NOTE: Please save this file locally before filling in the table, DO NOT work on the file within your internet browser as changes will not be saved. Adobe Acrobat Reader (available free here) is recommended for completion.

The ARRIVE guidelines 2.0: author checklist

The ARRIVE Essential 10

These items are the basic minimum to include in a manuscript. Without this information, readers and reviewers cannot assess the reliability of the findings.

Item		Recommendation	Section/line number, or reason for not reporting
Study design	1	For each experiment, provide brief details of study design including: a. The groups being compared, including control groups. If no control group has been used, the rationale should be stated. b. The experimental unit (e.g. a single animal, litter, or cage of animals).	Methods. Mice: Lines 206-210. Lines 211-214. Lines 221-225. Cows: Lines 228-230. Methods: Mice: single animal. Lines 206-210. Lines 211-214. Lines 221-225. Cows: single animal. Lines 228-230
Sample size	2	a. Specify the exact number of experimental units allocated to each group, and the total number in each experiment. Also indicate the total number of animals used. b. Explain how the sample size was decided. Provide details of any *a priori* sample size calculation, if done.	Methods: Mice: Lines 206-210. Lines 211-214. Lines 221-225. Cows: Lines 228-230 and Table 1 Methods: Mice: Lines 206-208. Line 211. Standard procedures. Cows: Table 1. Availability of field animals for experiments.
Inclusion and exclusion criteria	3	a. Describe any criteria used for including and excluding animals (or experimental units) during the experiment, and data points during the analysis. Specify if these criteria were established *a priori.* If no criteria were set, state this explicitly. b. For each experimental group, report any animals, experimental units or data points not included in the analysis and explain why. If there were no exclusions, state so. c. For each analysis, report the exact value of *n* in each experimental group.	Methods: Cows: lines 238-241. There were no exclusions in mice and cows experiments in the analyisis Methods: Mice: Lines 206-210. Lines 211-214. Lines 221-225. Cows: Lines 228-230 and Table 1Figures 2, 3, 4, 5. Table 1 and 2.
Randomisation	4	a. State whether randomisation was used to allocate experimental units to control and treatment groups. If done, provide the method used to generate the randomisation sequence. b. Describe the strategy used to minimise potential confounders such as the order of treatments and measurements, or animal/cage location. If confounders were not controlled, state this explicitly.	Methods: Mice: Lines 206-208. Line 211. .Standard procedures. Cows: Lines 241-242. Table 1. Availability of field animals for experiments. Lines 257-258. Methods: Mice: lines 200-205. Cows: 228-237.
Blinding	5	Describe who was aware of the group allocation at the different stages of the experiment (during the allocation, the conduct of the experiment, the outcome assessment, and the data analysis).	Methods: Line 202-204, 232-234, 257-259, 268-269
Outcome measures	6	a. Clearly define all outcome measures assessed (e.g. cell death, molecular markers, or behavioural changes). b. For hypothesis-testing studies, specify the primary outcome measure, i.e. the outcome measure that was used to determine the sample size.	Methods:Line 206-210. Lines 211-216. Lines 221-225. Figure 2 and Table 2. Line 263. Figure 3,4,5. Methods:Line 206-210. Lines 211-216. Lines 221-225. Figure 2 and Table 2. Line 263. Figure 3,4,5.
Statistical methods	7	a. Provide details of the statistical methods used for each analysis, including software used. b. Describe any methods used to assess whether the data met the assumptions of the statistical approach, and what was done if the assumptions were not met.	Methods: Lines 206-208. Lines 211. Lines 299-301. Figure 2. Table 2. Methods: Lines 206-208. Lines 211. Lines 299-301. Figure 2. Table 2.
Experimental animals	8	a. Provide species-appropriate details of the animals used, including species, strain and substrain, sex, age or developmental stage, and, if relevant, weight. b. Provide further relevant information on the provenance of animals, health/immune status, genetic modification status, genotype, and any previous procedures.	Methods: Lines 200-204. Lines 228-234 Methods: Lines 200-204. Lines 228-241
Experimental procedures	9	For each experimental group, including controls, describe the procedures in enough detail to allow others to replicate them, including: a. What was done, how it was done and what was used. b. When and how often. c. Where (including detail of any acclimatisation periods). d. Why (provide rationale for procedures).	Methods: Mice: Lines 198-225. Cows: Lines 227-297- Table 1 Methods: Mice: Lines 206-208. Lines 211-215. Lines 221-225 and figure 2. Cows: Figure 3 and 4. Mice: Lines 200-204 Cows: Lines 230-234. Line 206. Line 211.Line 221
Results	10	For each experiment conducted, including independent replications, report: a. Summary/descriptive statistics for each experimental group, with a measure of variability where applicable (e.g. mean and SD, or median and range). b. If applicable, the effect size with a confidence interval.	Figure 2, table 2, Not applicable

The Recommended Set

These items complement the Essential 10 and add important context to the study. Reporting the items in both sets represents best practice.

Item		Recommendation	Section/line number, or reason for not reporting
Abstract	11	Provide an accurate summary of the research objectives, animal species, strain and sex, key methods, principal findings, and study conclusions.	Abstract Lines 26-44
Background	12	a. Include sufficient scientific background to understand the rationale and context for the study, and explain the experimental approach. b. Explain how the animal species and model used address the scientific objectives and, where appropriate, the relevance to human biology.	Introduction: Lines 87-101 Introduction: Lines 56-101.
Objectives	13	Clearly describe the research question, research objectives and, where appropriate, specific hypotheses being tested.	Introduction: Lines 96-101
Ethical statement	14	Provide the name of the ethical review committee or equivalent that has approved the use of animals in this study, and any relevant licence or protocol numbers (if applicable). If ethical approval was not sought or granted, provide a justification.	Mice: Lines: 202-205. Cows: Lines 231-237.
Housing and husbandry	15	Provide details of housing and husbandry conditions, including any environmental enrichment.	Mice: lines 200-205. Cows: 228-237
Animal care and monitoring	16	a. Describe any interventions or steps taken in the experimental protocols to reduce pain, suffering and distress. b. Report any expected or unexpected adverse events. c. Describe the humane endpoints established for the study, the signs that were monitored and the frequency of monitoring. If the study did not have humane endpoints, state this.	Mice: lines 200-205. Cows: 228-237 Not observed Mice: lines 200-205. Cows: 228-237
Interpretation/ scientific implications	17	a. Interpret the results, taking into account the study objectives and hypotheses, current theory and other relevant studies in the literature. b. Comment on the study limitations including potential sources of bias, limitations of the animal model, and imprecision associated with the results.	Discussion. Lines 463-498 Discussion: Lines 481-487.
Generalisability/ translation	18	Comment on whether, and how, the findings of this study are likely to generalise to other species or experimental conditions, including any relevance to human biology (where appropriate).	Conclusions: Lines 501-507.
Protocol registration	19	Provide a statement indicating whether a protocol (including the research question, key design features, and analysis plan) was prepared before the study, and if and where this protocol was registered.	Mice: Lines: 202-205. Cows: Lines 231-237.
Data access	20	Provide a statement describing if and where study data are available.	Data availability section: Fully available without
Declaration of interests	21	a. Declare any potential conflicts of interest, including financial and non-financial. If none exist, this should be stated. b. List all funding sources (including grant identifier) and the role of the funder(s) in the design, analysis and reporting of the study.	In competing interests In financial disclosure