Do you think that nonhuman primates in research are better off in general than rodents?

- I would say that currently—at least in the United States—nonhuman primates are better off in that there are more explicit regulations and considerations addressing their psychological well-being and their perception of pain and distress. While there are certainly exceptions—including many or all members in this discussion forum—people often consider rodents to be "just mice" used for research in much larger numbers and for much more distressful experiments.

- Recent changes to primate housing focus on providing more space, increased social interactions, and increased complexity of the primary enclosure, while changes to mice and rat housing focus more on containment and isolation of biohazards. While some administrators and investigators make efforts to go beyond minimum requirements for these species as well, there are still many in the field who are willing to provide only the very minimum that is required in order to get their research proposal funded.

  The situation for nonhuman primates in research facilities is still not beyond further improvement—far from it—but I think the efforts thus far have been more effective and better accepted by the research community than those efforts made for their rodent counterparts.

- Nonhuman primates are better off in research labs; this may be related to the fact that they share many more similarities with humans than mice and rats.

- And when you compare the strong concern that humans display for the well-being of chimpanzees who have been used for research, with their rather shallow concern for monkeys, you are also tempted to make this inference.

- When looking into the mirror, a human sees more similarities with a chimpanzee face than with a monkey face and, therefore, feels more sympathy with a distressed chimpanzee than with a distressed monkey. This does not imply that the monkey suffers less than the chimpanzee; the opposite may be true, but our reaction will still be biased by the unrealistic, emotional interpretation of our visual perception of the chimpanzee face versus the monkey face.

- Money may be another factor that determines the attention given to the well-being of a specific group of animals used for research.

Compared with rodents, primates are pretty costly animals, so you try to assign as few subjects to your research protocol as possible. Good care translates into fewer animals—hence less grant money—needed to achieve statistically significant results.

When you check the literature, it becomes obvious that the number of animals used in research protocols is relatively low for chimpanzees, higher for baboons, much higher for macaques and marmosets, and much, much higher for mice, rats and hamsters. When you lose a monkey because of poor housing conditions you lose a lot more money than when you lose a rodent for the same reason. Ultimately you will save more money when you take good care of nonhuman primates than when you take good care of rodents. This is perhaps one reason why primates tend to be better off in labs than rats, mice and hamsters.

{Chapter 4}

Refinement and Enrichment for Other Animals

barking

Has anyone used music in dog rooms? I would like to see if exposing the dogs to music, radio talk or nature sounds can help keep the barking down to a dull roar whenever anyone enters the room or when the elevator goes by (classically conditioned to "elevator" means tech with food).

The dogs are used to me, and get quiet very quickly once they have recognized that it's me who entered their room. The problem starts when someone else comes into the quiet room and sets everyone off. I have been working with the barking ringleader to remain calm when others enter the room, but he is really stubborn; unfortunately, we have kind of trained him to bark by giving him attention whenever he gets all riled up. I am now wondering if some background noise/music might help to buffer the barking noise when people are entering the dog room.

- We provide music in many of our dog rooms. Personally, I don't think the radio (music) will keep the barking noise level down. When we want a short break from the barking, we make a tone: all ears are pricked and eyes focused on the person making the sound. But this is only a momentary effect and the barking continues unabated.

  We have found that the only way to get the barking to settle down is to stay in the room and *not* interact with the dogs but go

about the work that needs to be done. If the work involves some of the dogs then, for sure, take them out but ignore the others. In time, the barking will only last for the initial entrance into the room, and then you will be quietly but very attentively watched. Once quiet, say "hi!" at your own risk.

- Wells et al. (2002) found that exposure to classical music encouraged sheltered dogs to spend less time barking and more time resting.

- When we had a kennel of dogs that loved to bark, we set up some basic rules for people entering the building. It is a bit tedious at first, but if most people can stick to it, there will be positive results by the end of a week:
  (a) Walk up to the door and start to open it—but first make sure you have plenty of time to train!
  (b) As soon as the dogs start barking, shut the door—if you have an automatically locking door, shut it almost all the way, so you don't have to re-unlock each time you do this little exercise.
  (c) Wait until the dogs are silent again, and then open the door. Make sure you are opening and closing it normally, not inching it open or slamming it shut.
  (d) Once the barking starts again, shut the door.
  (e) Keep doing this until you are able to open the door completely and take a step in. Then go about your business calmly in the room.
  (f) Each time you do this, it will be quicker and quicker to get back in that hallway with no barks. It takes some time to condition the dogs, but it is definitely worth the effort. Don't get discouraged! We used to double check that our earplugs were in place before going near the door of a dog room; we are now able to walk into the room with quiet but happy animals.

toys

Do commercial toys provide long-term enrichment for single- or group-housed dogs when no person is around to entice them to play with the toys?

- In my experience, it very much depends on the dog. Some dogs will readily play with the toys whether a human is involved or not while others aren't the least bit interested even if a human is there. This holds true for play toys as well as chew toys.

- This has been my experience as well: the attractiveness of a toy depends greatly on the individual dog. However, the dogs in general make it overwhelmingly clear by the behavior they show when people enter their room that they much prefer the human contact and interaction to any other environmental enrichment. Often, this makes them pay attention to the toys even less, as they are far too busy trying to get attention from the human. I've secretly watched the same dogs, who seemed to have no interest at all in a toy, pick up the toy and play with it when they thought no humans were near or watching.

- We tried different commercial toys at our facilities. Some dogs like certain toys while others have no interest in them. It

seems to be the individual dog, not the breed, who enjoys certain toys. We rotate the toys weekly or more frequently. I have the impression that the more often we exchange a certain toy, the more attractive it becomes for the dogs.

Many of the dogs enjoy a tennis ball, but we don't leave it in the pen overnight since nothing would be left of the ball the next morning. This automatically enhances the attractiveness of the tennis ball: it's always new again the next day.

We have an elderly beagle who loves his blue hard plastic ball. He noses that around and flips it in the air all the while barking up a storm. It is really fun to watch. He does it on his own, no one is rolling the ball to him. Most of the other dogs show no interest in this type of ball, but this particular dog just loves it.

- The majority of our dogs like the dumbbells. They show more wear than any other hard plastic or hard rubber toys they have in their kennels. Unfortunately, we cannot give any rubber items softer than a Kong™ toy because of protocol issues; this is a shame because the dogs all loved them. We had a big dog who actually snuggled with his squeeze-and-toss football; it broke my heart when I had to take it away from him.

Healthy dogs love toys that they can tear apart. Is it reasonably practicable to give caged/kenneled dogs recycled cardboard or other paper-based material every few days as enrichment gadgets?

- I give our dogs small cardboard boxes stuffed with shredded paper and goodies. They also receive paper towel rolls with treats; the ends are stuffed with paper towel to keep the treats from falling out, so the dogs have to rip the rolls open to get the rewards. I also use food or bedding paper bags stuffed with shredded paper and treats.

- We have been giving our dogs in pens whole bags of shavings so that they can rip them open themselves. By the end of the day, the entire bag is ripped up, partly shredded and the bedding is spread. The other day I was watching one of the dogs digging his way into the bag, kicking out bedding as he went. It is a fantastic enrichment item.

- Paper-based toys are great for dogs, but you have to be willing to cleanup the unavoidable mess.

In your own experience, are there real safety issues—such as injuries or gastrointestinal obstruction—associated with certain dog toys?

- From my experience, it seems that for every toy given there will be one animal who succeeds in having a safety issue with it:
  (a) Latex/soft vinyl toys: I have used these toys for years. Some dogs would completely devour them; others would be conspicuously gentle with them. I had dogs eat these soft toys with no problem, but one dog did suffer from an intestinal obstruction caused by a piece of one of these toys.
  (b) Rope tugs/bones: Most dogs do fine with these toys, but one dog also got an obstruction caused by a string of the rope.
  (c) Hard rubber/plastic toys: These toys are pretty indestructible, so most dogs need a little extra encouragement to actually play with them. Even though these toys are so hard, we had one dog who managed to break a tooth while playing with a dumbbell.
  What I have learned from this is, to carefully evaluate any new toy for at least one week and to make sure it doesn't become a problem. After that, I inspect every item in the enclosure on a daily basis, but first verify that no toy is missing. You never know what a dog may choose to do with a toy!

- When they are very hungry or when they compete with each other over access to food, dogs have the tendency to directly swallow the food, this means they don't take the time to first chew and find out if it actually is edible stuff. Obviously, this can make it a bit risky to give dogs any kind of toy that they are not supposed to swallow. We evaluate whether a dog tends to be a chewer or a swallower and give soft toys to the chewer and hard toys to the swallower.

  This problem does not exist with rodents, rabbits, pigs, goats and cattle who all are strict chewers/grinders. They do not swallow large pieces, and if they happen to destroy a toy, they chew it into small segments that, if swallowed, pass through the gastrointestinal tract without ill effects.

- I have worked with quite a number of dogs who were pretty trouble-free with toys, but I remember one exception. We had one dog who chewed a rubber bone and the knuckle end got stuck in the duodenum. "Small" operation, and he was all right, but he was not given such bones again!!

oral gavage

In your experience, what is the least stressful oral gavage technique for a dog?

- I am the lead positive reinforcement trainer at my facility; my team and I have spent so much time training our dogs that they really seem to be willing participants for all of the experimental procedures we ask of them. I am sure it helps that I am the oral gavage doser for almost all of the PK studies we perform, and my restrainer is our *dog whisperer*.

  We have a solid trust relationship with our dogs. We place them on the exam table, and the restrainer simply hugs his arm around the dog so he/she is comfortably snug against the restrainer's body. The restrainer then has his hand placed gently on the dog's chest while his other hand is scratching the dog's head and ears. We always speak reassuringly to our dogs throughout the procedure, to keep them calm. The gavager then opens the dog's mouth and feeds in the gavage tube. I have to say, whenever I gavage our dogs, they seem to be very focused on me, relaxed but focused on my face while I speak to them in a reassuring and calm tone. We don't have any of our dogs squirm or try to get away at all; they literally don't move. They simply lean into the body of the restrainer and cooperate. Some even close their eyes as if they are going to fall asleep.

  It has taken a lot of training sessions, but the trust the dogs have in us is key for their cooperation. I think they almost look forward to being on study because of the tremendous amount of attention they receive. The individual who is taking the role of the restrainer has been doing husbandry for these dogs since they came to our facility many years ago. These dogs have known us since their first day at the facility; I am sure that helps us greatly in our training.

- That's the kind of comment I had hoped for. Thank you so much for sharing your experience and expertise. Yes, it certainly is mutual trust and patience that are the keys to working with animals!

  Just to clarify, you do not make use of a bite bar?

- We do not use a bite bar to aid in placing the gavage tube. I simply open the dog's mouth using my free hand. I keep my hand over the top of the muzzle—always making sure my fingers do not cover the nose—and slide the tube in while the dog is swallowing. We have never had a dog bite down on the tube, but I know that it could happen.

- I have observed some of our dogs during the oral dosing and can attest that the animals are really calm and amazingly cooperative. Some of the dogs were wagging their tails with great excitement because they got our attention, so it was sometimes difficult to keep them still during the procedure. Many of them actually raised their necks when you got ready to intubate them; it was amazing the first time I observed this.

  The procedure is very fast and the dogs are apparently comfortable with it; they certainly do not appear disturbed, let alone distressed. To me, they give the impression of being very happy to be on study as they are receiving so much attention.

socialization with personnel

What is the most practical and effective approach for socializing dogs with attending personnel so that the animals overcome their anxiety prior to, and fear during experimental procedures?

- We preferably order dogs from a vendor who has an extensive socializing program and will train the puppies beforehand to the specific procedures they will undergo in our facility. This makes the task of socializing the animals at our facility very easy.

- We receive our dogs from the same vendor. It's really amazing; some dogs even begin to lift their neck when you are getting ready to take a blood sample. The dogs seem to enjoy going on study as they get so much affectionate attention from the vet staff.

- Walking our dogs on a leash every day is the basis of our socialization program. It seems to me that these outings are highlights for the dogs, fostering a very positive relationship with their caregivers.

We are in the process of putting together an environmental enrichment program for our broodstock canines. Concern has been voiced over the males becoming perhaps too socialized, preferring human contact and not being interested in breeding. Does anyone have any comments on this?

- I honestly can't imagine bringing a female dog in heat around a male dog and having that male be more interested in the human than the female; those hormones kick in and create very strong urges, so much so that your well-trained pet may not listen to you, escape from your yard, urinate indoors—I know some people where the dog began to actually urinate on the people—and get into all kinds of trouble; all this is just from male hormones going into action even without a receptive female around. I can't see the dog losing his interest in the girls because he prefers human contact.
- Not to be trite—but Mother Nature will trump human contact every time. Intact, healthy male dogs, in my experience, never loose interest in making puppies.
- We have a group of very socialized breeders; they all have no problems breeding when in a room with a female in heat. These dogs are given supervised exercise as well as interaction with humans *every* day, and yet we have puppies all the time.

purpose-bred dogs for research

Should researchers only be allowed to use purpose-bred dogs for their projects?

- I personally would use dogs who have been purposely bred for research protocols. If I didn't know exactly a dog's medical and health history, I would have no assurance that the results obtained from such a dog are actually caused by the test drug and not by extraneous variables I don't know, because the dog comes from a shelter.
- In The Netherlands we are obliged by law to only use dogs who are purpose-bred; it is illegal to obtain dogs from shelters for research. Personally, I endorse this for several reasons:
  (a) Purpose-bred dogs are specifically bred for research; they all have a well-defined history.

(b) Purpose-bred dogs can be prepared for research already at the certified breeders. Good breeders—and there are some—will train the puppies to undergo several common procedures without stress. You can even ask some breeders to train the puppies for specific procedures prior to sending them to your lab. These animals will already be acclimated to laboratory conditions when they arrive at the lab. For them, the laboratory environment will not be distressing.

(c) Dogs from shelters have an unknown history. They may have had diseases, were medically treated and had all kinds of experiences that can interact with your research; you may never find out. Having to take unknown variables into account in your experimental group, you are likely to need more animals than when working with purpose-bred dogs.

(d) Unlike purpose-bred dogs, dogs from shelters are not at all used to the laboratory environment and, having to go through experimental procedures, however mild, is probably extremely stressful for them.

- I also feel that purpose-bred dogs, unlike dogs from shelters, are raised for and hence are familiar with laboratory-type living conditions. Dogs from shelters are not at all used to this, and they are probably extremely upset when brought into a research laboratory and subjected to procedures that evoke intense fear.

  Their greater variability, however, makes random source dogs probably *better* research subjects than purpose-bred dogs because they resemble much more an intrinsically variable human population.

- I sometimes consider laboratory animals, in this case purpose-bred dogs, to be like Formula 1 racing cars. They are very good at what they do on the race track with a nice flat surface and well-designed curves, but you could not drive one down the street to go shopping.

cats

environmental enrichment

What kind of enrichment is effective and practical for cats kept (a) alone or (b) in groups in the laboratory?

- We allow most of our cats to play together outside of their cages most of the day. If a cat doesn't get along with others, we give her some time out alone at least once every day. All cats are returned to their cages at the afternoon feeding.

  All of our cats have sanitizable toys such as fleece ropes or jingle balls. They also have access to scratching posts. We had "cat trees" at one time, but because we could not effectively sanitize them, they were removed from our program.

- Working with group-housed cats, I can recommend the following enrichment options as practical and effective:
  (a) Cardboard boxes with or without a hole cut for hide and seek.
  (b) Airline crates left open (the same ones the cats probably came in; the crates are cage-washable).
  (c) Fast-Trac™ (all plastic, chemically sanitizable); this commercial toy has never lost popularity—neither with the lab-housed cats nor with my cats at home; the round design makes it

enticing to nap in, and one swat of the ball, or even a slight bump, and the fun begins anew.

(d) Access to a window looking onto the hallway; we have a shelf installed on the door so the cats can sit on it and look out of the window.

(e) Feeder puzzle toys; these are commercially available or easy to make from food storage containers with random paw-sized holes cut in it; add cat treats or even kibble and the cats have to paw or bat out the treats.

(f) Laser pointer (we hang the laser pointer outside the room so that technicians passing by can play with the cats through the window for a few minutes without having to enter the room).

(g) Time with people (brushing, petting, playing with ordinary cat toys).

- Our cats also make constant use of the Fast-Trac™ toy. Singly housed animals curl in the center to sleep; if startled, the ball moves, and the game begins. Group-housed kitties line up around the outside edge—with one sitting in the middle—and don't get tired trying to somehow get the ball out. Now, my cat at home has no interest in this toy at all.

- My cats at home also have no interest in this device.

- They are probably less bored than cats in laboratories.

- Paper towel cardboard tubes can easily be turned into sham rodent burrows by connecting a few of them to a length of 2-4 feet, closing one end with packing tape and baiting the device with dry cat food pellets. Cats will first attentively check the entrance of the burrow, smell its contents and then bat and paw its wall. Moving the cardboard around will inevitably trigger a rustling noise created by the pellets tumbling at the far end of the burrow. The cats will now eagerly try to get hold of their prey by reaching into the burrow as far as they can while vigorously shaking it. Our house cat receives all her food in this manner; it takes her more than a half-hour every day to retrieve her pellet ration from these tubes.

- Access to a window is one of the most attractive enrichment options for cats. They love to watch what's going on outside their room.

- We have a cat at our facility who made her own enrichment. She was kept alone in one of our cat rooms for about three weeks and finally decided to get out for a walk. After everybody leaves in the late afternoon she does jumping exercise at the door, pulls down the lever handle, allows the door to swing open, and out she goes, roaming the hallway all night until we come back to work in the morning. We have found her like this every weekend, and now she has

also started to go for a stroll during the week. Pretty smart kitty!

We finally decided to intervene and changed the door handle so that she can no longer open the door. As a compromise, we added two other kittens in the room so that our escaper is less bored.

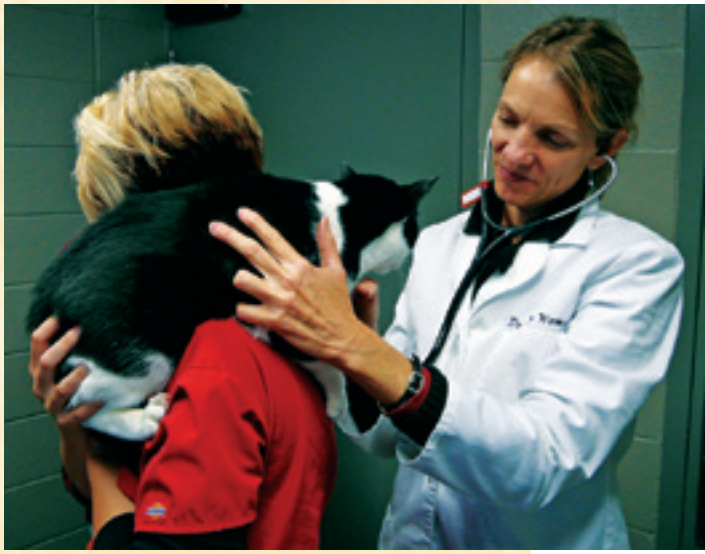
- I remember a similar story of mice, leaving their cages during the night, hoarding food from other mice and returning back home before personnel can witness the escapade.

- I strongly believe that the most effective enrichment for single-cage cats is contact with humans. Time is one thing that is in short supply in most facilities, but I do feel it can be worked around.

We don't have cats at our facility anymore but when we did, anyone who had even a few minutes would drop in to spend a few minutes with them. A good brushing, if desired, a play with a toy or just a lap to sit on was so much appreciated by these felines. The cats were visited quite a bit daily and therefore were not lonely. We did supply toys for them, including tinfoil balls, Fast-Tracs™, cardboard boxes for scratching, dried catnip, pieces of medium sized rope suspended or loose on the floor, small cat balls, plus many food treats. We tried to give them something new each day and eventually came back to the first toy which, by then, was a brand new, interesting toy to them. All cats were usually given free run of a room and never caged unless absolutely necessary. I think we did a pretty good job of keeping the cats—and us—entertained!

handling

Cats can be quite feisty when you have to treat them for whatever reason. What is your trick to get the job done without being scratched or bitten and without unduly distressing the cat? Using the very least restraint possible is probably the basic condition to do hands-on work with cats without distressing them and without taking chances of being scratched or bitten by them. A cat who feels forcefully restrained can turn into a fiercely self-defending creature who will show no inhibition to swiftly strike out at you even if you think you can trust her.



- From my experience at a small vet clinic, the least restraint possible with cats is best. Encircling them with your arms and body rather than holding them down usually works.

  Another trick that I find very effective is the *kitty burrito*:
  (a) place the cat on a towel,
  (b) flip the two sides over the cat,
  (c) flip the back end up, and
  (d) leave the cat's head sticking out of the front opening.

  This maneuver has the advantage of holding the cat's limbs in, without cranking down on the cat. It is useful for administering pills as well as collecting blood.

  When the burrito is impractical and the cat is squirmy, holding a bit of scruff can work. Some cats react to this as they did when they were kittens; they go limp. It depends on the cat; stressful to some, helpful to others. Watch their reaction!

- Yes this is a very good trick also in my experience; it works with almost all cats.

- If cooperation has gone out the window, I agree that the towel roll helps get things done with a minimum of wrestling.

- To take the temperature of a cat with a rectal thermometer, getting an assistant to gently tap on the cat's nose between her/his eyes tends to take the cat's mind off what is happening around the back, so that there is no objection, unless perhaps the cat is already very upset. We routinely tap or stroke the area between the eyes towards the nose to calm many cats down in order to facilitate lots of procedures. Some of the cats definitely go into a calm, almost trance-like state.

Cats tend to be more skittish when you want to take a blood sample than dogs. Are there practical ways to train cats so that they relax and perhaps even cooperate rather than resist and struggle during blood collection?

- When I first started at my facility 24 years ago, we used bags to restrain most cats. What a struggle that was! We no longer use that system thank heavens; but what we discovered over the years is that cats respond much better to mild restraint rather than being strongly subdued.

  The cat must be able to trust the person who is holding her; and the person must be able to read the cat's emotions properly and respond accordingly. *Cat people* hold this key! I myself am a dog/pig person and respond to their behavioral signals much quicker and more accurately than I do with cats; and of course cats sense this. I believe that we all have our niche in the animal care field and it should be nurtured and called upon at all times to ensure that the animals we look after receive the best quality care possible!

- A long time ago, I worked with a vet who had her own unique way of calming fidgety cats during jugular blood sampling. She used to get a third person to rhythmically and gently tap the cat on the head during blood sampling. Almost invariably blood sampling would be a lot easier and the cats did not appear unduly stressed by this procedure.

pigs

socialization with personnel

Do you make attempts to socialize pigs so that anxiety and fear do not become uncontrolled variables during experimental procedures?

- Absolutely! It helps calm the researchers as well as the pigs. Our work would be impossible if we did not spend the time getting our pigs really well used to people and to being handled.

- We receive our pigs from a vendor who has a really nice socialization program, so the pigs come to us with great behavior and we are, therefore, able to handle them fairly easily, especially while offering yummy prima treats, fruity gems and other treats.

- The caregivers at our facility socialize the pigs who are in their charge. Young pigs are quite easy to get familiarized with humans because they have not yet learned, through aversive experience, to associate them with fear and anxiety.

  On arrival, mature adults seem quite indifferent to me once settled in and at home. They are primarily concerned with their food supply; they tolerate being petted and scratched and are quite easy to handle for their size. Once they tolerate my presence and contact has been made, it is all downhill from there. They love to be scratched and have their bellies rubbed; they can't resist it. Good hard pats to injection sites will prepare them for those later. I use jam, peanut butter and large marshmallows for treats; medications can easily be hidden in there.

  The one thing I have learned over the years is not to try playing with them. Pigs bite each other during play, but also when something is not going their way. They will do the same to you if they have not learned that you are *not* one of them but a provider of all good things, and that a bit of respect will gain them some excellent treats; they are extremely fast learners!

- I believe, first and foremost, socializing pigs is a welfare issue, it *must* be done; not only the pigs, but also the research will benefit from it. I strongly believe an animal who is less stressed or not stressed at all will make the best research model.

blood collection

What is the least distressing way to collect blood from pigs on a regular basis? I am sure these intelligent animals can readily be trained to cooperate during this procedure; what are the training steps that work best?

- I dealt with a highly food-motivated boar of about 200 kg. His kind nature made him popular with people, so he got a lot of attention. This is probably one of the main reasons why I could train him successfully.

  Training took place daily for 5-10 minutes. I used juice in a squirt bottle as positive reinforcement and a fruit as a bonus at the end of each session. It took about a week to shape his behavior to allow for his first jugular bleed with no restraint.

- We frequently bleed pigs and usually apply a numbing cream to their ears, then while one person distracts the animal with petting, food or treats, the other person obtains a blood sample from the ear. The pig has to be very well-acclimated to humans in order to cooperate during this procedure. Since most of our pigs are very friendly, we've even been able to take blood samples from other peripheral vessels like the cephalic, using the same handling technique.

- We sedate our pigs for blood sampling. This does not seem to be a big issue, but I would love some day to have the time with a pig to really concentrate on training for sampling with no sedation. I am sure this is possible.

- Having a good, that means trust-based, relationship with the person in charge is probably the key factor to making the blood collection procedure stress-free for the pig and stress-free for yourself. I don't think that the venipuncture per se is a big deal for the pig, provided you know what you are doing and how to do it swiftly and correctly. When you have a good relationship with your pigs, the animals will, over time, start to cooperate during blood collection without any formal training.

- Socialization is the most important first step when trying to manipulate a pig in any way. An intramuscular injection can be administered without any ado if the pig is

well-socialized. Even injections that sting a little—for example ketamine—can be given without the pig really associating the sting with the handling person.

I think it is important to acknowledge that pigs are very easily spooked and, once their trust is broken, it takes a lot to earn it back!

- I find that farm animals, like pigs, are not looked at the same way as companion animals. Since they are still treated a certain way on the farm, some people in the biomedical industry feel that this should be good enough in research. I think this is hogwash and I strongly disagree. No animal used in research should fear the caregiver, the environment or any procedure. Pigs are very easily stressed and a stressed animal cannot be a good research model. I have found in most cases with pigs that major stress can be avoided, but it takes time. Unfortunately, in a lot of facilities time means money and that seems to be more important than compassionate animal care.

- We did not train for blood collection, but we had a project with daily bandage changes for 14-21 days. At first this required injectable anesthesia and a prolonged recovery. This was unpleasant for the pigs and for the technicians. So we taught the pigs to walk down the hallway to the OR [Operations Room] and allow us to mask them down.

  Pigs are food-oriented animals so we used favored treats as enticement to make them move in the right direction and as reward for cooperation during inhalation of the anesthetic. We worked with each pig twice a day for a total of about 30 minutes. It took four days for the smartest pig and nine days for the dumbest to get successfully trained before the actual research project started. The training shortened recovery and made the pigs and techs much happier and, in the end, saved time and money.

- That's the way to do business with animals in the research lab setting. When you have some first-hand experience with animals and are a bit concerned about their feelings such as fear, anxiety and despair, you must come to the conclusion that animals like pigs, cows, rats, rabbits, monkeys and dogs are too intelligent and trustworthy to be treated with force rather than taught to cooperate during procedures and work *with* rather than against you. This kind of working together is, by the way, also a valuable mental enrichment not only for the animal but also for yourself.

social enrichment

Pigs have a very strong social disposition and suffer in a similar manner as primates and sheep do when they are kept without a social partner. How do you address the need for companionship when the pig is housed alone during an experiment or test?

- When they find out that you are nice to them, pigs readily socialize with you and, if single-housed, will value any time you can spare to be with them. I visit each of our pigs at least once a day, talk to them, groom them a bit, and distribute food treats.

- Our single-housed pigs are well-socialized with humans; I spend a certain amount of time with each one of them every day, scratching, petting and giving them lots of attention. A good scratch with a toilet brush and lots of petting goes a long way!

  While I am cleaning their pens, I let two pigs out at a time so that they can interact with each other and play if they feel up to it.

  It is my experience that socialized pigs very quickly adjust to being housed in individual pens; they don't appear to be distressed. I can go into a pen with a socialized pig and give a pre-med with little or no stress to the animal. In a group setting this is harder and, once the group is disturbed, the pigs don't settle easily and are spooked for quite a while. They are harder to socialize in a group since they rely on each other for comfort instead of me.

- We use mesh-sided pens so that pigs can maintain contact with each other even if they can't mix. They also get lots of human contact and I do mean contact: lots of scratching, brushing and rubbing, and playing. On the odd occasion we only have one pig in the room, the human contact is increased even to the extent of just sitting in the bed alongside the animal for 10-15 minutes several times a day; pigs do seem to like lying, so they will typically lean up against you. I think we humans can provide—and should provide—highly valued companionship for pigs who have to be kept alone.

How do you go about establishing new pairs or groups of unfamiliar pigs? Does it help to sedate the animals first and then allow them to wake up together?

- It certainly works both in agricultural pig units as well as in the lab situation.

  It does seem to be important that future pen mates have body contact while they recover from sedation. They will stir and stumble over other pigs, settle back amongst the others and by the time they are fully recovered, all the pigs will have the same smell mix, distinguishing each one as a member of the *same* group. Our pigs wake up and just get on with things as if they've always been housed together. We have gilts, but my pig technician who is from a commercial background says that this technique also works with adult females, young intact males as well as adult castrated males.

environmental enrichment

Pigs are intelligent, highly inquisitive social animals. What can we do to mitigate boredom when they are kept in laboratories and assigned to research?

- We provide our pigs with balls and hanging soft nylon tug toys, which they chew up and destroy very quickly. We have tried several different types of scratchboards with limited success. The animals keep chewing them up. My ideal enrichment for our swine would be increased floor space and more human-animal contact.

- All of our pigs get basketballs, cardboard boxes stuffed with hay and treats, or empty, relatively large boxes in which piglets often sleep. Empty glove or hat cardboard boxes stuffed with hay and treats entertain our pigs quite a bit. They love shredded paper; I put a huge pile on the floor and sprinkle cereal on it; this simple trick promotes a lot of rooting. We have the large rubber feeders and I will place treats under stainless cat bowls, usually four or five bowls will fit in upside down. I then add shredded paper on top of the bowls to fill the feeder. The pigs have a blast rooting and trying to lift up the bowls to get their rewards underneath!

These delights are rotated so there is a new treat each day! The pigs also have chains hanging from the fencing as well as long strings of old rubber sipper tube stoppers; they love to chew and pull on these. They also like blankets to sleep on as well as play tug of war with. When possible a good hosing with water is much enjoyed! I would love to have a playroom for them with a children's swimming pool! Something to work on for the future!

Dry leaves or straw provide attractive substrate for rooting, especially when you sprinkle small food particles on it. The pigs will flip the substrate around and happily oink while rooting through it for goodies.

- All our mini-pigs have a Jolly Apple™ hanging from the ceiling, as well as a bowling ball or Boomer Ball™ on the floor of the cage. We give them produce occasionally. I have tried the Scratching Pads™ but the pigs always manage to break them and pull them down.

- Pigs have a very strong urge for scratching themselves and love rubbing their bodies against sturdy objects.

  Plastic broom heads can easily be turned into scratching pads. We attach them to the wire mesh of the pens with plastic strapping. The pigs will chew them on occasions, but they last a reasonable time and are cheap enough to be replaced as needed. Mind you, our pigs are large White x Landrace hybrids who, in my experience, are much less destructive than the mini-pigs.

- We give our pigs the following:
  (a) A large wad of wheat straw every day so that they can make a bed; we leave the wad in a slice as it comes from the bale so that the pigs can work it up. They get enough straw to completely bury themselves in it.
  (b) Cardboard boxes that the pigs can tear up.
  (c) Old rubber boots that the pigs can toss around the pen; admittedly, this can prove to be a problem as they don't differentiate between these boots and the ones full of leg!
  (d) Water; pigs love to play with running water; but again this can create a problem as they may pick up the hose and stuff it down the top of your boot, if you aren't quick enough.
  (e) Stiff broom heads fastened to pen walls at just below back/shoulder height. The pigs use them for scratching themselves at great length.
  (f) Lots and lots of human companionship for at least a week before any procedures and again for at least one week afterwards. Pigs love to have their bellies, but also their ears, rubbed and scratched.

  Animals who are used to regular human contact are relatively easy to handle during research-related procedures.

Your comments clearly suggest that your pigs receive the attention and care they deserve. That's the way to go!

- Thanks for the appreciation, but I'm lucky in that I have a first class technician, superb staff in general and pretty much a free hand—any experimental reasons for not providing enrichment have to be justified in the appropriate project license.

  Probably the best aid to pig welfare are our rather progressive researchers who appreciate that contented pigs are so much easier to work with and, in addition, yield better results.

When a research protocol requires single caging of a pig, what are practical options for housing arrangements so that the subject can keep contact with one or several non-experimental pigs to help buffer fear, anxiety and boredom?

- We house pigs on a regular basis individually due to surgical procedures. Individual housing makes it easier on each pig when the others are used terminally. Our pigs are kept in dog runs or pens and can hear, see and smell their fellow swine. I keep them side-by-side and they always lay beside each other even though there is wire between them.

  They have a conditioning period to become comfortable with human contact. Once a pig likes you, she *really* likes you and social time or playtime with you then becomes a must. I spend a certain amount of time every day with each pig, scratching, petting and giving the animal lots of attention.

  Often we let our pigs out in the hallway to interact with their neighbors while the pens are being cleaned. Once accustomed to being kept alone, our pigs make no fuss going back to their home runs.

- Pigs love any amount of human contact, especially if that involves food, petting or playing in water. We try to do as much of that as possible at cage cleaning. I believe that regular interaction with a human friend provides valuable social enrichment for our single-housed pigs.

- I've started to play a CD with digitally recorded pig grunting in a room where a specific pig had to remain in isolation. Her activity, positive interactions with human caretakers, and appetite immediately improved after the CD was introduced.

- Even though it is our default to house pigs in pairs or groups, there is often a need to keep some individually. We utilize every method available to provide the single-housed animal visual, olfactory, and/or auditory contact with other conspecifics.

coprophagy

Can anyone confirm that coprophagy is a normal behavior in pigs?

- I have never noted this behavior in swine. In fact, pigs stay as far away from their feces as possible and are very specific to defecate away from where they eat. We house our pigs on sawdust bedding; they will definitely snack on it, but not where there is any fecal material. So I would say this is not a normal behavior in swine.

- In Yorkshires, housed in solid bottom pens with aspen chip, I have not seen coprophagy either. They will eat walls, toes, rodent chow and all kinds of other stuff, but not feces.

- I've spoken to my deputy who managed a 200-sow research herd of pigs for many years and who also has extensive experience in commercial piggeries, and our current pig supplier; both have never seen coprophagy in pigs and their response was the same, "there is something wrong if they do." My experience has also always been that pigs dung in a discrete area and avoid contact with their feces as much as possible unless they are stressed, in which case they will soil their sleeping area or roll in feces—usually an indication that they are too hot.

goats

There is a rumor that we are going to get goats at our facility. I have no experience with goats other than petting zoos or friends' farms. Can anybody share advice on enrichment?

- You are in for quite a treat: goats are fabulous animals. Depending on where you source them from, they may be quite skittish or already humanized to chew all your clothes.

  Big males can be intimidating, but if you have ever worked with cows or horses, it is the same working style.

  Goats do best on solid flooring with bedding and fed hay twice a day; grain makes them fat if they don't get enough exercise. Since they do chew everything and can stand on their back legs, you may always want to check what is in reach for them over the top edge of their pens.

- If they have to be kept alone, interaction with humans is the best enrichment for goats. They love people to talk to them, scratch them and hand out treats such as yogurt drops, alfalfa cubes, Cheerios and ginger snaps.

- I used to manage a research herd of over 300 goats; they are fantastic animals to work with and I still miss them.

  Goats investigate everything with their mouths and can be *very* destructive if bored. They are browsers rather than grazers, so if you can provide woody material for them to browse on, it's the best form of enrichment, but obviously you need to be careful about toxic trees and herbicides. If you can't get browse, then red clover hay, Lucerne hay (alfalfa) or straw will keep them busy; they prefer rough hay to good quality meadow hay. Mineral licks are also popular.

Goats like things they can climb on; if you have the space, old wooden packing cases or concrete blocks—as long as they are sturdy and won't topple—provide great enrichment. They will happily stand on their back legs for long periods; if you can suspend browse or hay at a good height, it will make them work. An adult Saanen-type goat can easily reach up to six feet when standing like this; this means any fittings in the room need to be made goat-proof even at this height.

Plenty of rubbing posts will be welcomed; goats are a bit like pigs in this respect and enjoy a good scratch. If they are housed in groups, the lead animal will start the rub and then the rest of the group will take their turns; so posts, gates and other vertical structures need to be quite robust. A daily brush, just like you'd groom a horse, is usually enjoyed and helps keep the goats clean.

Space is quite important to goats; if you can provide plenty, it will act as enrichment.

Goats love to be outdoors. If group-housed they will play *Follow The Leader*. This activity doesn't seem to be a stereotypy as the goats will play this game in a variety of ways out in the field.

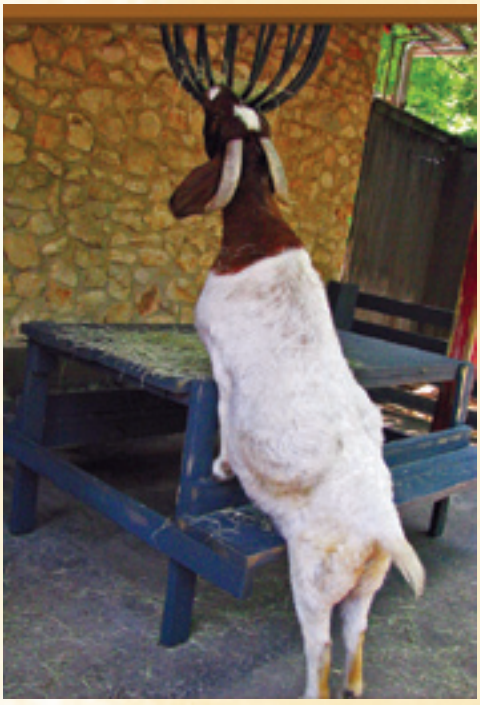
I don't think footballs or similar toys would last five minutes, but a large puzzle ball might be enjoyed by goats,

providing it is made of very tough material; goats don't have a particularly strong mouth but they are very, very persistent; same effect as dripping water on stone, but quicker!

If you have intact males, you will need separate clothing for use just with them, as once contaminated with their smell the odor does not wash out.

- Goats love to climb. Ordinary fences, usually, have only symbolic value for them; they are experts in climbing over them just to get out. If you have a good relationship with them—which is really not difficult—you will easily get them back in.

  Structures onto which they can climb provide great enrichment for goats.



poultry

How do you train poultry—specifically broilers—to peck keys for food?

- The simplest method is probably autoshaping. Stick a piece of food to the key of the apparatus, stand back and wait! The broiler will quickly make the association between pecking the key and the food presentation. The birds learn remarkably quickly when they can watch each other; so once you have got one broiler trained, let the others watch. You should get close to a 100 percent success rate.

- I started at Waikato University where the operant animal of choice is a chicken. They autoshape much like any animal. A good-sized key with some positive contrast will make it harder to get them to stop pecking than to get them to start pecking.

- Thanks for the encouraging responses. It looks like it will be easier than I thought. It is my intention to work with a breed that can be (a) non-food restricted and (b) re-homed after termination of the study.

- You will almost certainly *not* be able to ethically re-home a broiler chicken! These animals have been artificially selected to put on massive amounts of weight, very quickly. As a consequence, by six weeks of age, most birds have difficulty walking, and many will have become so lame that they will no longer be able to walk to get food and water. This limited mobility might also confound your study—as the bird gets older, its motivation to eat might be increasing, but its physical ability to actually peck the key might decrease, thereby giving misleading results. I'm not entirely sure of the aim of your work, but the broiler hen is a difficult animal to work with because of these inherent problems. Layers are much more robust and agile. We often keep them for a year or two and then re-home them.

- Our hens had the lab as their true home where they were allowed to retire.

Is it customary to keep trained hens in retirement or re-home them, or are they used in repeated studies?

- I am not sure if that lab is still running. When I was there in the late 90's, trained birds tended to be kept on as long as they would last. New birds would be named and trained by undergrads and then assigned to research projects. When one study ended, healthy birds would move to another study. Respect for the animal was implicit in the way things were run. Culling for other than health reasons was very rare. I went back and visited my birds—Glady, Slim, Roadrunner, Scats, Struggle and Spooky—many years after I graduated.

- To re-home your animals after the studies, they need to be signed off by your named vet. We regularly do this with layer hens, sometimes sending hundreds to free-range farms after termination of studies.

{Chapter 5}

Miscellaneous

professional stigma

When you work as a technician, caretaker or veterinarian in a biomedical laboratory you are bearing the risk of getting stigmatized by outsiders as a vivisectionist who does not care about animals. How do you deal with this often rather frustrating situation?

- It is my opinion that we need to inform outsiders what actually does go on in research facilities. They should be able to form their opinions based on facts, not on some stories that contain only half-truths. I tell critics that I wish animals would not have to be used in research, but since they are being used I feel an obligation to give them all the care, respect and humane treatment they deserve. I am not hiding the fact that I am pro-research but I am also not hiding that I am pro-animal; both positions can complement each other when you work in a biomedical research lab.

- I talk about what I do fairly freely, stressing the controls we have in the U.K., the fact that I very much care about the well-being of the animals in my charge, and the benefits that medical research, using animals, gives to everyone. There are sometimes sharp intakes of breath when I first tell people that I look after research animals but, generally, I am given a fair hearing and most people will accept what I do as being necessary. Of course you'll never convert the hardened *anti*.

- In my experience here in Italy, speaking with people about my work and discussing with them honestly the pros and cons of animal experimentation is the best way to respond to the allegation that we torture animals in secret labs.

- Yes, I also speak to people openly about my work in a research lab. I first began with my family and close friends who know that I have loved animals since I could talk and wanted to be a vet since I was five years old. These discussions helped me to openly speak with other people, such as my neighbors, who don't know me as well as my family and close friends do. I hold myself back at certain places such as the local vet clinic, where I know that the vet techs are very much against animal experimentation.

- It is my experience as a clinical vet that some people have the unshakable belief that everybody working in animal research labs is a bad person. Such individuals are usually misinformed but very attached to their opinion. They are not willing and not ready to listen. There is not much you can do but keep your mouth shut and go. After all, you have no reason to defend yourself. Other people may have the same belief, but they are more open-minded and will listen. When you tell them the truth, they no longer have a good reason to insult you but will respect your commitment to making life as easy as possible for the animals in your charge.

  Sometimes people argue that my commitment is rather naïve because there are millions of animals in research laboratories; I am wasting my time when I try to help a few of them. Telling the following story of the man and the starfish serves as a gentle but effective way to counter this way of thinking:

  > *A man is picking up starfish on a beach and throws them, one at a time, back into the sea. Another man comes along and wonders what he is doing. The first man explains that the starfish are above the high tide line and will die if they don't get back into the water. The second man is incredulous and says "but there are hundreds of starfish on the beach; you can't possibly make a difference!" The first man calmly picks up another starfish, throws it back to the sea, and says, "made a difference to that one."*

- I used to hide what I did for a living from folks but then one day wondered, "why am

I hiding?" After all, I care for animals and do what I possibly can to make life easier for them. Nowadays, I have no problem talking with interested people and critics alike about my work in the research lab.

I always start by making it clear that, as far back as I can remember, I always wanted to work with animals and to make a positive difference in their lives. When I first came into the animal research environment, I didn't know how long I would stay, but it didn't take me long to realize that here was the place where I could make a big difference; that was 23 years ago. I explain to people that, while I do find research interesting, it is the animals that brought me here and keep me here. I have been fortunate enough to have been able to bring about positive changes in the way they are kept and treated. This has been, and still is, very rewarding!

I once was asked how an animal lover, such as myself, could ever do what I do. My reply was, "would you rather have someone who doesn't love and respect animals work with them?" This was not rude, but it ended the conversation about my job.

- I have had people leave parties when they found out what I do. Fortunately, that is rare; most people listen, and I will explain to them that my job as an animal technician is to love animals, make sure they get the best care, use them well and, unfortunately, kill them well.

- I don't say a lot about my job unless I can trust the other person, and even then I do not go into details. The few people with whom I have discussed my work were at first rather critical, even judgmental, but after listening to me changed their view and told me that they do understand that research laboratories need caring technicians who do the daily work with and for the animals.

- It is no problem for me to talk about my job without fear everywhere I go here in the U.S. I tell people truthfully what I do, and how my job is precisely where I should be because of the level of concern I have for the welfare of animals in general and those in laboratories in particular.

- It is my personal experience that most people—not all!—quickly stop their accusations when you tell them honestly what you are actually doing, and how your presence alleviates rather than causes suffering to animals in research labs.

Many people think that working as a caretaker, technician or veterinarian in a research laboratory implies that you condone the research that is done, even if it may cause suffering and death to animals. How do you respond to this assumption?

- When I am drawn into a discussion on biomedical research and testing, I do my part to steer away from the question of pro or con animal experimentation. Yes, I do have a personal opinion on that issue but it is of no relevance, simply because I do not perform invasive experiments with animals myself. My mission is to care for animals assigned to such experiments, so I do my best to make sure that the animals are, at least, properly housed and handled.

- If you come across as not agreeing that the research being conducted on the animals in your care is beneficial, you are going to send a negative message to the public about research in general. I can hear comments like, "she is actually working in the lab and does not even believe that the research is necessary." That can hurt all of us in the field. I cannot imagine being able to justify to myself the use of animals for projects that I don't believe in.

- Exactly! That's the reason why I categorically refuse to be actively involved in a project in which I don't believe, either:
  (a) because of its adverse implications for animals, or
  (b) because of its scientific weakness.

- For me, the answer to the question if I believe that research is necessary is neither a *yes* nor a *no*. Based on my own experience and based on the literature that I have read, my answer would be that it all depends on the particular research protocol:
  (a) yes, there are certain invasive research projects that have significant scientific merit and, hence, are justifiable because no alternatives are available;
  (b) yes, there may be certain invasive research/testing projects that are necessary or legally mandated, but I am not in the position to argue for them because I am not an expert in that particular area of scientific research;
  (c) no, there are certain invasive research projects that have insufficient scientific merit and, hence, are not justifiable;
  (d) no, there are certain invasive research projects that are repetitive, hence are not justifiable because they are likely to cause unnecessary animal suffering; and
  (e) no, there are certain invasive research projects for which alternatives are available; they are not justifiable because they are likely to cause avoidable animal suffering.