**Supplementary material**

**Table S2**. Assessment of bias and quality in all studies included in the systematic review.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **Quality criteria** | **Study** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SUGÁR et al., 2022 | BARBARA et al., 2022 | BRASSELER et al., 2022 | MERA-CORDERO et al., 2022 | LUCKOS et al., 2021 | BUONSENSO et al., 2021 | FERNÁNDEZ-DE-LAS-PEÑAS et al, 2022 | FUMAGALLI et al., 2022 | EDWARDS et al., 2021 | CHU et al., 2021 | SALIHEFENDIC et al., 2021 | MÉNDEZ et al., 2021 | DA COSTA E SILVA et al., 2023 | BRAGA-PAZ et al., 2022 | GRISANTI et al., 2022 | PACHALSKA et al., 2022 | HERNDON et al., 2022 | AUGUSTIN et al., 2021 | KALAK et al., 2022 | MAIORANA et al., 2023 | KAATZ et al., 2022 | FORTUNATO et al., 2022 | PARANHOS et al., 2022 | LIU et al., 2022 | VAIRA et al., 2022 | SAID et al., 2022 | GAYLIS et al., 2022 | LENNOL et al., 2023 | BHATTACHARYYA et al., 2022 |
| **Title** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Accurate and concise description of the content of the article | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Summary of the background, objectives, methods, main findings and conclusions | √ | √ | √ | - | √ | - | - | √ | - | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | - | √ | √ | √ | - | - |
| Sufficient scientific background | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Rational explanation of the experimental approach | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Clear primary and secondary objectives | √ | - | √ | √ | √ | - | - | - | √ | - | - | - | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | - | - | - | - | - | - |
| ***Ethical statement of individual*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Ethical review permissions, licenses and official guidelines for use of individual | √ | - | √ | √ | - | √ | √ | √ | √ | - | - | √ | √ | √ | √ | √ | √ | - | √ | √ | - | √ | - | - | √ | √ | √ | √ | - |
| ***Study design*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Number of individual per group | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | - | √ | √ | - | √ | √ | √ | √ | √ |
| Information on whether the experiment was performed as a blind controlled study | √ | - | - | √ | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

*√, Criteria completed. (-), Uninformed/Criteria not completed.*

**Table S2 *(continuation)***. Assessment of bias and quality in all studies included in the systematic review.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **Quality criteria** | **Study** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SUGÁR et al., 2022 | BARBARA et al., 2022 | BRASSELER et al., 2022 | MERA-CORDERO et al., 2022 | LUCKOS et al., 2021 | BUONSENSO et al., 2021 | FERNÁNDEZ-DE-LAS-PEÑAS et al, 2022 | FUMAGALLI et al., 2022 | EDWARDS et al., 2021 | CHU et al., 2021 | SALIHEFENDIC et al., 2021 | MÉNDEZ et al., 2021 | DA COSTA E SILVA et al., 2023 | BRAGA-PAZ et al., 2022 | GRISANTI et al., 2022 | PACHALSKA et al., 2022 | HERNDON et al., 2022 | AUGUSTIN et al., 2021 | KALAK et al., 2022 | MAIORANA et al., 2023 | KAATZ et al., 2022 | FORTUNATO et al., 2022 | PARANHOS et al., 2022 | LIU et al., 2022 | VAIRA et al., 2022 | SAID et al., 2022 | GAYLIS et al., 2022 | LENNOL et al., 2023 | BHATTACHARYYA et al., 2022 |
| ***Experimental individual*** |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Information regarding individual species | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | - | √ | √ | √ | √ | √ | √ | √ | √ |
| Strain of the individual | √ | √ | √ | √ | - | - | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | - | √ | √ | - | √ | √ | √ | √ | √ |
| Sex of the individual | √ | √ | - | - | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | - | √ | √ | √ | √ | √ | - | √ | √ | √ | √ | √ | √ | √ | - |
| Weight range of the individual | √ | - | √ | √ | √ | √ | √ | √ | - | - | - | - | - | - | √ | - | - | - | √ | - | - | - | - | - | - | - | - | - | √ |
| Age of the individual | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | - | √ | √ | √ | √ | √ | √ | √ | √ |
| Information related to previous procedures performed on the individual | - | √ | - | √ | √ | √ | - | - | √ | - | √ | √ | √ | √ | √ | √ | √ | √ | √ | - | - | √ | √ | √ | - | √ | √ | √ | √ |
| ***Housing and husbandry*** |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Welfare-related assessments before, during, or after the experiment | - | √ | √ | √ | √ | √ | - | √ | √ | - | √ | √ | √ | - | √ | √ | √ | √ | √ | √ | - | √ | - | √ | √ | √ | √ | - | - |
| ***NSample size*** |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Number of individual used in each experiment and group | - | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | - | √ | √ | - | √ | √ | √ | √ | √ |
| Explanation regarding number of individual and sample size calculation | √ | √ | √ | √ | √ | - | √ | √ | √ | √ | - | √ | √ | √ | √ | √ | √ | √ | √ | √ | - | √ | √ | - | √ | √ | √ | √ | √ |

*√, Criteria completed. (-), Uninformed/Criteria not completed.*

**Table S2 *(continuation)***. Assessment of bias and quality in all studies included in the systematic review.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **Quality criteria** | **Study** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SUGÁR et al., 2022 | BARBARA et al., 2022 | BRASSELER et al., 2022 | MERA-CORDERO et al., 2022 | LUCKOS et al., 2021 | BUONSENSO et al., 2021 | FERNÁNDEZ-DE-LAS-PEÑAS et al, 2022 | FUMAGALLI et al., 2022 | EDWARDS et al., 2021 | CHU et al., 2021 | SALIHEFENDIC et al., 2021 | MÉNDEZ et al., 2021 | DA COSTA E SILVA et al., 2023 | BRAGA-PAZ et al., 2022 | GRISANTI et al., 2022 | PACHALSKA et al., 2022 | HERNDON et al., 2022 | AUGUSTIN et al., 2021 | KALAK et al., 2022 | MAIORANA et al., 2023 | KAATZ et al., 2022 | FORTUNATO et al., 2022 | PARANHOS et al., 2022 | LIU et al., 2022 | VAIRA et al., 2022 | SAID et al., 2022 | GAYLIS et al., 2022 | LENNOL et al., 2023 | BHATTACHARYYA et al., 2022 |
| ***Allocating individual to groups*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Full details of how individual were allocated to groups | √ | - | √ | √ | - | - | √ | √ | √ | - | - | √ | - | √ | √ | √ | - | - | √ | - | √ | - | - | √ | - | √ | √ | √ | √ |
| Order of individual inoculated and/or evaluated | - | - | - | √ | √ | - | - | - | √ | - | √ | - | - | - | √ | √ | √ | - | - | - | - | - | - | √ | - | - | √ | √ | √ |
| ***Experimental outcomes*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Clear experimental outcomes assessed | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | - | √ | - | √ | √ | - | √ | - | √ | √ | √ | √ |
| ***Statistical methods*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Statistical methods used for each analysis | √ | √ | √ | √ | - | - | √ | √ | √ | - | - | √ | √ | √ | √ | √ | √ | √ | √ | - | √ | √ | - | √ | - | √ | √ | √ | √ |
| Specification of the unit of analysis for each dataset | √ | √ | √ | √ | - | - | √ | √ | √ | √ | - | √ | √ | √ | √ | √ | √ | √ | √ | - | √ | √ | - | √ | - | √ | √ | √ | √ |
| Methods used to assess adequacy of the statistical approach | √ | √ | √ | √ | - | - | √ | √ | √ | - | - | √ | √ | √ | √ | √ | √ | √ | √ | - | √ | √ | - | √ | - | √ | √ | √ | √ |
| **Results** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Baseline data | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | - | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Description of health status of individual | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | - | √ | √ | √ | √ | √ | √ | √ |

*√, Criteria completed. (-), Uninformed/Criteria not completed.*

**Table S2 *(continuation)***. Assessment of bias and quality in all studies included in the systematic review.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **Quality criteria** | **Study** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SUGÁR et al., 2022 | BARBARA et al., 2022 | BRASSELER et al., 2022 | MERA-CORDERO et al., 2022 | LUCKOS et al., 2021 | BUONSENSO et al., 2021 | FERNÁNDEZ-DE-LAS-PEÑAS et al, 2022 | FUMAGALLI et al., 2022 | EDWARDS et al., 2021 | CHU et al., 2021 | SALIHEFENDIC et al., 2021 | MÉNDEZ et al., 2021 | DA COSTA E SILVA et al., 2023 | BRAGA-PAZ et al., 2022 | GRISANTI et al., 2022 | PACHALSKA et al., 2022 | HERNDON et al., 2022 | AUGUSTIN et al., 2021 | KALAK et al., 2022 | MAIORANA et al., 2023 | KAATZ et al., 2022 | FORTUNATO et al., 2022 | PARANHOS et al., 2022 | LIU et al., 2022 | VAIRA et al., 2022 | SAID et al., 2022 | GAYLIS et al., 2022 | LENNOL et al., 2023 | BHATTACHARYYA et al., 2022 |
| ***Numbers analyzed*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Number of individual in each group included in each analysis | √ | √ | √ | √ | - | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | - | √ | √ | - | √ | √ | √ | √ | √ |
| Data not included in the analysis (explanation of exclusion) | √ | √ | √ | - | - | - | - | √ | - | √ | - | √ | - | - | √ | - | √ | - | √ | √ | - | √ | √ | - | √ | - | √ | √ | - |
| ***Outcomes and estimation*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Gene information | - | - | - | - | - | - | - | - | - | - | - | - | - | √ | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| ***Adverse events*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Information regarding mortality | - | - | - | - | - | - | - | - | √ | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Modifications to the protocols to reduce adverse events | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **Discussion** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ***Interpretation/scientific implications*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Interpretation of the results, consider objectives, hypotheses, current theory | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Comments on limitations (bias, limitations of the model, imprecision of results) | √ | √ | √ | - | - | - | √ | √ | - | √ | √ | √ | √ | - | - | - | √ | √ | √ | √ | √ | √ | √ | - | √ | - | - | √ | - |

*√, Criteria completed. (-), Uninformed/Criteria not completed.*

**Table S2 *(continuation)***. Assessment of bias and quality in all studies included in the systematic review.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **Quality criteria** | **Study** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SUGÁR et al., 2022 | BARBARA et al., 2022 | BRASSELER et al., 2022 | MERA-CORDERO et al., 2022 | LUCKOS et al., 2021 | BUONSENSO et al., 2021 | FERNÁNDEZ-DE-LAS-PEÑAS et al, 2022 | FUMAGALLI et al., 2022 | EDWARDS et al., 2021 | CHU et al., 2021 | SALIHEFENDIC et al., 2021 | MÉNDEZ et al., 2021 | DA COSTA E SILVA et al., 2023 | BRAGA-PAZ et al., 2022 | GRISANTI et al., 2022 | PACHALSKA et al., 2022 | HERNDON et al., 2022 | AUGUSTIN et al., 2021 | KALAK et al., 2022 | MAIORANA et al., 2023 | KAATZ et al., 2022 | FORTUNATO et al., 2022 | PARANHOS et al., 2022 | LIU et al., 2022 | VAIRA et al., 2022 | SAID et al., 2022 | GAYLIS et al., 2022 | LENNOL et al., 2023 | BHATTACHARYYA et al., 2022 |
| ***Generalizability/translation*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Comments on how the findings are likely to translate to other species | - | - | √ | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| ***Funding*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| List of funding sources and the role of the funder(s) in the study | - | - | - | √ | - | - | √ | - | - | - | - | √ | √ | √ | - | - | √ | √ | √ | - | - | - | - | - | - | √ | - | √ | - |
| **Quality of publication** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ***Impact factor*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Periodic with Journal Citation Reports (JCR) for impact factor | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| **Criteria completed (n)** | 26 | 25 | 27 | 27 | 20 | 18 | 24 | 27 | 26 | 20 | 20 | 27 | 26 | 26 | 26 | 26 | 28 | 23 | 29 | 21 | 15 | 25 | 20 | 18 | 25 | 26 | 25 | 26 | 22 |
| **Criteria completed (%)** | 74 | 71 | 78 | 78 | 58 | 52 | 69 | 78 | 74 | 58 | 58 | 78 | 74 | 74 | 74 | 74 | 80 | 66 | 83 | 60 | 43 | 71 | 58 | 52 | 71 | 74 | 71 | 74 | 62 |
| **Criteria not completed (%)** | 26 | 29 | 22 | 22 | 42 | 48 | 31 | 22 | 26 | 42 | 42 | 22 | 26 | 26 | 26 | 26 | 20 | 34 | 17 | 40 | 57 | 29 | 42 | 48 | 29 | 26 | 29 | 26 | 38 |

*√, Criteria completed. (-), Uninformed/Criteria not completed.*