

Effects of relative humidity on health and wellbeing of laboratory animals

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In the below table scientific papers on the effect of relative humidity in studies performed in mice, rats and guinea pigs are listed. These effects can have consequences for the health and welfare of the animal and could potentially affect the reproducibility of research within these research areas.

RH (%)	Consequence
<10	Decreased protective properties of the skin when mice were transferred from 80% RH to 10% RH when compared to transfer from 40-70% RH to 10% RH ¹
<10	Decreased protective properties of the layers in the lungs when compared to 85-89% RH ²
10	Increased epidermal IL-1 α (mRNA and protein levels) when compared to 80% RH ³
10	Stimulation of epidermal DNA synthesis + amplification of hyperproliferative response to barrier disruption when compared to RH >80% ⁴
10-20	Decreased defense against virus infection, decreased tissue repair, inflicts caspase-dependent disease pathology when compared to 50% RH ⁵
12-18	Ocular irritation when combined with increased airflow compared to 60-80% RH ⁶
15-30	Delayed puberty in female mice when compared to 75% RH ⁷
20-35	Favorable condition for spread of influenza virus in guinea pigs when compared to 50% and 80% RH ⁸
20-35	Increased transmission of influenza virus in guinea pigs when compared to 50% and 80% RH ⁹
<30	Initiation of ringtail in the pouched mouse when compared to <45% RH, a condition that is described in laboratory mice as well ¹⁰⁺¹¹

- 35 Increased food intake when compared to 75% RH¹²
- <40 Increased incidence of ringtail in rats when compared to higher RH levels¹³⁺¹⁴
- <45 Increased eye disease probability when compared to RH above 45%¹⁵
- 45-55 Reduction of ammonia in cages when compared to higher RH¹⁶
- 50 Reduced transmission of influenza virus in guinea pigs when compared to 20%, 35% and 65% RH⁹
- 50 Reduced survival and viability of airborne bacteria when compared to 20% and 80% RH¹⁷
- 60-70 Increased transmission of Sendai virus in mice when compared to 40-45% RH¹⁸
- 65 Increased transmission of influenza virus in guinea pigs when compared to 50% and 80% RH⁹
- 70 Lower survival rate 24 hours after heat stroke at 37.5°C and 70% RH than 37.5°C and 65% RH¹⁹
- 65-75 Ammonia build-up in mouse cages when compared to lower RH¹⁶
- 71-82 Reduction in rodent and rabbit airborne allergens when compared to 54±2% RH²⁰
- 74 At 23° increases in airway resistance in rats when compared to ambient air environment of approximately 50% RH and 22°C²¹
- 75 First estrus attained earlier when compared to 15-30% RH⁷
- 80 No transmission of influenza virus in guinea pigs when compared to 20-35% and 65% RH⁹
- >85 Increased tendency for allergy when irritation of airways is induced in murine model when compared to RH conditions <10%²

- 90 Exposure to formaldehyde combined with 90% RH exacerbates allergic asthma in mice when compared to formaldehyde and 60±5% RH²²
- 100 Changed elastance of airways in rats when compared to 0% RH²³
- 100 Increased wound healing when compared to ambient “dry” environment²⁴

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