Supplementary Material 1.

Following Section 2.2 of the main paper, we explain how milking times were estimated (Section 1.1), and we explain the steps taken to pre-process the local positioning system data remaining after excluding milking times.

1.1 Milking times

During milking, cows moved from the cubicle yard to the collecting yard and parlour (see Fig 1A in main paper). To estimate when milking occurred, the mean number of sensors recording per timepoint in the cubicle yard was calculated for each day and time period. Additionally, the average number of sensors recording in the cubicle yard at each hour over the entire study was calculated.

Figure S1 indicates that the percentage of sensors recording in the cubicle yard was unstable between 04:00 h and 05:59 h and 14:00 h and 15:59 h. These periods were therefore interpreted as milking times; consequently, all data recorded during these times were excluded from the analysis.

1.2. Data pre-processing

Data pre-processing consisted of (1) removing location data outside of the cubicle yard (where the cows were housed; refer to Fig 1A in main paper) due to minor positional inaccuracies (10.16 % of original data; 12,756,417 data points removed), (2) removing nonsensical positional data (e.g., sensors 'stuck' in exactly the same or similar, point location for multiple consecutive time points; 0.00002 % of original data; 22 data points removed), (3) plots of trajectories were visualised manually and any further nonsensical data were removed (e.g., where the trajectory of a cow was located within an unrealistically small area for an extended period of time); these instances were deemed as biologically implausible (0.27 % of original data; 344,011 data points removed). In total, 89.57 % of the original data remained after these stages, leaving a total of 112,467,168 data points for the main analysis.
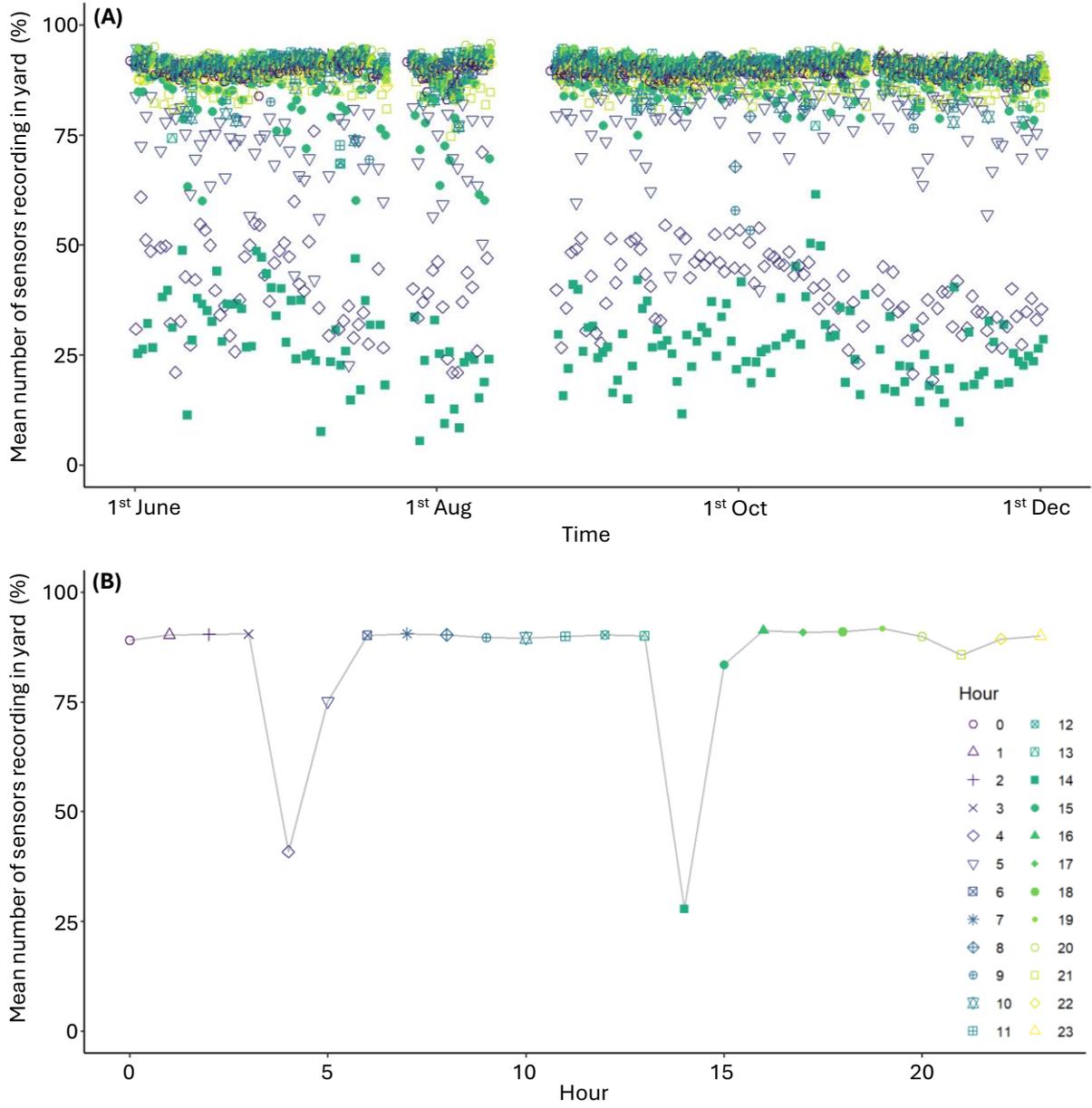
Dairy cow space-use behaviour and THI

Figure S1. Mean number of sensors recording in cubicle yard where cows were housed (A) over the study period by day and time period and (B) per hour.