Pre-weaning mortality of mice housed in individually ventilated cages with and without controlled humidity

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Background

Relative humidity (RH) and other environmental conditions may influence reproductive performance and animal welfare thus affecting research outcomes.

Maintaining a stable humidity level in animal facilities is challenging in Nordic countries when RH decreases very often below 40% during cold winter months.

Our aim was to compare reproductive performance of mice maintained either in humidity controlled (ScanClime) or non-humidity controlled (SmartFlow) individually ventilated cages (IVC)
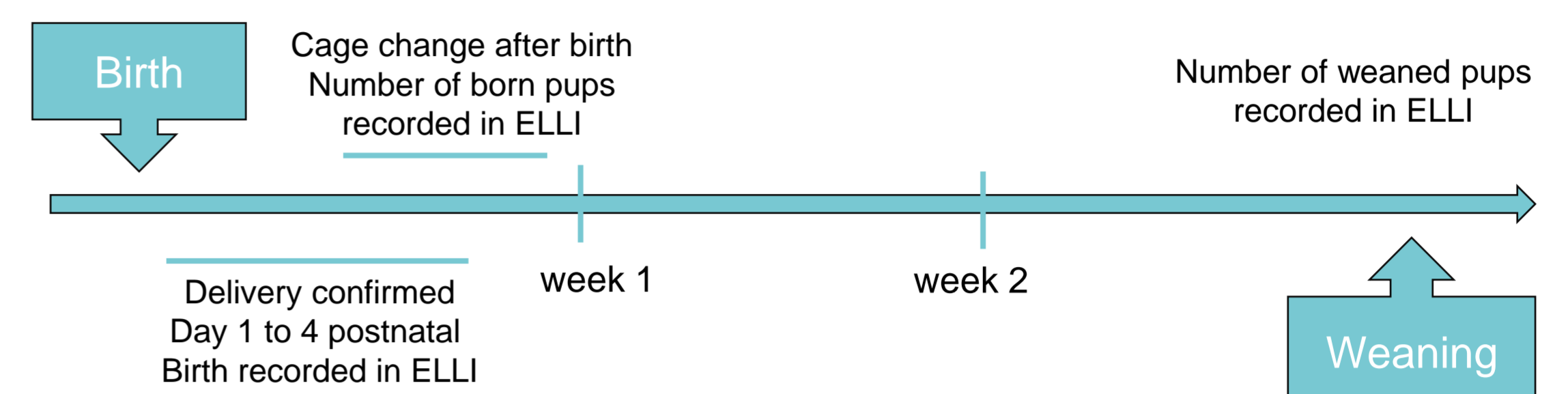
Materials and methods

We retrieved data from our ELLI record-keeping system and analysed the pre-weaning mortality from the calendar year 2018.

ScanClime type 56-SCLI-HC-T Humidification of air to 45-65% RH ±3%. Not de-humidification function. OR SmartFlow (Techniplast)

Data from 246 breeding pairs, 628 litters and 3970 born pups.

- Room temperature 21+/-3 °C
- All animals were housed in IVC caging (ScanClime vs.SmartFlow)
- Cage type Macrolon 2
- Aspen bedding with nesting material.
- 12h day/night cycle.

Birth → Cage change after birth — Number of born pups recorded in ELLI — week 1 — week 2 — Number of weaned pups recorded in ELLI → Weaning

Delivery confirmed Day 1 to 4 postnatal Birth recorded in ELLI

Pre-weaning mortality = Number of born pups recorded in ELLI − Weaned pups

ScanClime vs. offspring production during full calendar year 2018

SmartFlow room — Room 316 humidity

ScanClime room — Room 314 humidity — ScanClime humidity in room314
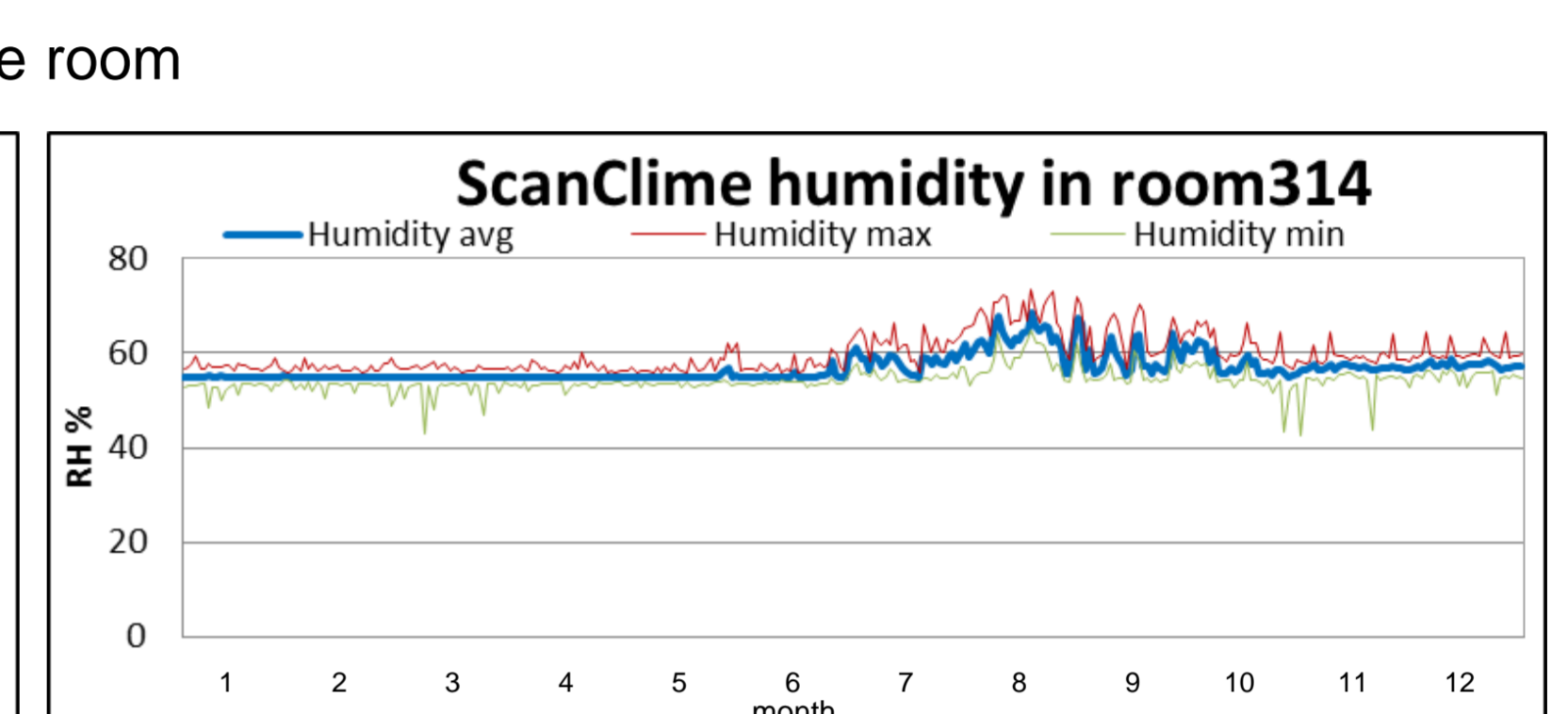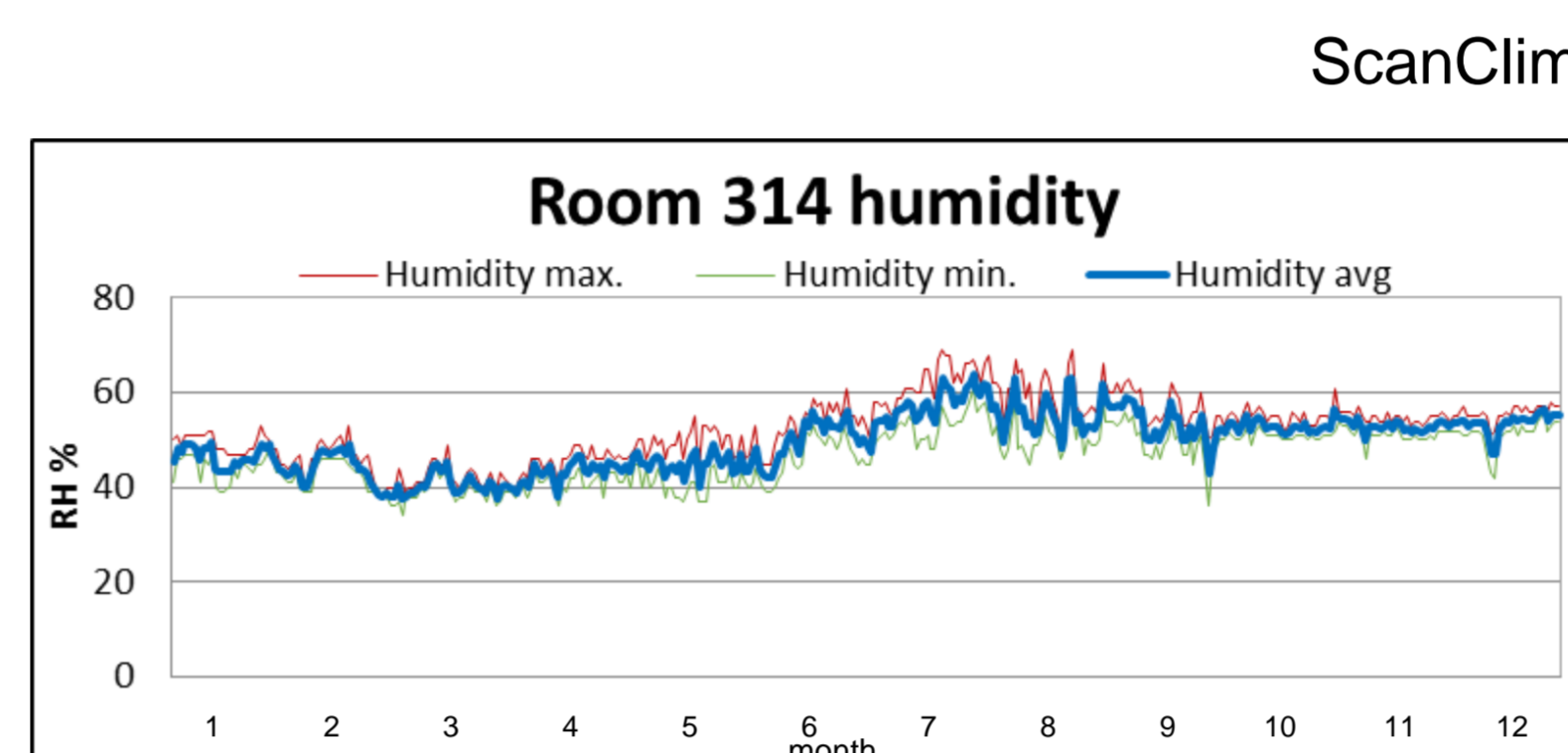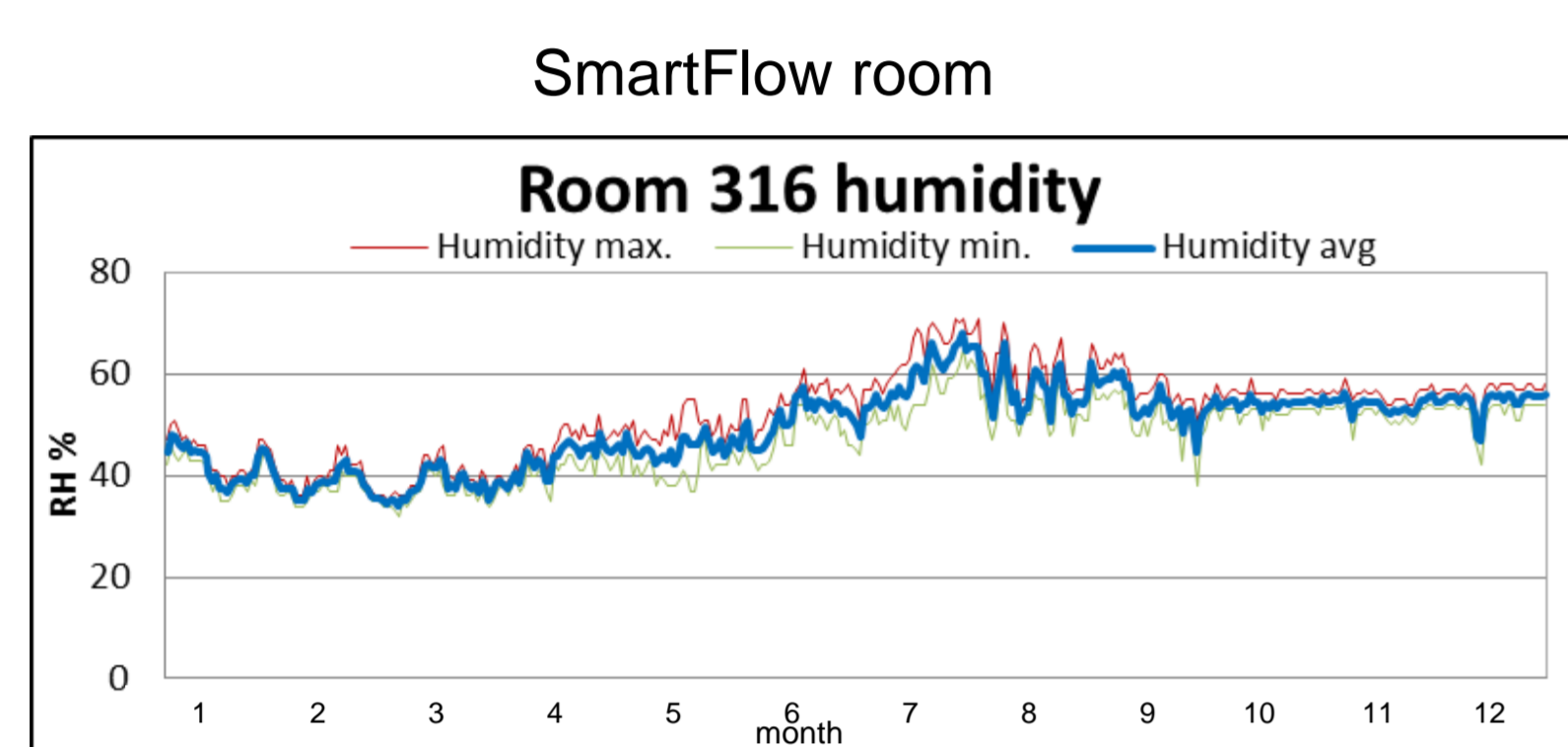
Observation period is a full calendar year of 2018.
Number of pups born in SmartFlow was 1787
Number of pups born in ScanClime was 1750.

Pups born — Pups weaned — % of Pups lost — Smart Flow 23 % , ScanClime 16 % **
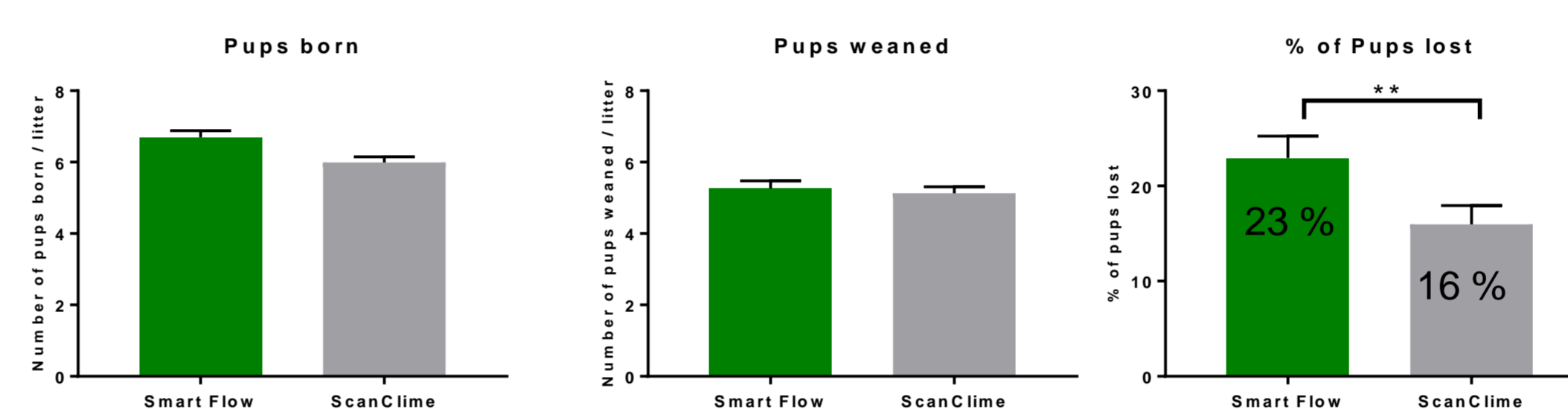
Values are presented as means with SEM.

ScanClime vs. Smart Flow offspring production during low humidity period

SmartFlow room — Room 309 humidity

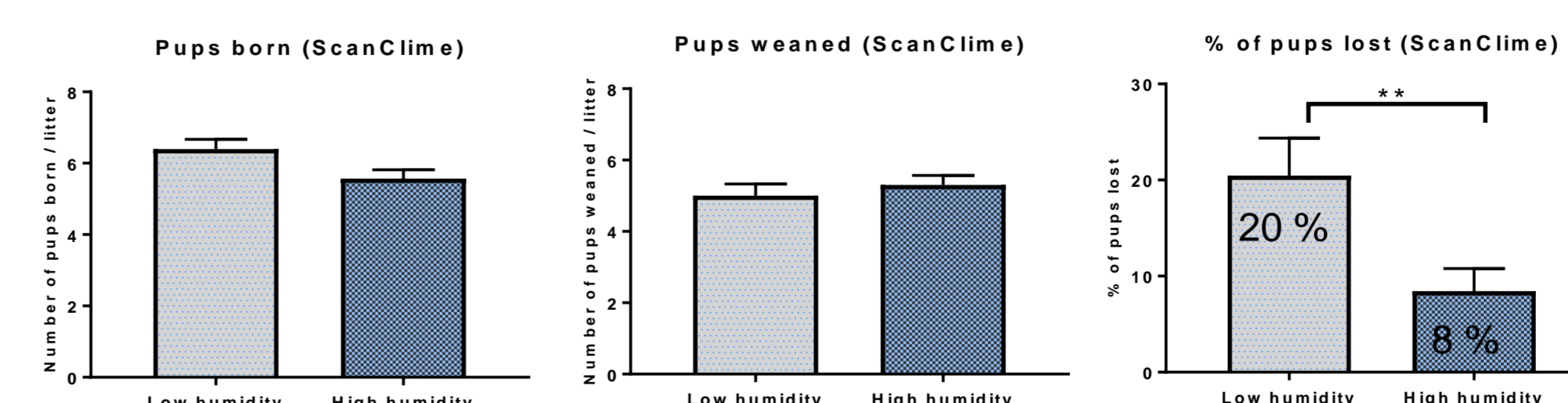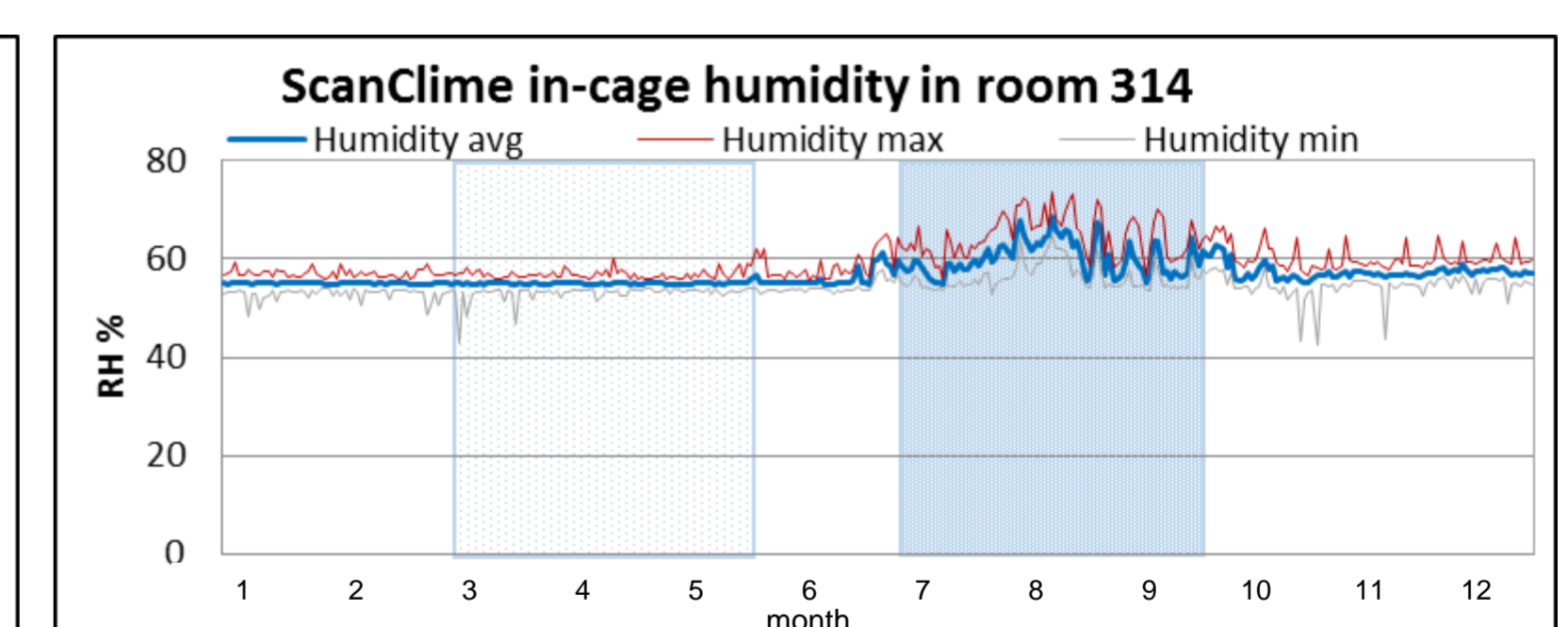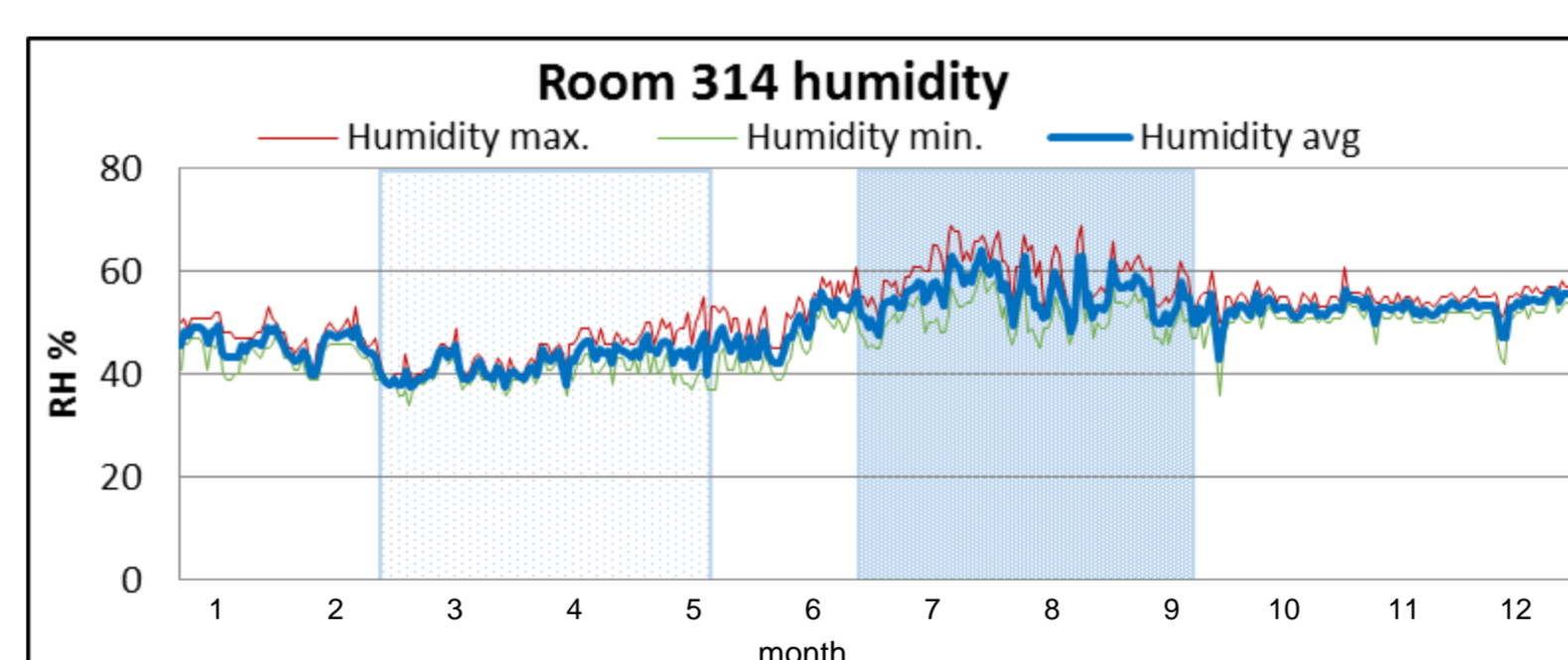ScanClime room — Room 314 humidity — ScanClime humidity in room 314
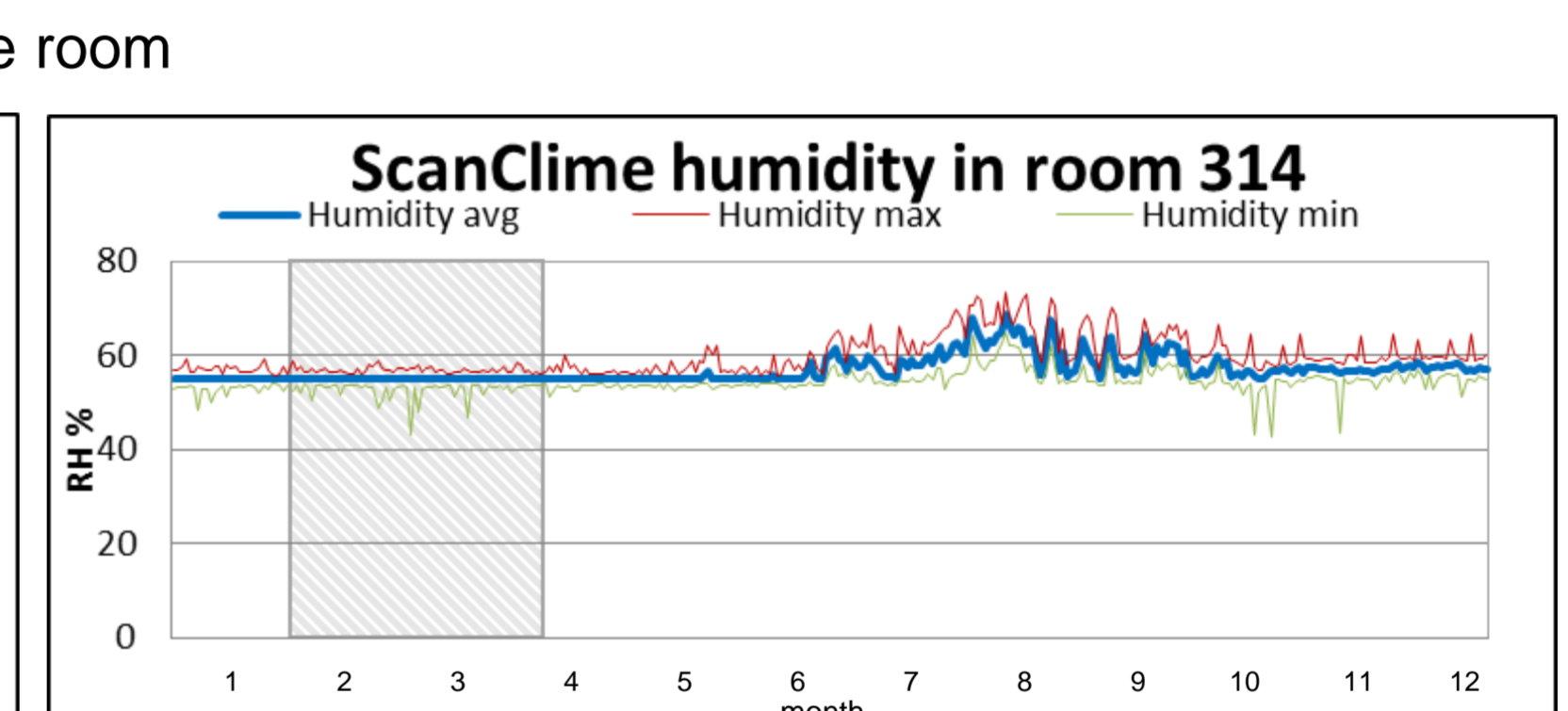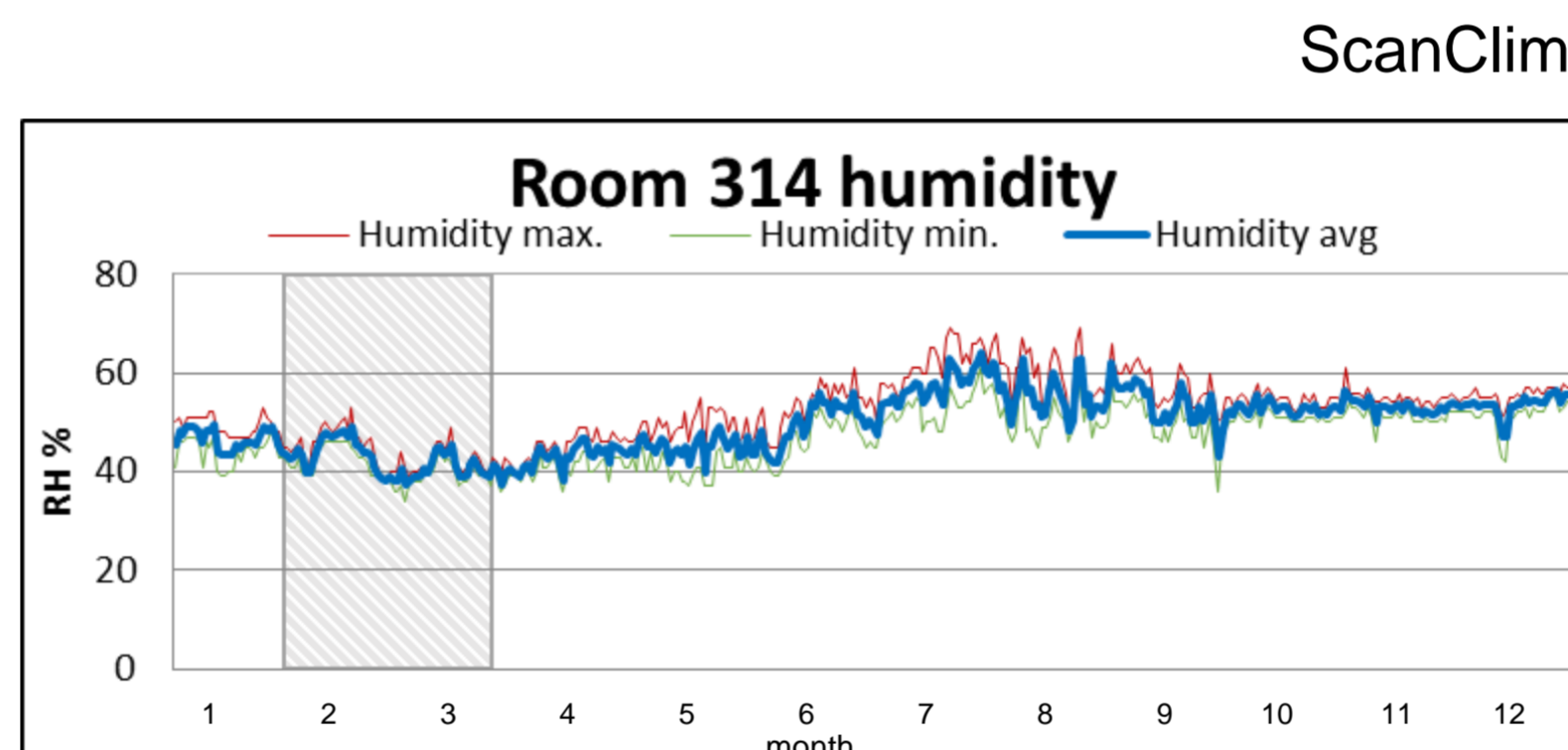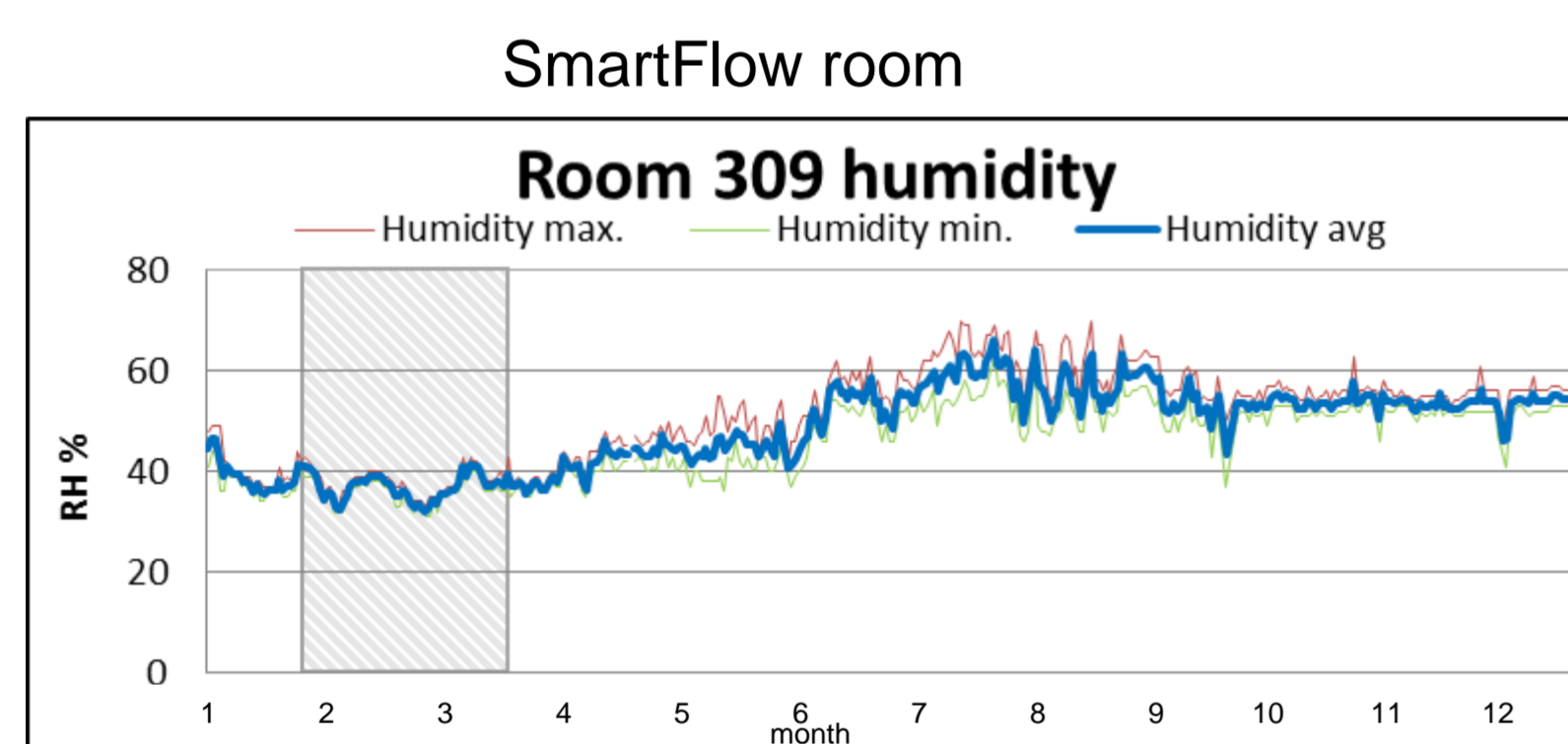
Observation period is from February until the end of March. This time period was chosen because RH was low: approximately 40 %.
Several strains were located in rooms 314 (ScanClime IVC system) and 309 (Smart Flow IVC system).
Number of pups born in ScanClime was 370.
Number of pups born in Smart Flow was 433.

Pups born (low humidity) — Pups weaned (low humidity) — % of pups lost (low humidity) — Smart Flow 32 %, ScanClime 22% *
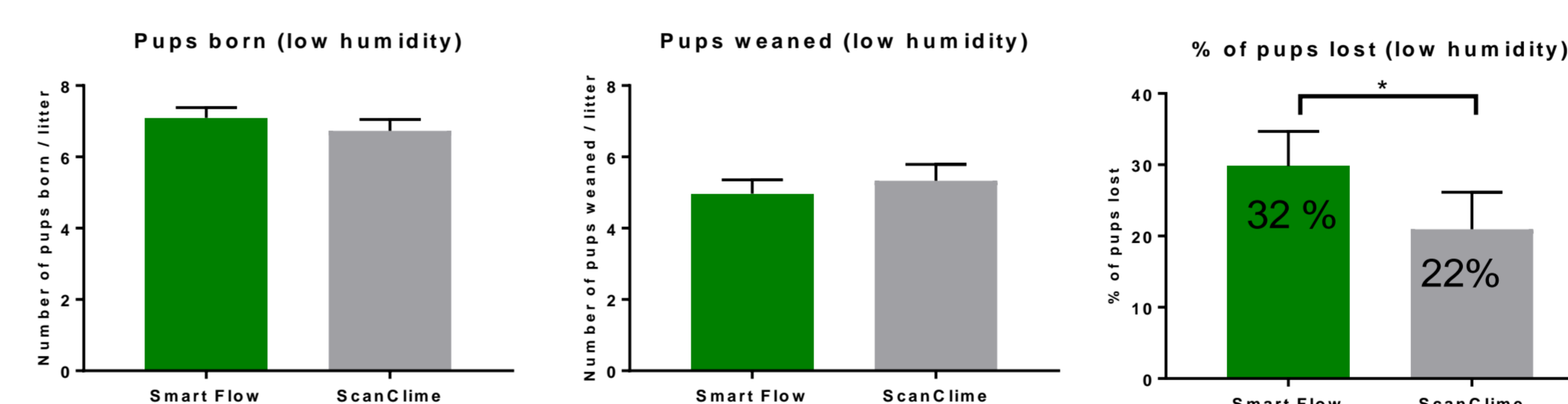
Values are presented as means with SEM.

Offspring production during high and low humidity seasons in ScanClime

Observation period is from March until the end of May labelled as

Low humidity (RH was low: approximately 40 %) and from July until the end of September, labelled as High humidity (RH was high: approximately 60 %).

Room 314 humidity — ScanClime in-cage humidity in room 314

Pups born (ScanClime) — Pups weaned (ScanClime) — % of pups lost (ScanClime) — Low humidity 20 %, High humidity 8 % **

Values are presented as means with SEM.

Conclusions

- Pre-weaning mortality was significantly lower in mice maintained in ScanClime during whole calendar year 2018.
- Similarly, pre-weaning mortality was lower during low humidity period in mice maintained in ScanClime.
- Our full year and seasonal observations showed that reproductive performance is affected by relative humidity.
- Data from mice kept in ScanClime during low and high humidity seasons also showed that there was a significant difference within the ScanClime
- It is possible that factors other than RH might influence the pre-weaning mortality.

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