



Guideline for Prevention and Management of Aggression in Group-Housed Male Mice

Purpose: To minimize home-cage aggression (“fighting”) in group-housed male mice to protect animal welfare and scientific data quality.¹⁻⁴

Note: Changes in housing may lead to additional costs, covered by the researcher. However, implementing the measures below can reduce fighting and injuries, improve animal welfare and research outcomes, and lower expenses related to single housing.

1. Guiding Principles

- Social stability is essential: avoid unnecessary changes in group composition or routine, as instability can trigger aggression.^{2,3,5}
- Prevention first: early grouping, environmental stability, odour continuity during cage changes, and adequate enrichment/escape opportunities.^{2-4,6,7}
- Early detection: aggression may occur without visible wounds; behavioural monitoring is important in addition to cage-side checks.⁴
- Immediate intervention: injured mice must be removed promptly; aggressors should not be reintroduced.^{1,5}
- No universal solution: aggression is multifactorial and strain- and context-dependent; local monitoring and adaptation are required.^{2,3}

2. Known Risk Factors

- Genetic background/strain: large differences in prevalence and severity across strains.²⁻⁴
- Age and social history: mixing unfamiliar adult males is high-risk; risk often increases around/after puberty.^{2,5}
- Husbandry disturbances: cage changes, transfers, odour contamination between cages, and changes in enrichment can destabilize groups.^{2,3,6}
- Limited ability to retreat: standard cages restrict flight/avoidance behaviours and can escalate fighting.⁴

3. Prevention: Practical Measures

3.1 Maintain a stable, low-stress environment

- House high-risk strains in low-traffic/low-noise areas; minimize vibrations and unnecessary cage movement.²
- Minimize disturbances during the dark phase; use red/dim light for necessary checks.²
- Avoid frequent changes in room or rack setup; if unavoidable, increase monitoring for 1–2 weeks afterwards.⁴

3.2 Group formation and social stability

- Group males at weaning and preferentially keep littermates together; avoid mixing unfamiliar adult males.^{2,5}
- Receive transported males as established cage mates when possible and monitor closely during the first week after arrival.^{2,5}
- Optimal transport age: 6 weeks old; avoid transport or grouping above 8–10 weeks of age.
- When moving animals between units, form groups based on the smallest cage type they will encounter to avoid later downsizing.
- Keep group sizes small to minimize changes in social dynamics and reduce injury risk; commonly 3–5 per cage, with reduction (e.g., 2–3) considered for aggression-prone strains or repeated incidents.^{2,3,7}
- Avoid removal and especially reintroduction of individuals; plan procedures so cage mates are handled together where possible.^{2,5}
- Do not add new males to an established group (“topping up”).^{2,5}

3.3 Cage change, odour continuity and handling

- Transfer a portion of nesting material from the nesting area during cage change to preserve odour cues and reduce post-cleaning aggression.^{3,6}
- Avoid transferring large amounts of heavily soiled bedding (urine/feces).⁶
- Change gloves between cages to reduce odour transfer; handle male cages before female/breeding cages where feasible.^{2,3}
- Retain familiar enrichment (tunnels/shelters) during cage change where hygiene allows.²
- Use tunnel instead of tail handling to reduce anxiety and stress responses.^{8–10}

3.4 Enrichment and resource distribution

- Provide abundant nesting material and multiple shelters/structures to enable withdrawal and reduce direct confrontation.^{2,7}
- Reduce resource competition by placing food in multiple locations and ensuring easy access to water.²

4. Monitoring and Early Detection

- Daily observations: chasing, repeated attacks, guarding behaviour, barbering/alopecia, weight loss or altered activity patterns.^{2,4}
- Cage-side wound checks alone can miss most fighting; add brief targeted behavioural observations during high-risk periods (post cage change, after arrival, around sexual maturity).⁴

5. Management of Aggression: Acute and Long-Term

5.1 Immediate Actions

- Immediately remove injured animals for assessment and pain relief/treatment.^{1,5}
- Identify and separate the aggressor when possible (often the animal without wounds); do not delay separation when injuries are present.⁵
- Do not reintroduce the separated aggressor to other male groups; plan a permanent solution (single housing).⁵
- If multiple animals are wounded or the aggressor is unclear, split into smaller compatible groups (e.g., 2–3) or single-house.^{5,2}

5.2 Wound grading and actions

- Mild: small dry scabs/superficial lesions without swelling or functional impairment → treat per veterinary plan and increase monitoring; consider separating the aggressor.⁵
- Moderate: open wounds, multiple lesions, or signs of pain/stress (e.g., piloerection, inactivity, weight loss) → veterinary assessment the same day; separation required.^{5,1}
- Severe: deep wounds, substantial bleeding, genital/limb injuries compromising function, or systemic compromise → urgent veterinary assessment; euthanasia may be required based on humane endpoints.^{5,1}

5.3 Post-incident prevention

- Perform a trigger review (recent cage change, transfer, procedure load, changes in enrichment/bedding, removal/reintroduction) and adjust routines accordingly.^{2–4,6}
- Update strain-specific practices (group size, enrichment, monitoring intensity) based on incident records.^{2,3}

6. Considerations for Single Housing

- Single housing may be necessary after persistent aggression or severe injury; weigh welfare, scientific requirements and practical constraints.^{1,2,5}
- If single housing is used, increase enrichment (nesting material and structures) and monitor for stress-related behaviour.^{1,2}

References

1. National Research Council. *Guide for the Care and Use of Laboratory Animals*. 8th ed. Washington, DC: National Academies Press; 2011. Available via NIH OLAW.
2. NC3Rs. *Minimising aggression in group-housed male mice*. Guidance resource (accessed Jan 2026).
3. Lidster K, Owen K, Browne WJ, Prescott MJ. *Cage aggression in group-housed laboratory male mice: an international data crowdsourcing project*. *Sci Rep*. 2019;9:15211. doi:10.1038/s41598-019-51674-z.
4. Theil JH, Ahloy-Dallaire J, Weber EM, et al. *The epidemiology of fighting in group-housed laboratory mice*. *Sci Rep*. 2020;10:16649. doi:10.1038/s41598-020-73620-0.
5. West Virginia University IACUC. *Guidelines: Prevention and Management of Fighting (Aggression) in Mice*. Version 2; reviewed/approved 03/2025.

6. Van Loo PLP, Kruitwagen CLJJ, Van Zutphen LFM, Koolhaas JM, Baumans V. Modulation of aggression in male mice: influence of cage cleaning regime and scent marks. *Anim Welf.* 2000;9:281–295. doi:10.1017/S0962728600022752.
7. Van Loo PLP, Van Zutphen LFM, Baumans V. Male management: coping with aggression problems in male laboratory mice. *Lab Anim.* 2003;37(4):300–313. doi:10.1258/002367703322389870.
8. Hurst JL, West RS. Taming anxiety in laboratory mice. *Nat Methods.* 2010;7:825–826.
9. Gouveia K, Hurst JL. Reducing Mouse Anxiety during Handling: Effect of Experience with Handling Tunnels. *PLoS ONE.* 2013;8(6):e66401. doi:10.1371/journal.pone.0066401.
10. NC3Rs. Mouse handling: refined, non-aversive methods (tunnel/cupping). Resource library (accessed Jan 2026).
11. Streiff C, Herrera A, Voelkl B, Palme R, Würbel H, Novak J. The impact of cage dividers on mouse aggression, dominance and hormone levels. *PLoS ONE.* 2024;19(2):e0297358. doi:10.1371/journal.pone.0297358.