_

Check the boxes for all enrichment that can be provided. At least one option should be selected from each category.

<b>Food treats</b>	standard produce*	<input checked="" type="checkbox"/>	<b>Foraging device</b>	Challenger ball™	<input checked="" type="checkbox"/>
	seasonal produce**	<input checked="" type="checkbox"/>		Shake-a-treat™	<input checked="" type="checkbox"/>
	raisins	<input checked="" type="checkbox"/>		Crumble Disk holder™	<input checked="" type="checkbox"/>
	coconut	<input checked="" type="checkbox"/>		Puzzle feeder	<input checked="" type="checkbox"/>
	peanuts, peanut butter	<input checked="" type="checkbox"/>		PVC tube or cups	<input checked="" type="checkbox"/>
	marshmallow	<input checked="" type="checkbox"/>		fleece board	<input checked="" type="checkbox"/>
	jell-o	<input checked="" type="checkbox"/>		stuffed animal	<input checked="" type="checkbox"/>
	cereal	<input checked="" type="checkbox"/>		paper bag	<input checked="" type="checkbox"/>
	Prang (frozen treats)	<input checked="" type="checkbox"/>		foraging tray with turf	<input checked="" type="checkbox"/>
	honey	<input checked="" type="checkbox"/>		<b>Social Interaction</b>	tactile (grooming bars)
	sunflower seeds, granola, trail mix	<input checked="" type="checkbox"/>	social housing- all day		<input checked="" type="checkbox"/>
	Ketchup, jelly	<input checked="" type="checkbox"/>	social housing -partial (overnight)		<input checked="" type="checkbox"/>
	BioServ® manufactured treat***	<input checked="" type="checkbox"/>	positive human contact		<input checked="" type="checkbox"/>
	Sugar-free (jell-o, Prang, BioServ treats)	<input checked="" type="checkbox"/>			
popcorn	<input checked="" type="checkbox"/>				
<b>Floor/hanging Device</b>	Kong varieties, Dental Ball®, Hercules ®	<input checked="" type="checkbox"/>	<b>Audiovisual</b>	television	<input checked="" type="checkbox"/>
	plastic ball/half-ball, dumbbell	<input checked="" type="checkbox"/>		radio	<input checked="" type="checkbox"/>
	Nylabone®	<input checked="" type="checkbox"/>		sound machine	<input checked="" type="checkbox"/>
	stainless steel rattle or mirror	<input checked="" type="checkbox"/>			
	PVC pipe	<input checked="" type="checkbox"/>			
	Tug toy®	<input checked="" type="checkbox"/>			

\* apple, orange, grape, banana, sweet potato, carrot, celery

\*\*extra produce types not fed out on a usual basis, such as watermelon or pumpkin

\*\*\* Primatreat™, crumble disk™, nutrablock™, foraging crumble™, etc...

Study signature/date: \_\_\_\_\_

a particular study! The IACUC administrator only needed to remind PIs a few times to include the form along with a submission, and it only took a few seconds to review the form for completeness. After helping with the initial creation of the checklist, the Attending Veterinarian could sit back and relax, knowing that animals were receiving species-appropriate enrichment that contributed to good animal welfare.


It's not very often that a complex problem can be solved by a simple solution, and rarer still

that a solution exists that makes everyone happy. This new process was circulated to different groups for feedback, then clearly communicated to everyone involved, emphasizing the benefits and limited resources required to implement. In this case, communication was part of the problem and part of the solution. Initially we identified the problem as "animals are not getting the right enrichment". The problem was actually communicating about enrichment to the PIs on what enrichment was available and recommended for each species,

and to the care staff and IACUC on what enrichment was allowed for each study. In order to get everyone on the same page, it took creating a page that everyone could understand. It turns out that herding cats is a lot easier when everyone agrees which direction to go in, and achieving agreement isn't always as difficult as it seems.

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## There's No Place Like Home

There's no place like home. There's no place like home. There's no place like home. Are we in Oz and clicking our ruby red slippers together three times to get back to our cherished home? The answer is no...because we are already home. Home for the past two years has been 'Free Range' style for our rabbit friends at Drexel. Living large and getting large is our motto. And what a wild ride it's been.

A home is a place of residence or refuge. It is generally a place to provide safety and is used as a center from which people or animals base their daily activities. Animals have their own homes as well, either living in the wild or shared with humans in a domesticated environment or biomedical environment. Home is also used to refer to the native habitat of a wild animal. Since our friends in the biomedical environment don't have their true native habitat, we try to simulate a captive one to the best of our ability. And that's exactly what has been done to provide our rabbits with an environment and/or aspects of it in a research realm.

Since it can be said that rabbits are generally creatures



of habit, the state of a rabbit's home or environment has been known to physiologically influence their behavior, emotions, and overall mental health. And so, for the past two years, our boys (who started the whole program)...have grown accustomed to their 'Free Range Digs', loving it all the way. Since the creation and implementation of the 'Free Range Rabbit' program, all subsequent rabbits and trainer rabbits have been living the 'Free Range' lifestyle.

Their hopping around the huge pens, stretching the full length of their bodies, running, playing—makes you laugh. Their exploration of new enrichment treats and toys is sweet. They are so much calmer, approachable and playful—it simply makes you smile. Rabbits are rabbits. Some of their favorite activities include digging and a challenging chew; it's in their nature, their DNA. In the wild, rabbits' activities include digging and burrowing underground and building entire populations beneath us. Gnawing and chewing are routine. Digging and chewing as well as daily exercise are crucial for a rabbit's psychological and

*Continued on page 10*

physical well-being. Rabbits that remain in a captive, restricted cage environment are more likely to exhibit aggression, obesity, boredom, etc. They have energy to burn—but it needs to be addressed daily, if possible. Offering an outlet or a permanent solution to these animals in this research world of ours makes for a happier, healthier, friendlier rabbit. Not to mention, reducing scientific variables.

Figuring out ways to keep our rabbits busy and entertained has not been an issue since they went 'Free Range'. Going through different stages of rabbit-hood in the free range style has allowed for the natural progression of these life stages. What is meant by this—the dominant and submissive rabbits determine the hierarchy, adolescence tends to bring about hormonal and intensified destructive phases and adulthood brings them into a settling stage. By allowing space and enrichment, they experience each phase and get through it—close to what they would experience in the wild or as close as we can make it.

Since rabbits learn by repetition, are actually quite

intelligent, the more consistent an enrichment program, the faster they will learn and demonstrate the behavior you are attempting. Developing a daily routine is key. Allowing rabbits a way to 'be a rabbit' in this limited environment, can tremendously contribute to their over-all welfare and accurate and ideal scientific results. With this idea in mind, it could mean less risk of repeating an experiment, thus less use of animals and healthy, happier animals. It's a win-win for all.

Location, location, location!—is indeed everything. If your facility is unable or does not have the capacity to utilize large animal pens/runs as rabbit 'caging', providing a large open, grounded space where they can exercise and socially interact a few days a week would still be beneficial. This will curb the mental and physical distress of being caged. Remember, if they are being caged, pay attention to the behaviors they exhibit. Provide proper chewing activities they would actually chew—such as untreated grapevine, wicker baskets, wicker items (can be stuffed with hay), untreated wood blocks, etc. Providing things like plastic balls,

mirrors, and metal chew toys doesn't quite suffice as what a rabbit would actually chew. Offering hay daily is significant, not just a few times a week. These simple changes to rabbits that remain caged can support some of their most natural behaviors (chewing, gnawing). Little changes are better than none. You will see new behaviors you never knew existed and you will get to know rabbit behavior better.

On behalf of our rabbit friends, we congratulate the "Free Range Rabbit Program" at Drexel Medicine, now in its second consecutive year—growing strong, happy and healthy. The original boys who started it all—are still living large! Come on down and see us sometime. I couldn't be more proud to have created such an amazing program with such a positive impact.



## International Laboratory Animal Science BioConference Live

*The Veterinary Bioscience Institute and BioConference Live, a product of LabRoots, brought together laboratory animal science professionals and experts for an innovative virtual conference, the Second Annual Laboratory Animal Science (LAS) BioConference Live, which took place on February 13th and 14th of this year. There were 12,440 registrants; 9788 of those registrants attended. That makes LASBCL the largest Laboratory Animal Conference in the world. Of those 12,440 registrants, 5729 were from places outside of the United States, which fulfills the expectation that this is truly an international conference! The top 11 non-US countries in attendance: India, the leader with 1029 attendees, followed by Canada, UK, China, Spain, Egypt, Germany, Pakistan, Australia, Italy and Brazil.*

*The theme of the 2013 conference, Animal Well-Being and Welfare Science, included four tracks: Animal Welfare, Non-Human Primates, Refinement, and Surgery. It is becoming common knowledge that increased animal welfare for our laboratory animals is more than just putting a toy in a cage. There are multifactorial components to animal welfare*

*including, but not limited to, enrichment, housing, mitigating pain and continually refining processes and models. It is also becoming widely accepted that increased animal welfare decreases stress, and this decrease in stress has a direct, positive benefit on the reliability of collected data. It may even make the data easier to collect in some instances, as the animals are more relaxed and potentially more compliant. Refinement should be the basis of all good research. Have a great animal model? There probably is still a refinement that is possible that could make the model better and improve animal welfare at the same time. Surgical procedures, no matter how simple, can ALWAYS be refined. Simply making sure that the surgeon is as well trained and as competent as possible is a refinement. Even expert surgeons benefit from an objective person providing an objective competency and proficiency assessment. There is always room for improvement.*

*This live, virtual event featured speakers from all over the globe presenting their material in the fields of Animal Well-being and Welfare Science as it relates to NHPs, refinements, surgery and animal welfare. The Veterinary*

*Bioscience Institute was thrilled to create this event, as their business model revolves around the reduction, refinement and replacement of animal models. The LAS BioConference Live featured live video keynote presentations where attendees had an opportunity to have their questions answered by presenters in real time. Conveniently held online for free, the Virtual Bioconference was easily accessible, time-efficient and cost-effective.*

### **RESEARCH ANIMAL WELFARE: A GLOBAL PERSPECTIVE**

**Kathryn Bayne, MS, Ph.D., DVM, DAACLAM, DACAW, CAAB**  
Global Director, AAALAC



#### **Abstract:**

Increasingly, scientific collaborations and contracts cross country borders.

The need for assurance that the caliber of animal research and animal welfare are consistent around the globe and that such animal use is done in a humane and conscientious manner is of concern to the scientific community, the general public, and other key stakeholders. Global harmonization of animal

*continued on page 12*

care and use practices is essential due to the scientific need for reproducibility and statistical validity of results intrinsic to quality research. Several pivotal international organizations (e.g., the World Organization for Animal Health (OIE) and Council for International Organizations of Medical Science (CIOMS) have established overarching principles and general guidance on the care and use of animals in research to facilitate global harmonization. In addition, the establishment of an institutional culture of care, conscience and responsibility promotes an environment of workplace integrity, ethics-based decision making, good communication of institutional expectations, clear lines of authority, and a system for continuous development and improvement of the animal care and use program. When this institutional culture is established, institutional personnel will ground their decisions and actions in an ethical context that will promote quality science and animal welfare. Several common themes addressing research animal welfare cut across country borders—training of veterinarians in laboratory animal medicine, implementation of the Three Rs, outsourcing/offshoring of animal use, availability of various medications and diagnostic test kits,

increasing recognition of the value of environmental enrichment, and concerns regarding transportation of laboratory animals. The global landscape of research animal welfare is in a state of evolution and these topics will be used as a reflection of the progress made and opportunities for future improvement.

### **ESTABLISHING A BEHAVIOR MODIFICATION PROGRAM**

**Jessica Lockhart, MS, Ph.D., CAAB**

*Certified Applied Animal Behaviorist*

#### **Abstract:**



Working with animals in a laboratory or research setting poses unique challenges.

Primarily, animals need to be maintained in a low stress environment in order to ensure that research results are accurate and reflective of treatment effects rather than the influence of unexpected confounds. One of the most difficult confounds to address is the impact of maladaptive or stress induced behavioral changes in the research subjects. Animals that perceive high levels of stress can engage in a wide variety of coping behaviors (stereotypic behavior patterns) that

can negatively impact study results. These perceived levels of stress may be linked to a wide variety of issues including handling procedures, environmental set-up, or other subtle influences that caretakers may overlook. It is important to identify any changes in behavior as early as possible and effectively treat these changes in order to limit and eliminate their effects on the data collected. A structured behavior monitoring and modification program can effectively track any changes in behavior as soon as they occur and treat/eliminate these undesired behaviors before they have a chance to become permanent. In addition, the use of behavior modification techniques can also reduce stress on staff during daily and routine management of the animals in residence at the facility. Overall, the use of a behavior modification program can provide significant improvements to animal health and staff attitude at any animal facility. This presentation covered the important points of establishing and maintaining an effective behavior modification program in a laboratory setting.

## THE VETERINARIAN'S ROLE ASSURING ANIMAL WELFARE

**Taylor Bennett, DVM, Ph.D.,  
DACLAM, DACAW**

*Consultant, Program Evaluation,  
Regulatory Compliance:  
Senior Scientific Advisor  
for the National Association  
for Biomedical Research*



### **Abstract:**

In the U.S.,  
Laboratory  
Animal Veteri-  
narians (LAVs)  
are in a unique  
position  
compared to

many of our colleagues in other countries when it comes to assuring animal welfare. LAVs have been granted a tremendous amount of responsibility and authority for managing institutional animal care and use programs. The definitions developed to implement the Animal Welfare Act (AWA) include one for "attending veterinarian" a key part of which includes, "a person ... who has direct or delegated authority for activities involving animals at a facility subject to the jurisdiction of the Secretary." The 8th Edition of the *Guide for the Care and Use of Laboratory Animals* also contains language that addresses the veterinarian's role in providing oversight for the Institutional Animal Care and Use Program (ACUP), including establishing policies and procedures, ensuring

regulatory compliance, monitoring Program performance, and supporting high-quality science and humane animal use. What the LAV chooses to do with that responsibility and authority can have a tremendous impact on the welfare of all the animals involved in an institution's animal care and use program. This presentation explored the role of the LAV in not only assuring compliance, but in supporting high quality science by managing an environment that takes into account the animal's health, behavior, and biological functions.

## **SOME LIKE IT HOT: USING MOUSE BEHAVIORAL THERMOREGULATION TO IMPROVE MOUSE WELFARE IN THE LABORATORY**

**Brianna Gaskill, Ph.D.**

*Postdoctoral Research Scientist,  
Charles River Laboratories  
International, Inc.*



### **Abstract:**

In these experi-  
ments, a nesting  
material enrich-  
ment is validated  
in terms of reduc-  
ing a physiological

stressor with natural coping behavior, improving welfare, and demonstrating end user benefits. Mice are housed at ambient temperatures (Ta) between 20-26°C, which is below their lower critical

Ta (30°C). Thus, mice are thermally stressed, which can compromise aspects of physiology from metabolism to behavior. Raising Ta is not a solution due to increased aggressive interactions and because temperature preference differs by gender and behavior. Nest building is an adaptive behavior that increases survival and reproduction in the wild. We hypothesized that nesting material would allow mice to alleviate cold stress by building insulating nests and creating a unique microenvironment within the cage. Three common types of mice (BALB/c, C57BL/6, CD-1), of both sexes, were tested in the following experiments. Data were analyzed as GLMs. We first determined how much material (0-10g) was preferred by mice at different Ta. Within standard Ta, all mice preferred 6-10g of nesting material (P<0.05). Thus, mice should receive no less than 6g but may need 10g or more to alleviate thermal stress. Second, we determined if nesting material altered thermogenesis. Dome-like nests radiate less heat (P=0.03) and CD-1 mice (P<0.01) and males (P<0.01) showed energetic reductions from nest building. Only BALB/c mice had reduced non-shivering thermogenesis, based on brown fat protein expression (P<0.05). Last, we tested if reduced

*continued on page 14*

thermogenesis from insulating nests would free resources and improve reproduction. All mice provided nesting material showed improved breeding performance ( $P < 0.01$ ) without increased food consumption ( $P > 0.05$ ). Only C57BL/6 mice had increased pup survival ( $P < 0.01$ ). This improvement has the potential to result in economic gain for producers. These experiments demonstrate that nest building decreases heat loss and energy expenditure. Reduction in thermal stress, by creating a unique microenvironment, improves mouse welfare and breeding profitability.

### BEHAVIOR, THE MOST CONFOUNDING OF VARIABLES

**Eric Hutchinson, DVM,  
DACLAM**

*Director of Primate Medicine,  
Molecular & Comparative  
Pathobiology, Johns Hopkins  
Medicine*



**Abstract:**

Biomedical researchers ignore the relationship between an organism's

behavior and its underlying biology at their peril; in particular the increasing focus on model refinement can have unintended consequences. Four studies were presented

demonstrating the complicated but often overlooked relationship between the behavior and the basic physiology of animals housed in laboratory environments. These examples demonstrated that those conducting behavioral research must not discount biologically relevant manipulations and vice versa. Female BALB/c mice raised with nesting material excrete more urinary corticosterone than those raised with no enrichment, and those given enrichment as adults experience significant thymic atrophy compared to those given nothing. Pigtailed macaques undergoing separation from a social partner and movement into a new room for experiments show significant, transient increases in platelet activation over unmanipulated animals. Rhesus macaques demonstrating self-injurious behavior as adults show significant differences in cognitive performance, impulsivity, and dopaminergic function as juveniles, years before their abnormal behavior may become overt. Finally, male C57BL/6N mice receiving a common clinical treatment, fenbendazole impregnated feed, demonstrate potential deficits in rotarod performance over untreated controls. The complicated relationship between behavior and biology may seem daunting to the

biomedical researcher, but this relationship and its potential as a confounding variable should be fully accounted for in the pursuit of scientific validity.

### RESEARCH INNOVATIONS AND HANDLING TECHNIQUES FOR NSG MICE

**Emily Jocoy, Ph.D.**

*Technical Information Scientist,  
The Jackson Laboratory*



**Abstract:**

Immunodeficient NOD scid gamma (NSG) mice improve the efficiency of human

disease models and enable research innovations that were not previously possible. This presentation explained how NSG mice are the most effective and reliable transplant hosts for the widest range of human cells and tissues, including the most functional "humanized" immune system described to date. Attendees learned how NSG mice support sophisticated pre-clinical disease models such as patient-derived cancer xenografts. Housing and handling techniques that ensure the welfare of the mice and the quality of research models were also described.



## **ZEBRAFISH HOUSING, HUSBANDRY, AND CARE**

**George Sanders, DVM, MS**

*Certified Fish Pathologist (AFS/FHS), Aquatic Animal Program Director, Department of Comparative Medicine, School of Medicine, University of Washington*



In this lecture, Dr. Sanders described and discussed the most common methods used for the housing, husbandry and care of zebrafish in the Laboratory Animal Science setting.

Topic included:

- Review of Care and Use Guidelines—U.S.A.
- Fish Uses in Biomedical Research
- Why Use Zebrafish?
- Biosecurity/Housing and Husbandry
- Quarantine
- Sick Animal Identification and Diagnostics
- Euthanasia, Pain, and Analgesia
- Personal protective equipment, zoonoses and allergies

## **POSSIBILITIES OF ENVIRONMENTAL REFINEMENT: IMPROVING HOUSING CONDITIONS OF LABORATORY ANIMALS**

**Vera Baumans, DVM, Ph.D., DipECLAM**

*Laboratory Animal Science Specialist, Dept. Of Animals, Science and Society, Div Laboratory Animal Science, Utrecht University*



### **Abstract:**

Housing systems for captive animals have often been designed on the basis of

economic and ergonomic aspects, such as equipment, costs, space, workload, ability to observe the animals and to maintain a certain degree of hygiene, with little or no consideration for animal welfare. Environmental refinement can be defined as any modification in the environment of captive animals that seeks to enhance their physical and psychological well-being by providing stimuli meeting the animals' species-specific needs. In this presentation, an overview of environmental factors that influence the well-being of captive animals was presented with specific reference to the needs of the most common laboratory species. It is important to evaluate environmental

refinement in terms of the benefit to the animal by assessing the use of and preference for certain refinement, the effect on behaviour and the performance of species-typical behaviour on physiological parameters. Also important is to evaluate the impact of refinement on scientific outcome, how the refinement influences the scientific study and whether and how the statistical power is affected. Communication and teamwork between animal welfare scientists, animal research scientists, institutional animal welfare officers, veterinarians and animal ethics committees, animal facility management and personnel is a key issue for success.

## **A REVIEW OF THE PHYSIOLOGIC AND BEHAVIORAL NEEDS OF THE LABORATORY RABBIT AND HOW ENVIRONMENTAL ENHANCEMENTS CAN MINIMIZE STRESSFUL DOSING AND HANDLING PROCEDURES**

**Karen Froberg-Fejko, Latg, VMD**

*President, Bio-Serv*



### **Abstract:**

Laboratory rabbits are used commonly for a variety of research models. Understanding their

*continued on page 16*

behavioral and unique physiological differences from other species is an important consideration when employing appropriate husbandry and handling practices. This presentation reviewed rabbit physiology, natural behaviors, and enrichment options including social housing. Reducing stress and striving for a well-adjusted rabbit will attain better research outcomes.

#### **CHALLENGES AND REFINEMENTS IN THE MANAGEMENT OF A BIOCONTAINMENT FACILITY UNDER THE NEW GUIDE**

**Iris D Bolton, DVM, DACLAM**

*Senior Clinical Veterinarian,  
University of Texas Medical  
Branch*



#### **Abstract:**

Working with laboratory animals in the containment setting has always presented

unique challenges. Concerns related to biosecurity, occupational health and safety, and adequate training of personnel compounded by potential bio- and agro- terrorism, public perception and vigilant scrutiny by agencies such as Centers for Disease Control, Department of Homeland Security and Federal

and State public health agencies have occasionally eclipsed efforts to assure the highest standards of animal care and welfare. The adoption of the 8th edition of the *Guide for the Care and Use of Laboratory Animals* has required that facilities take another look at their containment programs to assure that their husbandry practices meet or exceed the expectations outlined therein. This seminar focused on some of the unique challenges in biocontainment with particular emphasis on environmental enrichment and social housing, as well as discussed potential refinements to assure excellence in programs of animal care.

#### **NONHUMAN PRIMATE ENVIRONMENTAL ENRICHMENT PROGRAM AT WAKE FOREST UNIVERSITY**

**Kelsey Neeb, BS, LAT**

*Environmental Enrichment  
Coordinator, Animal Resources  
Program, Wake Forest School  
of Medicine*



#### **Abstract:**

Creating an environmental enrichment program for nonhuman primates has

been the highlight of various workshops and conferences for many years. Refinements to the 8th edition of the *Guide*

*for the Care and Use of Laboratory Animals* emphasize the importance of understanding the behavioral needs of each laboratory species in the overall animal care program. With the increased competition for limited sources of grant funding, many institutions are left with financial challenges to ensure their facility can provide for a well-conceived enrichment program. This presentation highlighted different aspects of the Wake Forest University Nonhuman Primate Environmental Enrichment Program and illustrated how the changes to the *Guide* do not always necessitate sizeable changes in the budget. Indoor/outdoor pen housing, indoor only pen housing, and standard rack housing for Rhesus macaques, cynomolgus macaques, and African Green monkeys were addressed.

## The Role and Responsibilities of the Enrichment Coordinator

*"What do you do for a living?"*

*Anyone in my position can see that this simple question does not have a simple answer.*

*"I'm an Environmental Enrichment Coordinator."*



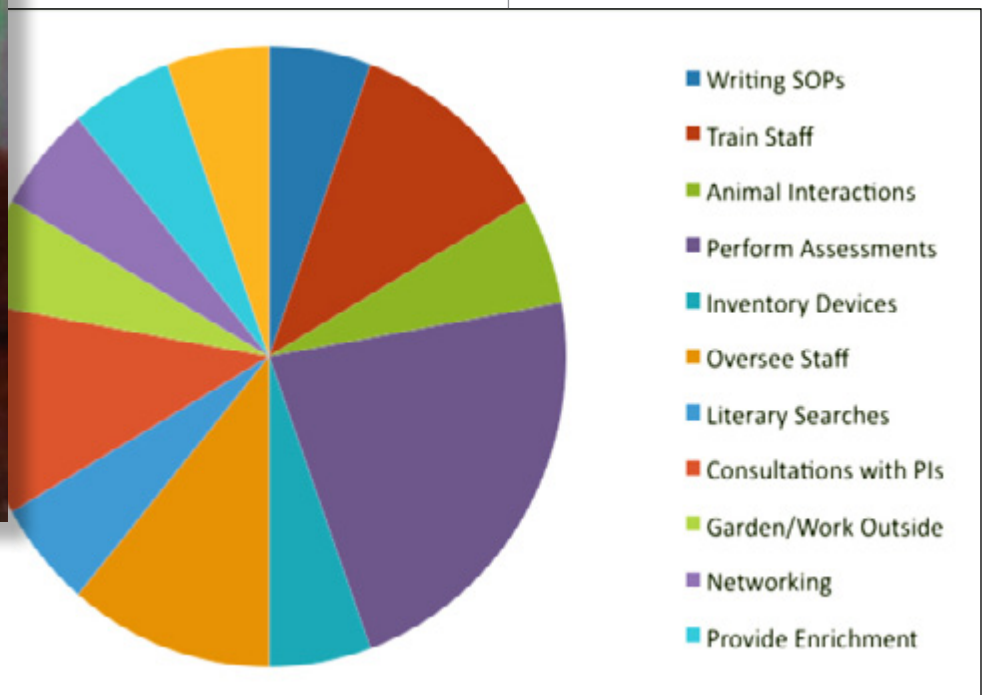
Kelsey with a red-ruffed lemur

But that's not the end of it, is it? What is an Enrichment Coordinator? How can we describe our position in a way that the general public, and even other members of the research community, can identify with? I would love to say that I am an animal trainer, but the majority of my time is not actually spent handling the animals.

On any given day, I might do a number of the following: train and oversee staff; write Standard Operating Procedures (or SOPs); coordinate housing animals in social groups; provide consultation on animal housing, husbandry, and study

procedures; purchase, inventory, construct, or maintain enrichment devices; perform literary searches to keep on top of best-practices and professional standards; field requests for interpretations of regulations and guidelines pertaining to enrichment of animals; perform behavioral assessments of animals, and then work with the research and veterinary staff to address behavioral issues; attend workshops and seminars; actively engage other members within my field to discuss common issues and potential solutions; design and implement ways to

*continued on page 18*



study the efficacy of various enrichment techniques and devices; design, develop, and maintain an organic garden for food enrichment; cut down tree limbs for browse and/or natural cage furniture; and many other tasks that might come up during the course of the day.

Depending on the institution, the role of Enrichment Coordinator could be as variable as the definition of "enrichment" itself.

An ILAR article written by Drs. Weed and Raber (2005) provides several references and proposed definitions of enrichment.

*Enrichment is an attempt to ameliorate problems caused by containment, . . . the goals of enrichment are to alter behaviour so that it is within the range of the animals' normal behaviour (Chamove 1989, p. 155).*

*Environmental enrichment is a process for improving or enhancing environments and care within the context of the inhabitants' behavioral biology and natural history. It is a dynamic process in which changes to structures and husbandry practices are made with the goal of increasing behavioral choices to animals and drawing out their species appropriate behavior and abilities, thus enhancing animal welfare. (BHAG 1999, as cited in Young 2003, p.2).*

The *Guide for the Care and Use of Laboratory Animals*, 8th ed., also provides a definition of enrichment (pages 52-53).

*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 through physical exercise, manipulative activities, and cognitive challenges according to species-specific characteristics.*

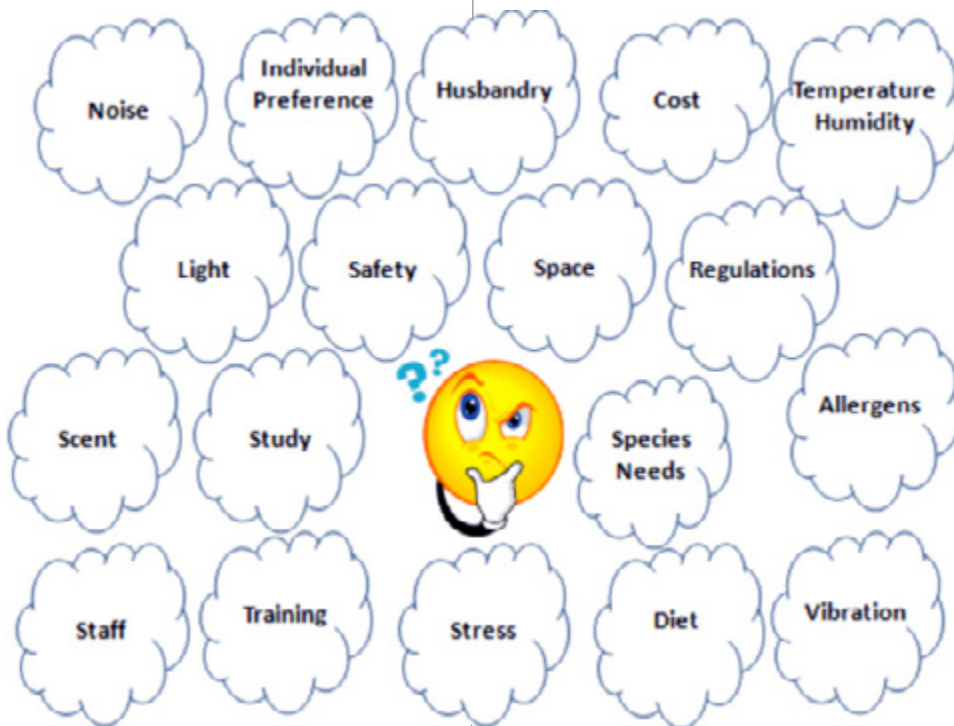
*Well-conceived enrichment provides animals with choices and a degree of control over their environment, which allows them to better cope with environmental stressors.*

As you can see, there are a variety of interpretations on the purpose and function of enrichment and a variety of ways that an Enrichment Coordinator can meet these goals. Some institutions need their Enrichment Coordinator to function as the designated individual that provides enrichment, animal-behavior management, positive-reinforcement training of animals, and social housing of animals. Whereas others need an Enrichment Coordinator to train animal

husbandry and research staff about enrichment, socializing animals, and managing the behavioral needs of the animals in their care. There are also institutions that use an alternate staff member, such as an operations manager or veterinarian, to oversee the enrichment program.

I happen to belong to the second category. My primary role is to coordinate the enrichment efforts of all components (research, animal husbandry, veterinary, engineering, administration, etc.) amongst our four campuses to create a well-functioning and consistent enrichment and behavior management program. Because of that, my days can vary greatly based on each component's needs and the needs of the institution as a whole. As one can imagine, this can lead to a wealth of challenges, especially considering the large size of Wake Forest University, how diverse research studies can be, and the physical distance between our campuses. There are many factors to keep in mind when developing and maintaining an enrichment/behavioral management program.

The most important aspect of my job is communication. I have to be able to communicate with all levels of staff in



all components in order for the program to function effectively.

The research staff and investigators must have a clear understanding of the enrichment program to determine how the enrichment could affect their studies. Enrichment is a variable. Behavior is a variable. They need to be aware how daily interactions with their animals could impact data. The research staff must understand the behavior of the animal species they study, so unexpected changes in behavior can be discussed and addressed with members of the veterinary and enrichment staff.

In my circumstance, the animal husbandry staff provides

the bulk of enrichment to the animals. They are educated on how enrichment is meant to function and why. They are trained to identify changes in animal behavior, and to contact the Enrichment Coordinator or the Attending Veterinarian. In most circumstances, they serve as the first line of defense in addressing behavioral issues or determining if something else has changed in the animals' environments.

The veterinary staff must be trained to identify various abnormal behaviors vs. normal behaviors. In some circumstances, a change in behavior can be an indicator of pain or other medical problems. These need to be investigated and

medical concerns ruled out prior to addressing the issue as purely behavioral.

If every component of the enrichment program is able to communicate well with the others, everything else will slowly fall into place and you'll be left with an integrated, well-functioning, consistent, adaptive, collectively-engaging enrichment program.

### **So how do you become an Enrichment Coordinator?**

I am asked this question frequently, usually by someone who is interested in entering the field. Sometimes, I'm asked by people who are assessing my ability to be considered an "expert" in my field. In any case, education and experience are the most important tools to obtain a position in the field, whether that entails educating yourself, pursuing more formal education processes, or taking advantage of opportunities to gain more experience in your desired career.

My childhood goal was to work with animals, so I took advantage of as many opportunities as I could to work with animals in a variety of different situations. I have a Bachelor's degree in ecology, evolutionary and population biology. In college, I worked at the Purdue

*continued on page 20*



Veterinary Teaching Hospital. I also volunteered at a local therapeutic riding center working with horses, and interned at the local zoo training lemurs, chickens, ducks, and various other species. I took advantage of an opportunity to intern at the Alaska SeaLife Center working with seals and sea lions native to that area. After college, I interned at the Shedd Aquarium, took a job as a veterinary assistant at an emergency vet clinic, and eventually found a position as a veterinary assistant at a contract research organization in Michigan. At that institution,

I was given the opportunity and support to build a behavior/enrichment program, train staff, work with animals one-on-one and develop the skills I would need to excel in my current position. From there, I was offered the opportunity to join Wake Forest University and be a part of their growing enrichment program. My experience is diverse, which helps me meet the challenges of being an Enrichment Coordinator. I have been, and continue to be, very fortunate to work with passionate individuals that support the same goals for animals in a research environment.

The challenges in being an Enrichment Coordinator can be as variable as your roles and responsibilities. But the rewards are just as great. As an Enrichment Coordinator, I am able to be part of bettering the research community. I support researchers in their goals and help them to maintain better animal models. I encourage them to understand ways they can work with the animals instead of against them. I also serve as an advocate for the animals in their environments to help ease the stress that any form of captivity can bring about. The field of research is ever-changing and growing, and as such, the need for more Enrichment Coordinators continues to grow and the role they can fill continues to evolve. The best reward, in my opinion, is that I am part of a community of dedicated, passionate individuals working with animals in biomedical research to provide improved health to human beings and animals.

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- Weed, J.L. and Raber, J.M. 2005. Balancing Animal Research with Animal Well-being: Establishment of Goals and Harmonization of Approaches. *ILAR Journal* 46(2):118-128.
- Young RJ. 2003. *Environmental Enrichment for Captive Animals*. Oxford: Blackwell Science Ltd.

## Social Housing— The Gold Standard of Enrichment



With the publication of the new *Guide for the Care and Use of Laboratory Animals* in 2011, there came a renewed emphasis on the need for social housing of laboratory animals. There are numerous reports in the literature about the positive effects of appropriate social housing on the well-being of laboratory animals. These include decreased stress, lower incidence of stereotypic behaviors and improved immune function. However, achieving appropriate social housing can present challenges, and inappropriate social housing that results in aggression or other negative effects can be more deleterious both to animal welfare and to the science.

The species that likely presents the greatest challenge for social housing is the nonhuman primate (NHP). Animal welfare regulations have long recognized the need to address the psychological well-being of NHP. Consequences of single housing, such as self-injurious or stereotypic behavior, or physical harm from an incompatible cage mate, can pose significant threats to the quality of the research. It is recognized that certain types of research require that animals be singly housed. For example,

single housing is required if the animals must be monitored for food intake, if they are immune compromised, or if they require water restriction. In such cases, the *Guide* recommends that other stimulation be provided in the form of environmental enrichment devices and/or visual, olfactory and auditory contact with conspecifics. However, other experimental situations, such as those that require head caps or cranial implants, do not necessarily justify single housing.

Similarly, other social species should be pair or group-housed. Most rodents, rabbits, dogs and other mammalian species used for research prefer to be socially housed. As with NHP, social housing can present problems if the animals are not compatible. It is important to appropriately

pair or group these animals from an early age to increase the probability of compatibility. Frequent monitoring is also necessary so that if serious aggression occurs, the animals can be separated before any significant harm is done.

In order to address the complexities and problem solving related to social housing issues, the Animal Welfare Information Center at the National Agricultural Library, the Center for Alternatives to Animal Testing (CAAT) at the Johns Hopkins Bloomberg School of Public Health and *The Enrichment Record* will sponsor a two day workshop that will be held at the Natcher Center on the NIH campus. One day will be dedicated to old world NHP social housing and the second day will address social housing in other species. The dates have not yet been confirmed, but please stay tuned to *The Enrichment Record* and the AWIC ([awic.nal.usda.gov](http://awic.nal.usda.gov)) and CAAT ([caat.jhsph.edu](http://caat.jhsph.edu)) websites for updated information.

### References:

- National Research Council. (2011). *Guide for the Care and Use of Laboratory Animals*, 8th Ed. Washington, DC: National Academies Press.
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### A GUIDE TO THE BEHAVIOR & ENRICHMENT OF LABORATORY RODENTS

**Authors:** Christina Winnicker, Brianna Gaskill, Joe Garner, Kate Pritchett-Corning

Now available from Charles River, *A Guide to the Behavior & Enrichment of Laboratory Rodents* is an excellent resource for those looking to implement or enhance an existing behavioral husbandry and enrichment program. Authored by behavior and enrichment experts with extensive experience in the field, *A Guide to the Behavior & Enrichment of Laboratory Rodents* examines the innate physiological and behavioral needs of laboratory animals and details how to build a successful enrichment program around them. Beneficial to both researchers and laboratory animals, a successful enrichment program enhances the well-being of the animals, which can lead to more accurate test results and, in turn, to better science.

Learn more at:

[http://www.criver.com/en-US/NewsEvents/WhatsNew/Pages/Guide\\_Behavior\\_Enrichment\\_Laboratory\\_Rodents.aspx](http://www.criver.com/en-US/NewsEvents/WhatsNew/Pages/Guide_Behavior_Enrichment_Laboratory_Rodents.aspx)

<http://crivereureka.com/behavior-enrichment-guide/>

#### SHAPE OF ENRICHMENT WORKSHOP

**June 9-13, 2013, Henry Doorly Zoo and Aquarium  
Omaha, Nebraska**

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=ind\\_ex\\_sb.html](http://www.enrichment.org/miniwebfile.php?Region=International&NotFlag=1&File2=ind_ex_sb.html)

#### 11TH INTERNATIONAL CONFERENCE ON ENVIRONMENTAL ENRICHMENT (ICEE)

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



### THE ENRICHMENT EXTRAVAGANZA

**Rutgers University  
May 22, 2013**

*The Enrichment Record* and Rutgers University have partnered to bring the Enrichment Extravaganza back to New Jersey. On **May 22, 2013** the laboratory animal community will come together at Rutgers Livingston Campus to share ideas and strategies for improving animal welfare in the biomedical research environment.

This full-day event will consist of a morning plenary session featuring Dr. Jan Lund Ottesen, Vice President & Head of Laboratory Animal Science, Novo Nordisk A/S, Denmark. Dr. Ottesen will be discussing Novo Nordisk's advanced enrichment program and emerging trends in Europe. As an appointed industry member of the Danish Consensus Platform for 3Rs Alternatives to Animal Experimentation and a member of the European Federation of Pharmaceutical Industries and Associations' (EFPIA) Research Animal Welfare group, Dr. Ottesen has a unique perspective and comprehensive insight to offer the U.S. audience.

Other featured speakers are Dr. Kristine Coleman, a primate behaviorist, and aquatics expert Christian Lawrence. The afternoon session will include four dynamic breakout workshops and a poster session. This year's poster session will allow primary poster authors the opportunity to share a proven enrichment method or solution with their colleagues.

If you are interested in the latest advances and innovation in the field of environmental enrichment, this is a *must-attend event*. For more information, contact Denise Bianco at [bianco@enrichmentrecord.com](mailto:bianco@enrichmentrecord.com).

To register or to submit an enrichment poster abstract, go to <http://enrichmentrecord.com>.

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*Please provide a photo of your favorite foraging device, manipulanda, 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!*

Brianna N. Gaskill, Post Doctoral Research Scientist  
Christina Winnicker, Director of Enrichment and Behavioral Medicine  
Charles River Laboratories International, Inc.  
Wilmington, MA

**Species:** Rodents. We especially like the material for mice because of the substantial amount of research conducted with it, but rats and hamsters also seem to build well with it.

**Description:** The material is a thick corrugated paper cut in thin strips 4-5 inches long. The paper is 3-ply and can easily be woven to create dome nests that act as retreat spaces and are thermally insulating. It works even better when combined with other materials. We especially like this material as we feel it is similar to grasses which are commonly woven into wild nests, making it a biologically relevant building material.

**Durability:** The mice constantly build and destroy the nest throughout a 24 hr period (unpublished data) so the material breaks down over time. We have found that the material can be used up to 2 weeks if the cage is not crowded or excessively soiled. Transferring nesting material to the new, clean cage has also been found to help minimize post cage cleaning aggression<sup>1</sup>. However the integrity of the material is best if replaced or supplemented weekly.

*Continued on page 26*



*Example of a complex nest built by mice when they can use the structure of their environment along with various materials*



A full dome nest built by a BALB/c mouse

**Why we like it:** Mice are cold stressed in standard laboratory temperatures<sup>2</sup>. While this is not only a welfare concern, it is also a concern for scientific research: increased metabolic rates and chronic stress can alter many aspects of physiology. Simply raising room temperatures is not a solution because temperature preference differs with age, gender, and behavior, making it exceedingly difficult to identify an optimal temperature<sup>3-5</sup> and increased aggressive interactions are seen in warmer temperatures<sup>6</sup>. Allowing mice to build nests is an adaptive behavior used by wild mice to survive in cold conditions<sup>7-8</sup>. Not all laboratory mice can build efficiently with all nesting materials<sup>9-10</sup>, but Enviro-Dri was identified as the best nesting material that even poor nest builders could build with<sup>10</sup>. While providing any type or amount

of nesting material is likely to be somewhat enriching, providing at least 8g of material has been shown to reduce cold stress<sup>11</sup>. Giving mice 8-10g of material has also been shown to improve feed conversion<sup>11-13</sup>, pup survival<sup>13</sup>, and overall reproduction<sup>12-13</sup>. Enviro-dri, based on our calculations, is cheaper than other popular nesting materials (at appropriate amounts) and can be utilized by your whole colony.

**Cons: Minimal!** It can be difficult to observe mice during daily rounds, but in general, a mouse hidden in a well built nest is probably a healthy mouse<sup>14</sup>. We've found that observations and pup checks can easily be made from the bottom of the cage. We have even tested this material on several types of nude animals which have issues with eye lesions, and have found no increased occurrences<sup>12</sup>.

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**Genevieve Andrews-Kelly, B.S., LATG**

Group Leader, Primate Behaviorist, Huntingdon Life Sciences, East Millstone, NJ



Genny Andrews-Kelly is a passionate supporter of environmental enrichment. The initial creator, along with Gina Savastano and Jennyann Fischer, of the Enrichment Extravaganza, an acclaimed forum for new ideas and strategies on integrating innovative enrichment methods into the daily care of laboratory animals to enhance their welfare, Genny is totally dedicated to advancing awareness and encouraging the use of environmental enrichment in our community. While *The Enrichment Record* is now the primary sponsor of the Enrichment Extravaganza, Genny is still a major participant, facilitating workshops on general enrichment topics.

A founding member of the Editorial Board of *The Enrichment Record*, Genny is a frequent contributor to the online Laboratory Animal Refinement Enrichment Forum. In addition to writing and presenting about enrichment, she is an experienced Jersey Shore Ghost Tour Guide (we'll scare the yell out of you!)

Genny's passion for environmental enrichment dates back to 1995, when she was a student at Rutgers University. Originally, her plan was to be a primate behaviorist in Africa like Jane Goodall. And then...she received an internship at LEMSIP (Laboratory for Experimental Medicine and Surgery in Primates) at NYU. Genny participated in animal husbandry, assisted the technical staff, played with baby chimps, concentrated on enrichment, and fell in love! "I realized how important enrichment was," Genny says, "and decided to be their voice."

A graduate of Rutgers with a B.S. in International Environmental Studies, Genny was inspired by Volunteer Coordinator Cynthia Kirby and Jayne Mackta, Publisher of *The Enrichment Record* and President & CEO, Global Research Education & Training LLC (GR8.) In her current position at Huntingdon Life Sciences, Genny uses positive reinforcement techniques to train cynomolgus macaques. She trains staff in these techniques, provides guidance and support for the refine-

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ment of positive reinforcement programs for nonhuman primates and swine, and serves on the Institutional Animal Care and Use Committee (IACUC). She has also served as Co-chair of the Enrichment and Captive Care Committee.

Prior to assuming her current position, Genny served as Veterinary Associate at Merck & Co. In this position, she managed the Environmental Enhancement Program for a colony of rhesus macaques and vervets. She sought novel methods of enhancing psychological well-being to promote species-specific behavior and reduce rates of stereotypic behavior. Her extensive knowledge of nonhuman primate behavior enabled Genny to refine and evaluate enrichment activities for NHP in her charge while providing guidance and support on the development and refinement of enrichment programs for dogs, rabbits, guinea pigs, ferrets and pigs. She demonstrated her outstanding leadership abilities as chair of the Laboratory Animal Resources (LAR) Enrichment Committee.

Genny's husband, Danny, is the comic book artist who contributed memorable cartoons to *The Enrichment Record* when readers were invited to explore their lighter side and to share their world view from the perspective of Danny's beagles. The couple love to spend time with Pippin, a research beagle they adopted in 2003, Frodo, a Lab mix rescue dog, and their research cat, officially titled The Monkey Cat.

### Thoughts on the Future

"We must make environmental enrichment a priority," Genny says, "until it is an integral part of every animal care program." She hopes that in the very near future, enrichment will not be seen as a separate issue. "It will," she says, "be something we automatically do!"

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)

### NJ AALAS BRANCH MEETING

By Genevieve Andrews-Kelly, B.S., LATG

The NJ AALAS Branch meeting was held at Novartis in East Hanover, NJ, on January 15, 2013. The speaker was Christina Winnicker, DVM, MPH, DACLAM, Director of Enrichment and Behavioral Medicine at Charles River.

Dr. Winnicker's presentation, *Ethologically Relevant Environmental Enrichment*, focused on developing a behavioral husbandry program. She discussed the importance of understanding the natural history of the species that we work with, but also pointed out the importance of research appropriate behavior—as some natural behaviors may not be behaviors that we seek out in laboratory animals. For example, a wild rabbit would naturally flee from humans; although a natural behavior, this is not desirable in a research rabbit that needs to be handled by technicians.

Dr. Winnicker discussed the need to understand the biology of the species we are working with—rats cannot see color, so colorful enrichment is not as important to rats as it would be for nonhuman primates. Animals need to be provided with choice, and enrichment needs to be evaluated for efficacy. Obtaining a baseline for behavior and an appropriate ethogram for the animals can help with the evaluation.

Dr. Winnicker talked about "Three Ss"—Science, Security and Safety, in evaluating enrichment. For the Science perspective, we need to ensure that research goals can be met with the enrichment that we provide and that animals can be easily observed and safely restrained. For the Security aspect, we need to ensure that the devices can be properly sanitized to avoid cross-contamination. As for Safety, the enrichment must be durable, and not cause injury to the animals.

Ultimately, a successful and ethologically relevant environmental enrichment program will encourage species-typical behavior and support laboratory-relevant behavior while decreasing abnormal behavior.

More information can be found in the book, *A Guide to the Behavior and Enrichment of Laboratory Rodents*. If you would like to request a copy, email [askcharlesriver@crl.com](mailto:askcharlesriver@crl.com).

# THE Enrichment

The Enrichment Record is a quarterly E-Zine created by the Laboratory Animal Research Community as an online forum for:

- Discussing environmental enrichment in the optimal care of laboratory animals
- Documenting best practices
- Sharing data on the impact of environmental enrichment on the science
- Building the case for integrating enrichment into research design

**HAVE YOU HEARD?**  
*The Enrichment Record* is now delivered directly to 30,000 animal research professionals around the world.

Thanks to VBI's generous commitment to open discussion about environmental enrichment for laboratory animals, *The Enrichment Record* can greatly expand its reach and ability to increase community engagement at every level.

