

Time for change? Practicalities of implementing non-aversive methods for handling mice

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Abstract

Recent studies have shown that the method choice for handling laboratory mice is important to animal welfare. In 2015, 60% of all animals used in Home Office procedures were laboratory mice. Given the large number of mice within global facilities, mouse welfare should be a high priority. Improved handling not only leads to more consistent scientific data, it can also lead to improved animal welfare. Historically mice have been picked up by their tail, a method that has been passed down to generations of technologists and is widely accepted as a method of handling. Hurst and West (2010) showed that picking up mice by their tail induces aversion and high anxiety. By contrast, using alternatives, such as a tunnel or cupped on the open hand, leads to voluntary approach to the handler, low anxiety and animals that more readily accept some physical restraint. Hurst and West's findings were consistent across strains and sex of laboratory mice, handlers with differing levels of experience and different light periods (light/dark). From a welfare perspective, the response from the mice on a daily basis is a positive step in the right direction.

The evidence presented by Hurst and West indicates that a change to the standard method for picking up mice would provide improved welfare for millions of mice worldwide. However, this will only happen if the non-aversive methods are taken up by facilities. To be successful, the practicalities of these methods need to be demonstrated and appropriate instruction provided

for technical staff and researchers to aid implementation of the methods.

First, I gained information from talking to technologists, conducted a survey of their responses concerning key issues and established practical details of implementation in our own facility. I then played a major part in designing and constructing a video-based tutorial with accompanying commentary, to demonstrate the handling methods and their use in common laboratory situations from a practical, technologist's viewpoint. This includes ways to avoid common problems in implementation to reduce stress in both animals and the technologists carrying out the handling. Although my main focus was practical implementation from an animal technologist's perspective, as this will have the greatest impact on implementation, the tutorial provides important training material for technologists and researchers alike.

With valuable support from NC3Rs to provide a web-based resource, truly available to all (nationally and internationally), the tutorial is now hosted on the NC3Rs' website (<http://www.nc3rs.org.uk/mouse-handling-tutorial>). Statistics gained from NC3Rs for the first six weeks since its launch show that the tutorial is already being used in a wide range of countries in addition to the UK. Feedback from fellow technologists in the United States has further enhanced the hope that animals outside of the UK will also benefit from the non-aversive methods of handling that have been developed.

Introduction

In 2010, Hurst and West published a paper entitled "Taming Anxiety in Laboratory Mice" (*Nature Methods* 7:825-826). This outlined the significant improvements to the welfare of laboratory mice that can be seen by avoiding the traditional tail handling method and using a non-aversive alternative.

Picking up mice by the base of the tail has historically been accepted as the method of choice for handling them but there has been an absence of any scientific data to substantiate this method of handling. This has been passed down through generations of technologists without any thought as to the impact it has upon laboratory mice.

Hurst and West (2010) presented significant data to show that mice find tail handling aversive, resulting in high levels of anxiety in those picked up by the tail. Two alternative methods of handling were presented that do not induce this aversion and anxiety, leading to more reliable scientific data and a significant improvement in mouse welfare. They compared the response of laboratory mice picked up and held by three different methods: by the tail base, cupped on the open hand, or picked up inside a transparent tunnel. In each handling session, the handler picked up each mouse in turn by the designated method and held it for 30 s. After moving away from the open cage for 60 s, the mice were handled again so that each mouse was picked up twice and held for a total of 60 s. The voluntary response to the handler was recorded for each of the handling methods. This showed that mice habituated to tunnel or cup handling are much more willing to interact voluntarily with their handler, regardless of strain, handler's experience, and if carried out in the dark or light period.

Hurst was awarded the 2010 NC3Rs' prize for the most outstanding original contribution to scientific and technological advances in 3Rs. NC3Rs recognised that the work has the potential to improve the lives of millions of laboratory mice.

Funded by a NC3Rs' studentship, Gouveia (2014) carried out further research to establish the practicalities of how long and how frequently mice need to be handled to gain the benefits of these alternative handling methods. She showed that only brief handling (2s) was sufficient to improve the response towards the handler and anxiety, compared to those picked up by the tail. Frequent handling using non-aversive methods increased tameness but this was not the case for tail-handled mice.

The potential impact that this work could have is substantial. Handling stress confounds research studies involving physiological or behavioural responses. Increased data variability due to uncontrolled handling stress can result in impaired test

performance (due to stress), false positive or negative responses, and requires more animals for testing. High anxiety induced by previous handling experience can cause particularly strong impairment of performance in behavioural studies (Gouveia 2014; Gouveia and Hurst submitted). Handling also has a substantial impact on the animal's welfare. In 2015, mice made up 60% of all animals used throughout the UK in Home Office regulated procedures. This equated to over 1 million mice, without taking into account the many animals that are held within facilities that undergo procedures that are not regulated. The number of mice within UK facilities that could benefit from improved handling could be in the many millions, and considerably greater than this worldwide.

However, the use of alternative methods to handle mice in the laboratory will only be of benefit if carried out correctly. Incorrect implementation could result in high levels of stress, reducing the impact or even having the reverse effect of increased stress and anxiety. Following the publication of Hurst and West (2010), there was uncertainty about how the alternative handling methods would impact upon the daily running of animal units if there was widespread adoption. It became clear that a few issues needed to be addressed in order to facilitate a smooth transition to the new methods of handling and allow laboratory mice and the technical/research community to benefit from the new findings.

The largest impact would be on Animal Technologists responsible for the day-to-day care of animals, and who would be responsible for the changeover of methods. For this, any negative impacts would have to be as small as possible. The technologists needed guidance from somebody who had implemented the methods, recognised common mistakes made and could offer guidance on how to overcome any problems. My own contribution has thus focussed on understanding the range of concerns and potential issues across a broad range of Animal Technologists and facilities, and the provision of simple, clear and practical advice. To understand the range of concerns and potential issues, I organised a workshop on mouse handling at the Institute of Animal Technology Annual Congress 2012. In addition to implementing the new methods in my own local animal facility where I am NACWO, I conducted two small studies to gain some objective data on potential issues of concern. I then helped to put together a tutorial on mouse handling, both by providing the technologist's perspective on practical handling issues and by filming appropriate video clips with associated commentary to demonstrate best practice in different scenarios and how to avoid common problems that we had identified. Initially, I presented the tutorial in person at an event organised by Charles River and, on invitation, to the BSG Technician Symposium in Cambridge. This provided useful

feedback to improve the tutorial, which has now been turned into a freely-available on-line resource, hosted on the NC3Rs website. Details of these activities are outlined in separate sections below.

Consultation with professional Animal Technologists

The opinions of Animal Technologists concerning the findings by Hurst and West (2010), and their practical implementation in animal facilities, was gained via a workshop at the Institute of Animal Technology 2012 Congress which was attended by 60 delegates (all experienced Animal Technologists). Following on from a presentation by Professor Hurst, I gave a presentation on practical issues and led an interactive question and

answer session to discuss the issues from my own perspective after implementing the new methods in my local animal facility. The main purpose was to show best practice and give some advice to help others wishing to carry out the methods based on our own experience. The workshop would also help me gain information about the issues that others perceived or had experienced. Each participant was provided with a handset to submit answers to a set of 15 questions, which were collated with TurningPoint polling software. This allowed me to share responses instantaneously with the delegates to guide the discussion, and also allowed me to store the data for future analysis. The questions asked, and resulting responses, are summarised in Table 1.

Q1: Following on Hurst and West's findings, does your facility currently implement new handling methods?

Yes	No
17%	83%

Q2: What is the main reason for technologists not implementing new methods?

Time	Cost	Scientific protocol	Manager instructed	Other
73%	0%	0%	9%	18%

Q3: What is the most common method of handling laboratory mice in your facility?

Tail	Hand	Tunnel	Other
95%	5%	0%	0%

Q4: Roughly what % of animals in your facility consist of laboratory mice?

0-25%	26-50%	51-75%	76-100%
6 %	19%	22%	53%

Q5: When transferring mice to a clean cage by the tail, do you support the mouse on your arm or hand?

Yes, always	Yes, sometimes	No never
30%	54%	16%

Q6: What would be the mouse's preferred colour choice for a home tunnel?

Red	Clear
67%	23%

Q7: Does your facility supply environmental enrichment for laboratory mice?

Yes	No
97%	3%

Q8: What is the main reason technologist's supply enrichment?

Improves welfare	Direct instruction	Scientific protocol	Other
100%	0%	0%	0%

Q9: How much longer would you be prepared to add onto cleaning to improve welfare?

None	1-2 seconds	3-4 seconds	5 seconds or more
3%	33%	17%	47%

Q10: By which of these methods are you more likely to be bitten?

Tail (hand support)	Tunnel	Cup
73%	3%	24%

Table continued →

Q11: Which of these lab species are you <i>more</i> likely to form a bond with?				
Rabbit	Cat	Mouse	Primate	Dog
3%	22%	0%	11%	64%
Q12: Which of these lab species are you <i>less</i> likely to form a bond with?				
Rabbit	Cat	Mouse	Primate	Dog
8%	4%	84%	4%	0%
Q13: After the evidence presented today, are you more likely to implement a new handling method?				
Yes	No	Undecided		
73%	9%	18%		
Q14: If you were to change from tail handling which method would you choose?				
Tunnel	Cup	Other		
54%	43%	3%		
Q15: Is it the role of an animal technician to develop better welfare practices?				
Yes	No	Don't know		
94%	6%	0%		

Table 1. Responses to Institute of Animal Technology Congress 2012 workshop on mouse handling.

This revealed that only 17% of facilities were yet implementing the new handling methods for mice, although the work had been well publicised. Among the 60 delegates, 95% reported tail to be the most common method for handling laboratory mice in their facility. The main reason for not implementing the new methods was the perceived time required (thought to take longer than tail handling by most respondents). However, it was interesting that 97% of workshop participants were willing to add at least 1-2 seconds per mouse to their cleaning schedule to benefit animal welfare, and nearly half (47%) would spend 5 seconds extra per mouse. Two thirds of respondents also felt that mice would prefer red over clear handling tunnels. It was encouraging to see that 73% indicated that they would be more likely to implement a new handling method following the workshop, though 19% were still undecided. However, there were concerns regarding the implementation and it was clear that tail handling was still the most common method in most facilities, more than 15 months on from the Hurst and West (2010) publication. The challenge remained how to convince technologists and their managers to implement improved methods of handling within their establishments.

Practical issues

To address some practical issues, which were raised by technologists at the workshop and might inhibit implementation of the new methods of handling, I conducted two brief studies to gain some objective data, outlined below.

Time issue concerns with alternative methods of handling

While Hurst and West (2010) used a substantial

duration of handling (60 s per day) to demonstrate the major difference in mouse response to alternative handling methods, Gouveia (2014) showed that only brief (2 s) handling was sufficient to make a difference. Further, my own experience of in-house implementation suggested that simply handling mice to transfer them between cages at cleaning was sufficient to tame mice to the two non-aversive handling methods. Even so, others voiced concern that using alternative methods to transfer mice during cage cleaning would add extra time to cleaning schedules. Cleaning is a major part of a technologist's daily routine. A method that adds extra time to an already tight time budget is not going to be attractive to technologists, bringing the benefits into conflict with potential costs. It is of major importance to find a balance between the two in order to eliminate stress from both the animal and technologist during this husbandry procedure.

To understand whether there is likely to be an increased cost of handling time during cage cleaning, I set up a small study to compare the time required to clean mice out using three methods of handling: customary tail handling, encouraged into a tunnel, or cupped on the hand to transfer animals between cages.

I set up a camera to observe one of two technologists cleaning out laboratory mice. The 49 mice used were a mixture of C57BL/6, BALB/c and ICR (CD-1) males and females (obtained from Envigo UK). The mice were housed in conventional MB1 cages (North Kent Plastics) in groups of 2-5, containing corn cob substrate and paper nesting material (IPS Ltd). Each cage was enriched with a cardboard mouse house

(Datesand Ltd) and a clear plastic tunnel (Clear Plastic supplies, (50mm diameter, 130mm long 3mm thick).

The two technologists were aware of the filming but were not told the reason why until afterwards (to avoid biasing the results). The technologists were of varying levels of experience but completely competent in all three methods. It should be noted that the time recorded was cage transfer time only, and the time to remove any enrichment was not recorded. Each technologist handled the mice by each method, involving three separate cage cleans by each technologist.

Wilcoxon matched pair tests compared the duration of handling between each pair of methods, taking handler into account. There was no significant difference in the amount of time taken to clean mice by either tunnel or cup when compared to the traditional tail method (Figure 1). The cup method had a slight increase in time compared to tunnel handling, due to some mice jumping off the hand and back into cage. However, although this differed from tunnel handling, it was not significantly longer than for mice picked up and transferred by the tail (Figure 1).

I did not find that tunnel or cup handling added time to our cleaning procedures compared to tail handling, when carried out by personnel that were well practiced and competent in all three handling techniques. Carrying out a formal evaluation of the time it took to pick up and transfer mice between cages during cleaning allowed me to answer the question of time with confidence when technologists showed concern about how it would impinge on their daily routine, and to ease any apprehension that changing handling methods would add more time onto their daily workload. A completely independent test of the impact of tail versus tunnel handling on the duration of cage cleaning was carried out by Lynn McLaughlin in the main Biomedical

Services Unit at the University of Liverpool (talk presented at the LASA conference, 2015). This confirmed that technologists could clean out as quickly using a tunnel once very familiar and competent with the method. However, she showed that it took technologists time to get good at using the new method. Inevitably, some time is needed to gain good handling skills using any method. The important issue is to ensure that personnel know how to implement the new methods in a safe and efficient way. Clearly, a resource was needed to help train technologists so that they could learn best practice as quickly as possible.

Tunnel preference

The initial work carried out at our animal facility, leading to the publication of Hurst and West (2010) and Gouveia and Hurst (2013), was carried out using transparent tunnels. However, there is general support for the use of red as the optimum colour choice for laboratory animal enrichment, because mice are relatively insensitive to red light and therefore perceive red shelters as darker. An issue raised was that mice might not want to utilise transparent tunnels within the cage as much as red tunnels, although clear tunnels allow better observation of animals. As clear tunnels that are placed within cages for tunnel handling can also double up as enrichment, would mice prefer a red tunnel over a clear one?

I carried out a small observational study to determine whether there was any major preference among 4 singly housed male BALB/c laboratory mice. The mice were housed in M3 cages (North Kent Plastics) but moved to a MB1 cage (North Kent Plastics) for the duration of the filming. The standard stainless steel mesh cage top was replaced by a clear Perspex top with ventilation holes. Food and water were presented within cage, with the water bottle in a metal holder and food in a dish. The test cage contained corn cob substrate (IPS Ltd), paper nesting material (IPS Ltd) and a cardboard mouse house (Datesand Ltd). The

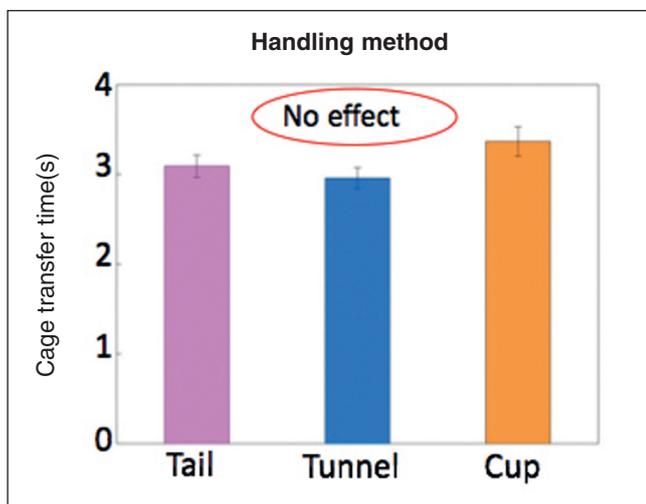


Figure 1. Cage transfer time (seconds) for mice handled by three methods (n = 98 transfers per method, mean ± sem).

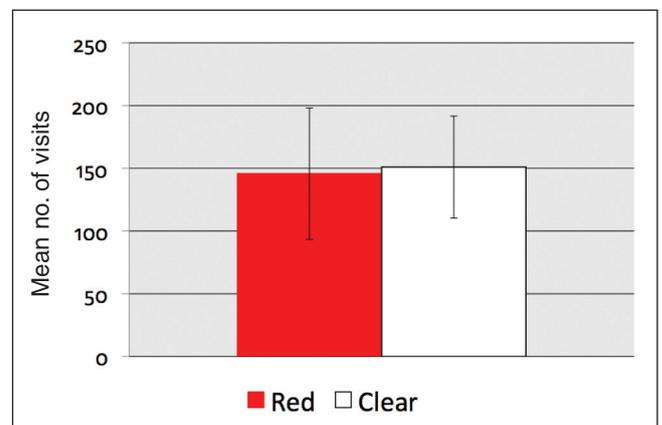


Figure 2. Number of visits by singly housed male BALB/c mice to red and clear tunnels within a cage. (n = 4, mean ± sem).

mice were supplied with a choice of two similar plastic tunnels (50mm diameter, 130mm long, 3mm thick), one red in colour and one clear. The mice were filmed over a four hour period during the active dark phase of the light cycle under red light to determine if the mice had a colour preference. The mice had an opportunity to habituate to the two tunnels prior to the test being carried out.

There was no clear preference for one tunnel over the other. During filming, the mice visited both tunnels but did not use either tunnel as a place to nest or spend long periods of time. This confirmed our general observations when providing transparent or opaque tunnels as enrichment in cages within our facility. The mice enjoyed climbing over and going through the tunnels, indicating that a tunnel within the cage has enrichment value regardless of the colour and transparency, consistent with previous observations.

While there is no major preference for one tunnel type over the other, there are advantages to using a clear tunnel over a red tunnel. When handling mice using a clear tunnel, health checks can be conducted on normal healthy animals, without having to remove the animal or manipulate the mouse to examine its ventral surface. Mice exhibit normal behaviours within the tunnel and remain calm, allowing any abnormalities in movement or behaviour to be noticed through the transparent surface. Visual inspections are more difficult using red tunnels and any minor injuries could be missed. It is apparent that in our facility the mice do not use the tunnels as a nesting place, but more as an enrichment. The ability to conduct brief health checks within clear tunnels potentially can save a little time on daily duties and help to ensure the good health of the animals, providing a clear advantage for using clear over coloured tunnels.

Mouse handling tutorial

My supervisor, Professor Hurst, gained funding through a BBSRC Sparking Impact Award to produce a tutorial that would train technologists and researchers in the new handling methods and explain the potential impact from both a mouse welfare and scientific perspective. This funding allowed me to spend the equivalent of one day per week over a 9 month period working on the tutorial, from the initial design to finished product and presentation to suitable audiences. I was specifically tasked with bringing a technologist's perspective to illustrate the practical issues of implementing the new handling methods in a busy animal facility. I also had to establish suitable filming conditions to provide high quality video clips and then film suitable clips to illustrate the methods and their implementation, conducted with the help of Professor Hurst's PhD student, Kelly Gouveia. The story board for the tutorial was decided jointly between the three of us, based on

feedback previously gained. Kelly Gouveia was responsible for putting together a section on scientific background to introduce the tutorial and explain why non-aversive handling is important. We drafted the accompanying commentary to provide clear instruction and advice, which was then approved in joint meetings with Professor Hurst.

The layout of the tutorial covers three main areas:

1. Impact of human-animal interactions and handling stress in mice. This introduces the value of the mouse to the scientific community as a universal model, but points out that the relationship between the mouse and human handler is not well understood.
2. Introduction to non-aversive methods for handling mice and effects on welfare and experimental results. This covers reduction in stress to the mouse and how this can improve scientific data.
3. Practicalities of non-aversive handling: best practice for implementation in routine husbandry and experimental procedures. This looks at how the methods can be implemented from a technical point of view with minimum disruption to normal work. It also addresses common difficulties experienced and how to avoid these. This section comprises the main body of the tutorial and is the most crucial for training purposes.

Ensuring the correct implementation of the alternative handling methods is by far the most important aspect of the tutorial, with the potential to make the largest contribution to mouse welfare. However, even highly experienced animal technologists and researchers may not have had appropriate training to correctly implement the new handling methods. Although these look simple, I know from experience that if not carried out well, they can take extra time and cause stress to both the handler and the mice. We thus identified the main key issues and targeted video clips to provide clear visual demonstrations.

Making instructional video clips

To ensure high production quality, I filmed the video clips using a Panasonic HDC-SD9 HD camcorder, mounted on a tripod. Extra lighting was provided using 2 Polaroid 256 LED Video Light panels. After initial trials, we decided that a clear MB1 cage base without cage enrichment would provide the clearest video clips for demonstration purposes, and used a curtain to provide a plain non-distracting background. Videos clips were trimmed of superfluous material to ensure that viewers would focus only on the point being made and converted into MP4 format. Still photographs were shot with an Olympus E410 DSLR camera and edited using Olympus Master editing software.

Tunnel and cup handling as an alternative to picking up by the tail

The first video clips in the tutorial provide a simple video demonstration of tail, tunnel and cup methods for picking up mice, to familiarise the viewer with what these methods involve. We also emphasise that animals that are picked up by tunnel or cup can still be restrained by the tail, as this does not increase stress. This ensures that people understand that it is picking up mice by the tail that is stressful.

Practicalities of tunnel handling

This section deals with how to hold a handling tunnel correctly, how to get mice into the tunnel and return them to the cage. We show how to position the tunnel correctly to avoid mice bypassing the tunnel, and use of the free hand to guide the mouse into the tunnel. We emphasise the need to take charge of the situation and not let the mouse decide when to go inside the tunnel, as indecisiveness in this situation results in frustration for the technologist and increases handling time. The video demonstrates that gently tipping the mouse out backwards is the best way to remove the mouse, while shaking the tunnel must be avoided. We also point out the advantage of a plastic tunnel that the animals cannot grip but discuss the range of different tunnels that can be used.

Practicalities of cup handling

This section deals with how to handle mice by the cupping method and return them back to their home cage. We show how to offer open hands to the mouse, use the corner of the cage, and that the mouse will happily sit on the open hands. To return the mouse, the hands are lowered into the cage and the mouse will leave safely back to its cage. We show two methods that can be used to habituate mice to sit on open hands happily, without attempting to jump off. We show that the mouse can first be held between closed hands for approximately 10 s before the hands are opened. We use a video clip to demonstrate that mice typically are then willing to sit calmly on the hand, though warn that this may take a few sessions with very jumpy animals. Once habituated, there is no longer any need to enclose mice within the hands. We also show that mice already habituated to being picked up in a tunnel will sit calmly if then tipped out backwards onto the open hand, combining the two methods.

Cage transfer

As cage cleaning is one of the main reasons to handle mice, we first show that using the alternative methods takes no longer than tail handling once practiced. Later in the tutorial, we show video demonstrations of how this can be easily achieved with each method without chasing mice around their home cage.

Handling for common procedures

We include video clips to demonstrate how to transfer animals picked up by tunnel or by cupping to scruff restraint where procedures require this level of restraint, and that this can be achieved just as quickly and practically when mice are picked up by the tail. We also present data showing that scruff restraint is not stressful for animals that have been accustomed to tunnel or cup handling. Lastly, we show how easily animals can be transferred to other locations, such as an anaesthetic chamber, using either the tunnel or cup method.

Testing out the tutorial

I presented the tutorial to technologists and researchers at two events using a PowerPoint format. One event was the Charles River sponsored technologist event held in Liverpool, the other was an IAT Cambridge Branch Symposium entitled "Leave our Tails Alone". The tutorial was presented to see if the content and level of the information worked well and was well understood by fellow technologists. The feedback at the end of the presentations was well received and the video content was felt to be important in helping with the uptake.

Online resource

Ideally, we wanted the tutorial to be freely available to anyone to watch at any time, either as part of a formal training course or for self-tuition. Following discussions with NC3Rs, Mark Prescott offered to work with us and with a video company to produce a professional online resource that they would host to help maximise the uptake. An online resource would allow the viewer to fast forward or rewind as required for further clarification. To ensure that the audio commentary was as clear as possible, Katie Lidster from NC3Rs agreed to read the commentary as she had previous experience on other NC3Rs videos. We then worked with the video company to ensure that the timing of commentary and video fully corresponded to get over the points we wanted to make, reviewed each draft and suggested suitable amendments until we were happy with the final version.

The tutorial was launched live on the NC3Rs website on 26th September 2016 to correspond with the NC3Rs Annual Technician Symposium. This can be viewed at: <http://www.nc3rs.org.uk/mouse-handling-tutorial>

I was invited to attend the symposium to discuss the tutorial and any questions or issues with fellow delegates. Feedback once again was very positive, with some technologists stating that they are slowly implementing the new techniques in their facilities. They particularly appreciated the opinion of another technologist who understood what is expected of animal technologists and how the implementation of

new ideas can impact on their daily routines. All were in agreement that there are positive benefits to laboratory mouse welfare, but there is still some uncertainty about the amount of time the new methods will take to carry out.

Analysis of mouse handling tutorial usage

NC3Rs has been tracking the number of views of the tutorial since its launch, and where in the world it is being accessed from (Figures 3 and 4). This indicates that the tutorial is being viewed in countries around the world and not solely reaching UK establishments. Although the statistics cover only a six week period since the launch so far, it is very encouraging indeed that the site has been accessed 2160 times and the tutorial played 1545 times over this time period.

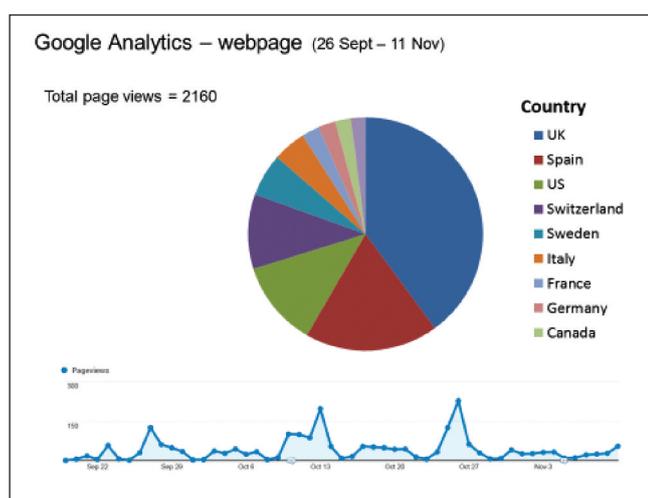


Figure 3. Summary of mouse handling tutorial views (total number and geographical spread) on the NC3Rs website for the first six weeks after launch (26th September 2016 to 11th November 2016).

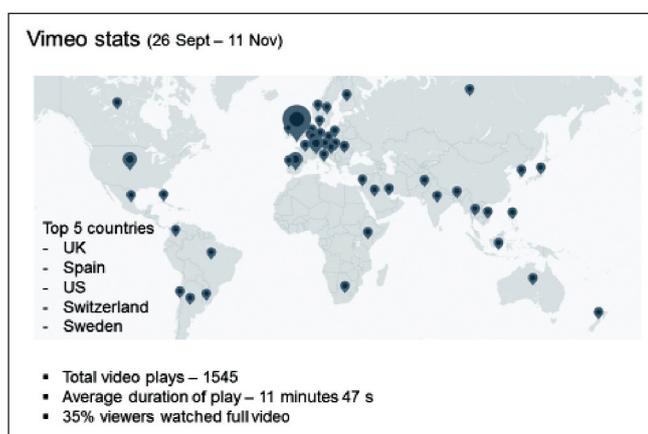


Figure 4. Countries that have accessed the mouse handling tutorial on the NC3Rs website over the first six weeks after launch (26th September 2016 to 11th November 2016).

Discussion

The tutorial provides a resource that is suitable for animal technologists and for research staff and students, and is available to all relevant establishments within the UK and worldwide. By highlighting common problems that can be encountered initially, it should be of particular help in aiding technologists with the transition from tail handling to non-aversive methods. Ultimately, this will lead to improved welfare for millions of mice held in establishments across the world. As time constraints have been pointed out as the most important factor in limiting uptake of the new methods from a technologist's point of view, it was vitally important that this was addressed in the tutorial to show how to capture animals efficiently. Otherwise this important refinement could simply be discarded as being impractical in a busy establishment. From my own practical experience of implementation, I know that this is not the case, but a proper training tutorial is essential to show other technologists how to implement the new methods and avoid time-consuming mistakes.

With support from NC3Rs, the tutorial is now available via their website. The initial uptake is encouraging, though we are looking at further steps to advertise the tutorial and encourage uptake, particularly outside the UK. I am also currently preparing a FAQ for the NC3Rs website to accompany the tutorial. A technologist has a moral obligation to uphold the highest standard of welfare for animals within their care. I have discovered for myself the considerable benefits of avoiding picking up mice by the tail and using alternative methods from the obvious difference this makes in their behaviour. By playing a major role in putting together this tutorial and focusing on essential practical issues, I hope it will provide other technologists and researchers with the necessary information and encouragement to carry out the changes needed so that all mice will benefit.

Testimonials

The value of promoting non-aversive methods via the tutorial and other presentations can be measured through uptake by the research community. Although slow to start with, the methods are now starting to be trialled and taken up. I will continue to offer advice and support, and will try to help with any issues raised. As a unit that now solely uses this method for routine handling, we have been able to see the benefits to the mice without any negative effects on the day-to-day running of our animal unit.

The following are testimonials from technical staff who have adopted the non-aversive methods in their facilities. They, too, are seeing the benefits without too much disruption to their daily routines. This is a small change to husbandry procedures but has a large impact upon mouse welfare.

“Thanks especially for sharing the video; I have in turn shared it with my supervisor and she is considering making the tunnel technique our standard practice for our facility, with Jess’s endorsement. Once our facility is on board, I’m confident other LARC facilities in the IU School of Medicine will learn about it as well. The video is compelling enough; I don’t see how anyone could argue against a simple change that demonstrably makes for such happier animals.”

“It’s ideas like this that so clearly improve animal well-being that make this work interesting and worthwhile every day!”

“Yes, I really like using tunnels to transfer mice from cage to cage. The video really sold me on it – seeing the difference a simple change in handling has on each mouse’s well-being and how that affected their behavior on tasks like the star maze and their decreased fear response to a human hand, made me much more conscious of my handling technique.”

“With naive mice, I find that it does take a little longer to transfer from cage to cage but with mice acclimatised to the tunnels it is as quick and easy as any other method I’ve tried. More than anything, though, my own initial ineptness with the tunnels slowed me down but once I was comfortable with it time is not an obstacle.”

“I was very impressed with the video and happy to learn that there was something I could so easily change that makes a difference to these animals. It is just great to see that I can have an effect on the well-being of the mice.”

Thanks again,

Nikki Cobb

LARC

Indiana University School of Medicine

“Department of Pathology at Cambridge has switched to tunnel/cup handling for all technologists. Some research staff have adopted this, others still utilise tail handling. We find newer research staff members very keen to engage with the new handling techniques although some ‘old-timers’ are a bit resistant.”

“We now find tunnel handling as quick as tail capture, although initially there is a time investment. We moved a room at a time to the technique to manage the workload. The cost of tunnel purchase has been slightly offset by reduced need for disposable cardboard tunnels now that each cage has a polycarbonate tunnel at all times.”

“We’ve seen a huge improvement in interaction between mice and handler and definitely wouldn’t want to go back to tail capture.”

Regards,

Lisa Wright

NACWO/Facility Manager

Department of Pathology

University of Cambridge

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“After a small trial period with handling tubes/cupped hands, I as NACWO implemented a tail lift ban for all husbandry interactions with our mice, eventually staff have found no major issues with time once we and the mice got the hang of no tail lifting.”

“I did invest in handling tubes but this investment was considered worthwhile as having the tubes in the majority of the cages helped remind staff of the tail lift ban and promoted the change in our behaviour not to use the tails.”

“The NC3Rs video has also helped show the benefits to staff with reservations or long standing tail lift skills.”

“My AWERB, HOI and NVS are full supporters of us adopting Hurst and West’s paper on alternative methods of handling, researchers were informed of the proposed shift away from tail lifting and have agreed to this as a worthwhile refinement.”

Andy Milner

Technical Manager, Bioresources Unit
University of Portsmouth

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