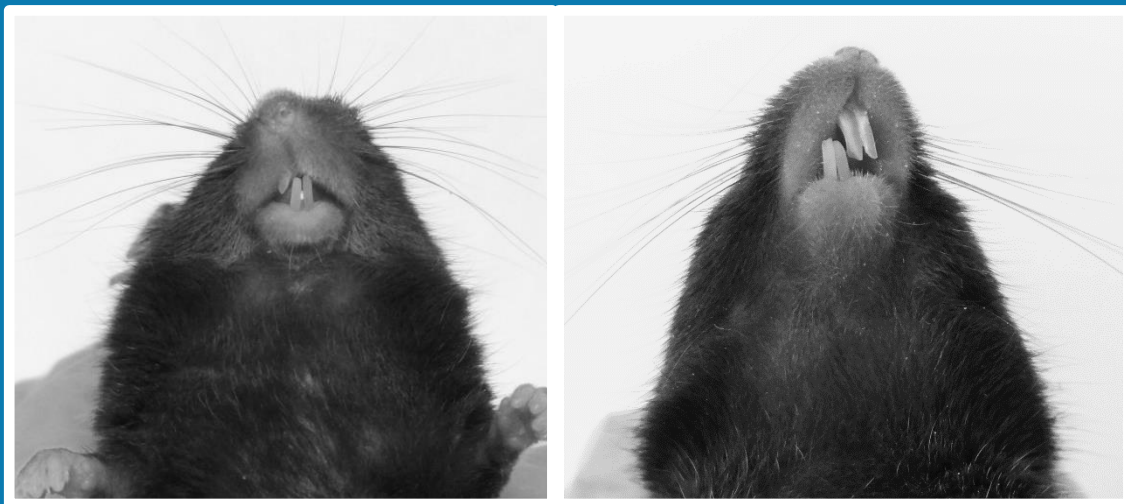


Malocclusion in mice: spot the signs and take action



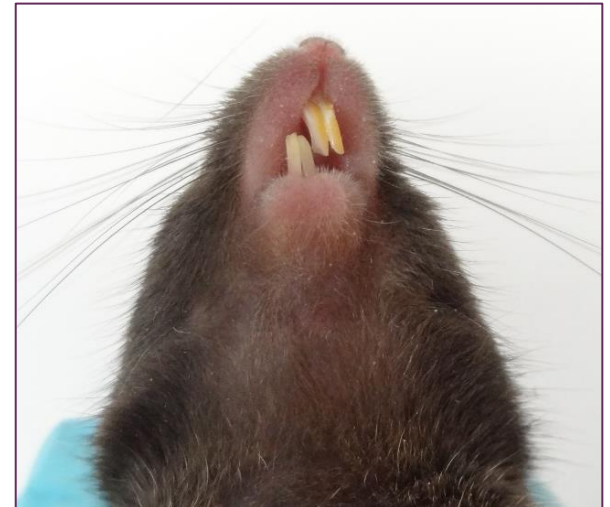
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1. What is malocclusion?

What we know about malocclusion in mice

- Malocclusion is a dental disorder that should always be suspected if a mouse is in poor health.
- Malocclusion is misalignment of the upper and lower sets of teeth, which prevents the teeth from naturally wearing down.
- The incisors of mice grow ~1mm per week; a missed diagnosis can rapidly progress into a serious health condition.



Why malocclusion is a welfare concern

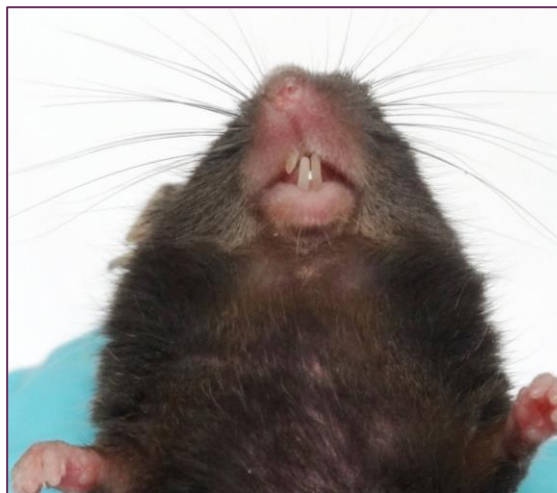
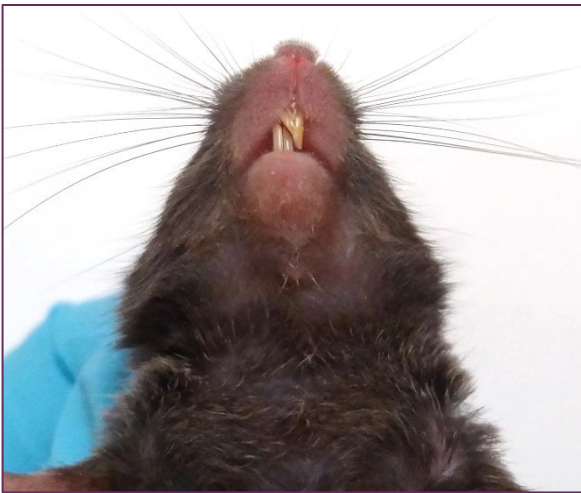
Malocclusion results in overgrown teeth. If this condition is not addressed it can result in pain and suffering due to:

- Soft tissue damage and oral abscesses.
- Inability to eat and drink, resulting in malnutrition, emaciation and even death.



What can we do about malocclusion?

- Be aware of the risk factors and do what we can to minimise them.
- Identify malocclusion and take action as early as possible.



2. Risk factors associated with malocclusion

Risk factors associated with malocclusion

Malocclusion can be present from birth, or can occur later in life as a result of genetic or environmental factors.

Risk factors associated with malocclusion include:

- Blunt force trauma.
- Inappropriate feed and/or insufficient enrichment.
- Genetic background (e.g. mutations; inherited traits).
- Certain models or procedures (e.g. oral tumours; irradiation).

More about risk factors: blunt force trauma

Blunt force trauma can result in broken teeth or jaw misalignment and can occur due to:

- Improper handling of mice.
- Fighting with cage-mates.
- Gnawing on very hard materials (e.g. cage lids or bars).



Minimising the risk: blunt force trauma

- Handle mice gently, confidently and securely to prevent accidental injury or falls. Take extra care with pups.
 - www.nc3rs.org.uk/how-to-pick-up-a-mouse
- Monitor behaviour and minimise aggression.
 - www.nc3rs.org.uk/mouseaggression



Minimising the risk: provide opportunities to wear down the teeth

Rodents wear down their teeth by gnawing on food and other items in their environment.

- Provide suitable solid food.
 - i.e. not just mash.
- Provide enrichment that can be gnawed safely.
 - e.g. nylon chews, wooden blocks.



Minimising the risk: provide appropriate enrichment in sufficient quantities

- Mice may repetitively bite bars in response to an understimulating environment (stereotypy).
- Insufficient enrichment for all group members may lead to competition; lower-ranking individuals may not get access.

Evaluate environmental enrichment to ensure it is improving animal welfare: www.nc3rs.org.uk/evaluating-enrichment.

Minimising the risk: genetic background and scientific procedures

Traits that increase the risk of malocclusion (e.g. jaw deformity) can have a genetic basis and can be hereditary.

- Avoid breeding from animals with malocclusion.
- Check if malocclusion risk is increased for your model, procedure or strain (e.g. www.jax.org).
- Record and share information when risk factors are identified.

Malocclusion still occurs when risks factors are minimised

Minimising risk factors is good practice for positive mouse welfare, however malocclusion cannot always be prevented.

Everyone working with mice should know:

- That malocclusion is a serious welfare concern.
- How to spot the signs of malocclusion.
- How to check that teeth are healthy and aligned.
- What action to take if malocclusion is suspected or evident.

3. Spotting the signs and checking for malocclusion

Small or runted?

Smaller body size is an indicator of malocclusion, but some mice are just naturally smaller than their cage mates.

- Naturally smaller mice will be bright, active, and thriving with no extra dietary help.
- Runted mice will be weak, hunched and in need of dietary support.

Both small and runted mice need their teeth checked, but runted mice should be checked very thoroughly.

Increase vigilance around weaning age

Malocclusion often becomes apparent at weaning age or shortly after.

- Always check the teeth of pups that are not gaining weight as expected.
- Increase vigilance for malocclusion around 2 – 5 weeks of age.



Signs of ill health: cage-side observation

Take time to closely observe your mice for signs of ill health.

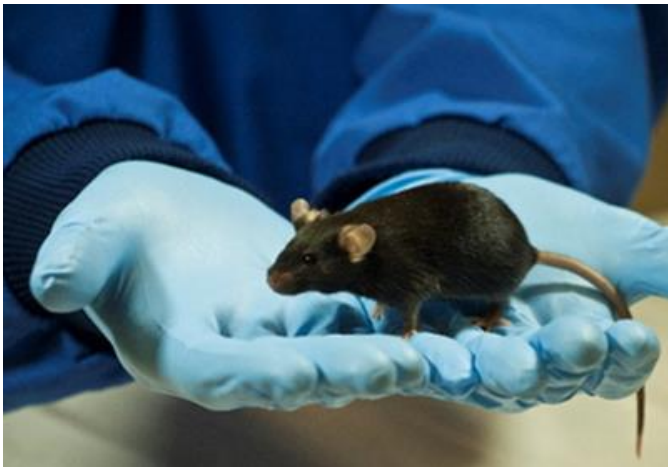
- Do any of the mice look underweight or small in comparison to their cagemates/littermates?
- Is there any other evidence of pain or ill health?
 - e.g. hunched posture, abnormal gait, lethargy, narrowing of the eyes, abnormally shaped face.
 - www.nc3rs.org.uk/grimacescales

If the answer is yes, check the teeth.

Checking for signs of ill health: in-hand check

Take time to carry out an in-hand check of the mice.

- Use a non-aversive method to pick up the mice
 - www.nc3rs.org.uk/how-to-pick-up-a-mouse
- Visually check the mouse from nose to tail.



Scruff restraint to inspect the teeth

If you are not satisfied that the animal is in good health, restraining the mouse by the scruff allows proper inspection of the mouth and teeth.

Minimise the stress associated with scruff restraint by using non-aversive methods to pick up mice.

See the following video:

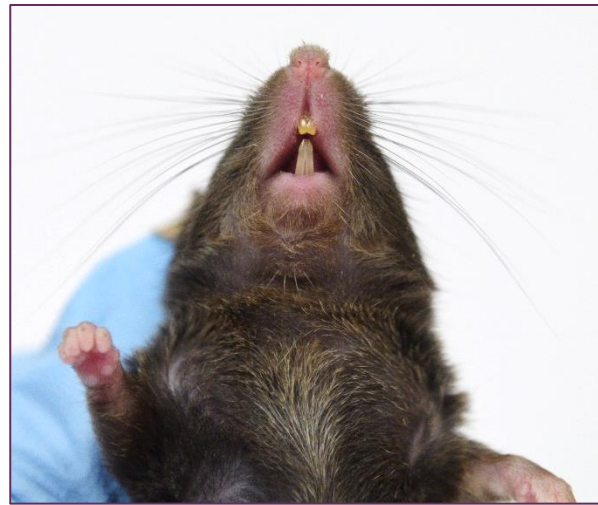
www.nc3rs.org.uk/scruffhandling



Healthy teeth

Confirm that the teeth are:

- Straight and aligned.
- Intact.
- No signs of overgrowth.



Being observant prevents further suffering (case study 1)

During a visual check it was noted this female was:

- Smaller than her cage mates.
- Slower than her cage mates.
- Hunched in posture.
- Pinched in at the lower spine (thin).
- Moving with an abnormal gait.
- Abnormally shaped in the nose area.

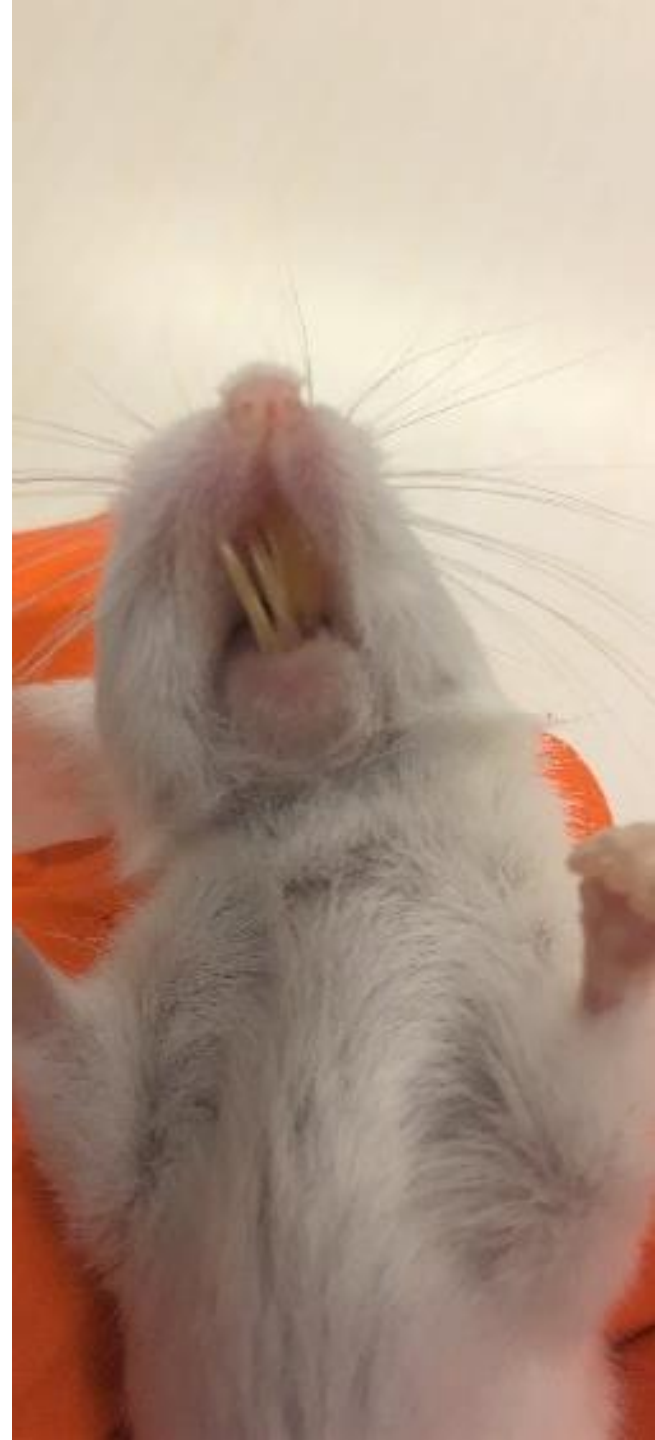
This is what the teeth looked like.



Being observant prevents further suffering (case study 2)

This mouse had similar indicators of ill health. On further inspection, this is what the teeth looked like.

- Do not rush your work or assume the teeth have already been checked.
- Do trust your instincts and check the teeth.
- If you are unsure, ask for help.



4. Taking action when malocclusion is evident

Taking action when malocclusion is evident

- Malocclusion warrants euthanasia.
- Strong justification is required to keep an animal with malocclusion.
- If keeping an animal is justified, the Named Veterinary Surgeon (NVS) and/or Named Animal Care & Welfare Officer (NACWO) must be consulted to put a care plan in place.

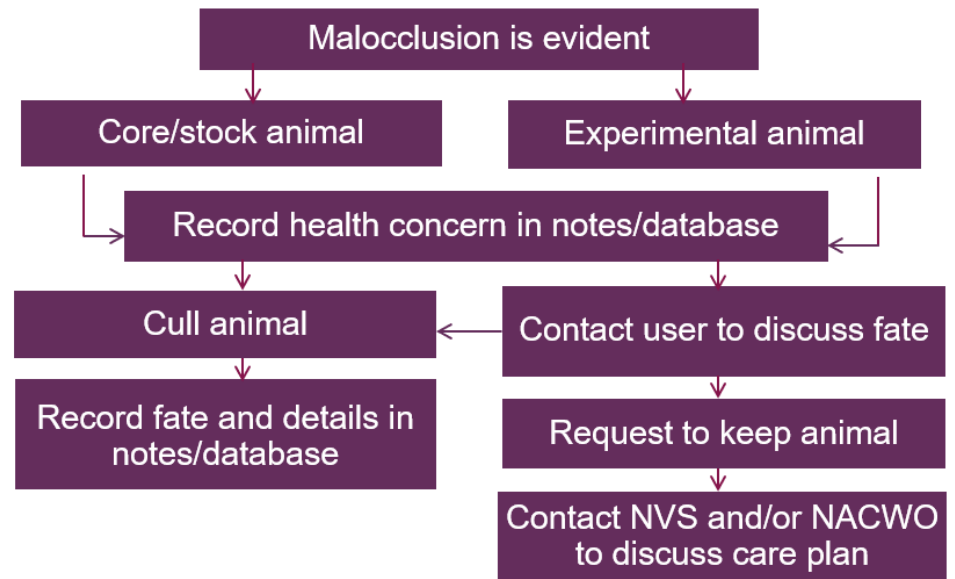
Caring for a mouse with malocclusion

The specific details of the care plan put in place by the NVS and/or NACWO will vary, but it is likely to include:

- Regular, life-long maintenance of the teeth.
 - Take care not trim teeth too short; this will result in pain.
 - Use good tools to prevent teeth from being damaged.
- Feeding the mouse on a soft or powdered diet (mash).

What is the procedure in your facility?

- Who do you ask if you are unsure?
- What steps do you take if malocclusion is evident?



The details will vary depending on your facility, but the process is likely to follow similar steps to those shown by the decision tree on the next slide.

Malocclusion is evident

Core/stock animal

Experimental animal

Record health concern in notes/database

Cull animal

Contact user to discuss fate

Record fate and details in notes/database

Request to keep animal

Contact NVS and/or NACWO to discuss care plan

Summary

- Malocclusion negatively affects the welfare of mice.
- Being aware of the risk factors and indicators of malocclusion prevents and minimises suffering.
- Take time when checking animals; trust your instincts and check the teeth.
- Familiarise yourself with what healthy and unhealthy mouse dentition looks like.
- Know the procedures in your facility.
- If you are unsure, ask for help from your colony manager, NVS or NACWO.



National Centre
for the Replacement
Refinement & Reduction
of Animals in Research

For further resources on malocclusion, visit:

www.nc3rs.org.uk/malocclusion

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