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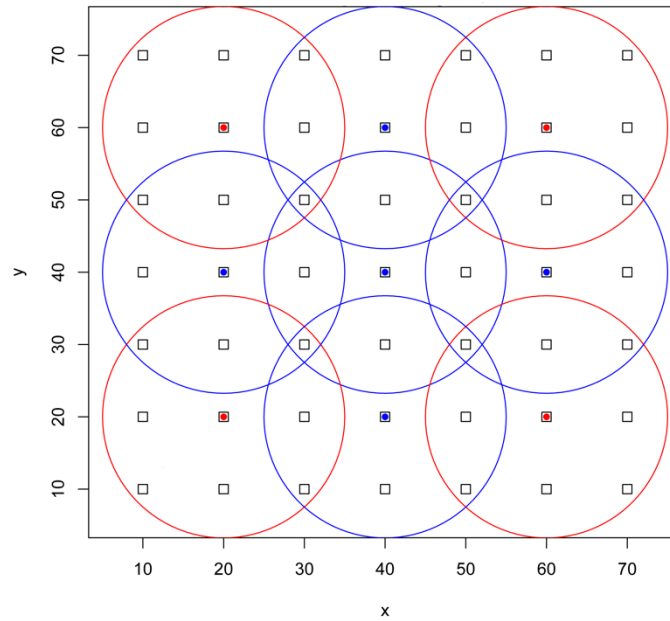
## Appendix 1

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## 1. Enclosure layout

The experiment was performed in four enclosures of 70 x 70 m each. In each enclosure, nine feeding stations were placed, arranged in such a way that at least one feeding station was present in an animal's home range (based on an average circular home range) (Fig. A1). The four feeding stations in the center of each quadrant were equipped with RFID antennas to record the entry of RFID (PIT) tag equipped mice.



**Figure A1.** Enclosure layout with feeding stations indicated by coloured dots (blue: without antenna, red: with antenna), and average home range circles centered on each feeding station. x- and y-axis indicate length (m).

## 2. Missing data

Due to occasional hardware malfunctions, some recording nights were missing from the dataset. Missing data:

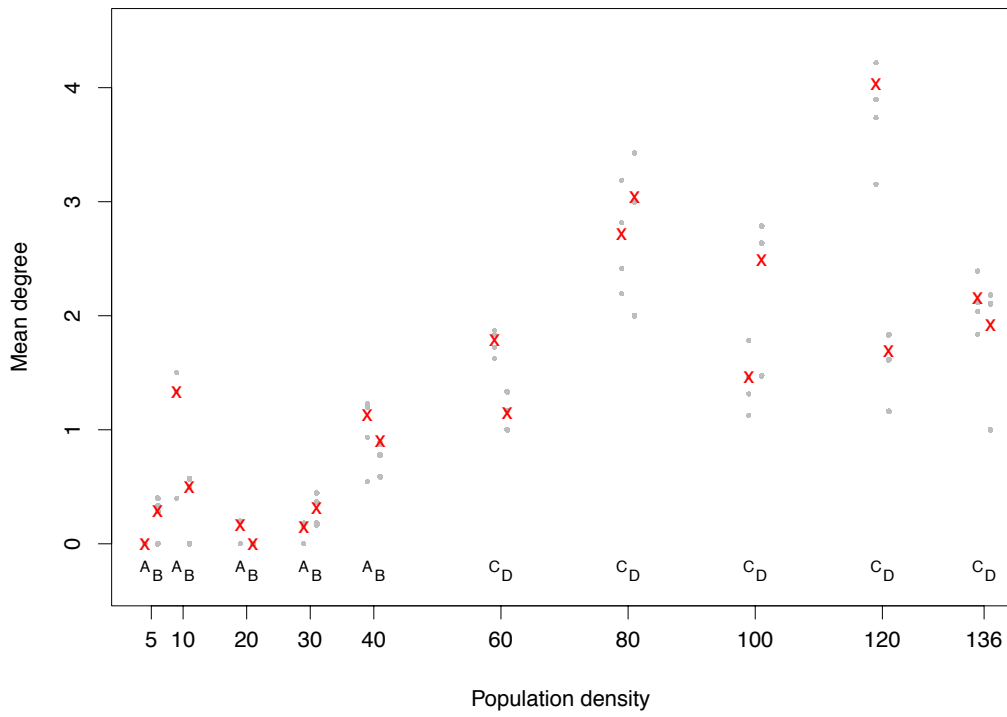
- Enclosure A: week 4 and 5 (N = 30 and 40): 1 missing night for all antennas in each week (battery failure).
- Enclosure B: week 1 (N = 5): 1 missing night for 1 antenna.
- Enclosure C: week 3 (N = 100): 2 missing nights for 1 antenna.
- Enclosure D: week 2-5 (N = 80-136): No recordings for 1 antenna (broken antenna).

We tested whether and how contact patterns are affected by missing data. This was done by permutation: for each enclosure, one randomly chosen antenna was removed from the dataset for the duration of an entire week (i.e. one density), resulting in weeks during which only 3 antennas are used. Contact matrices were then re-calculated. This was repeated 1000 times for statistical comparison with the original results (p-value = proportion of permuted results  $\geq$  the real result).

Mean degree was not significantly affected by missing data (Table A1, Fig. A2).

**Table A1.** p-values for the statistical comparison between the permuted (simulated missing data) and the real datasets. p-values are the proportion of permuted mean degree values that were  $\geq$  the real value.

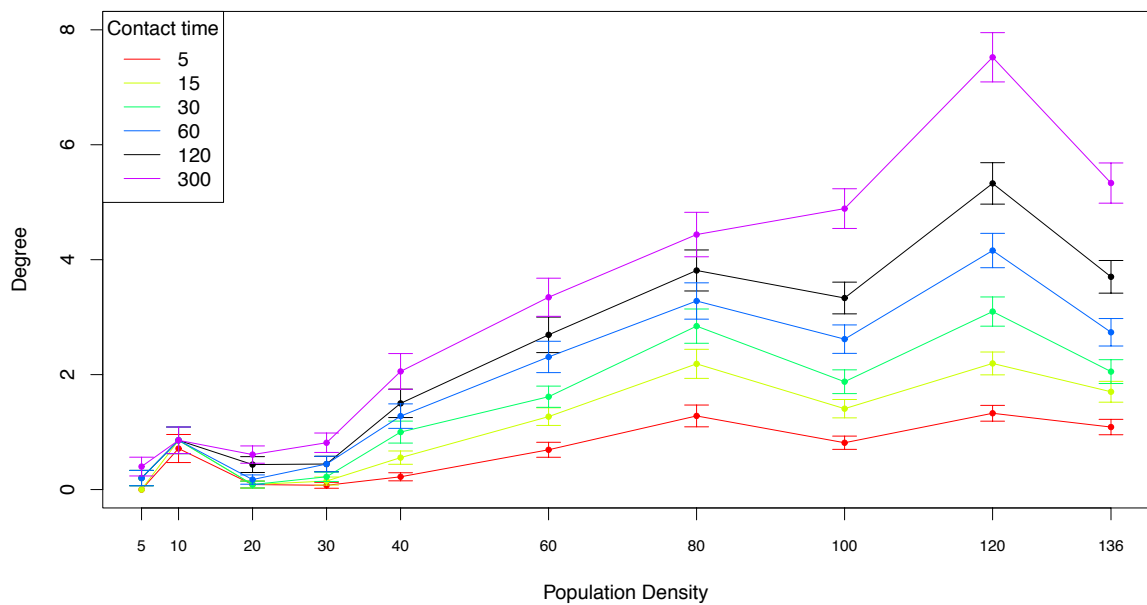
Density	Enclosure	Mean	p-value
5	A	0.00	1.00
5	B	0.29	0.74
10	A	1.33	0.64
10	B	0.50	0.76
20	A	0.17	0.76
20	B	0.00	1.00
30	A	0.14	0.76
30	B	0.31	0.49
40	A	1.13	0.51
40	B	0.90	0.00
60	C	1.79	0.49
60	D	1.14	0.50
80	C	2.72	0.49
80	D	3.04	0.35
100	C	1.46	0.52
100	D	2.48	0.69
120	C	4.03	0.25
120	D	1.69	0.34
136	C	2.15	0.24
136	D	1.91	0.69



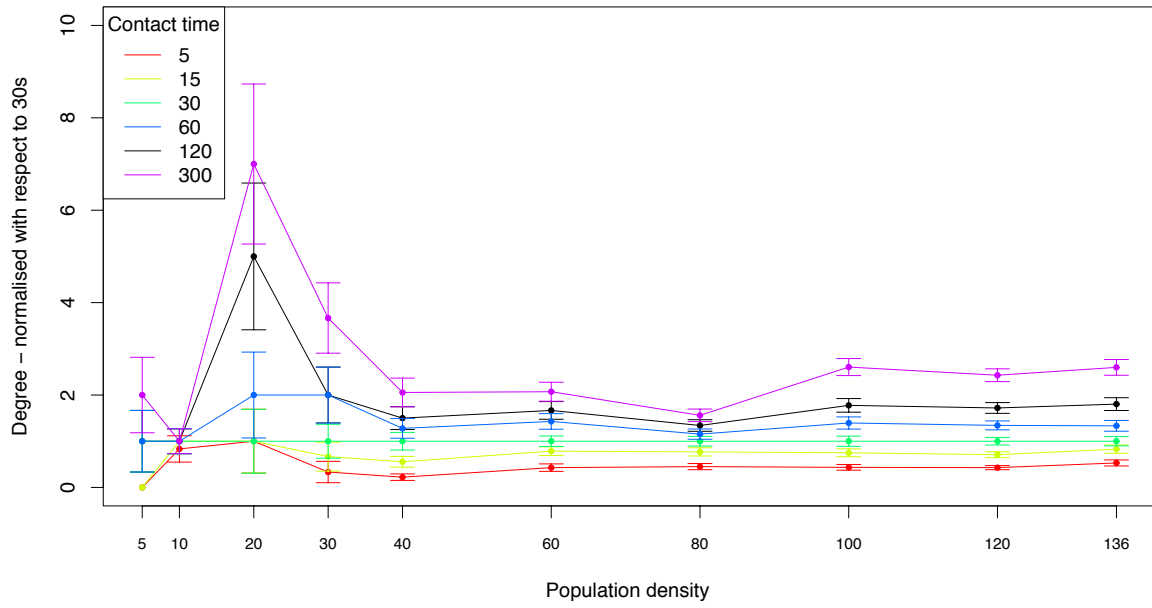
**Figure A2.** Mean degree for 1000 permuted datasets with missing data (grey dots) and the real dataset (red crosses) for each enclosure.

### 3. Effect of contact time

Contacts are defined based on the time interval between visits of different individuals, but this time interval is an arbitrary choice. Although there may be biological reasons to choose a certain time interval, it is best to take into account an objective evaluation of the effect of the choice of interval. We calculated the correlation between population density and different social network measures for a range of contact times (Fig. A3 and A4). This correlation changed slightly, but always had a similar shape except for the largest interval, where a plateau phase is less obvious. This interval (300 s) is very large though, and biologically less relevant. Differences were larger at low population densities, which is a logical consequence of a longer contact time definition and therefore a higher number of contacts. Importantly, even at very low contact interval times there are still contacts at low densities.



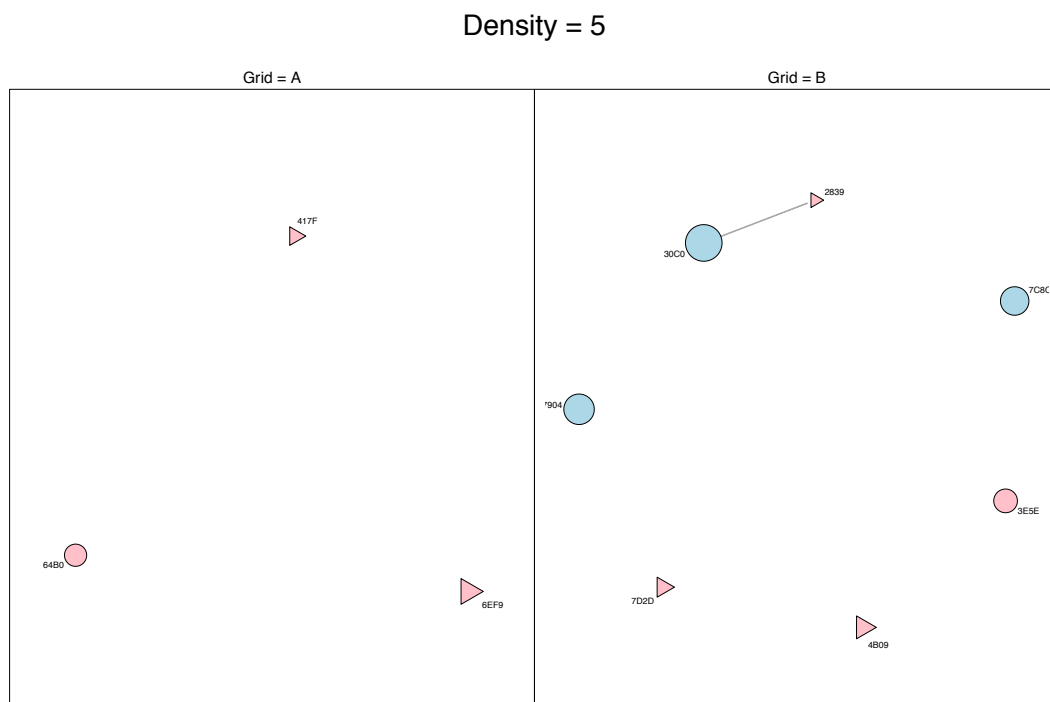
**Figure A3.** Population density vs. degree for a range of contact times.



**Figure A4.** Population density vs. normalised degree for a range of contact times. Degree was normalised by dividing by the degree at contact time 30 s.

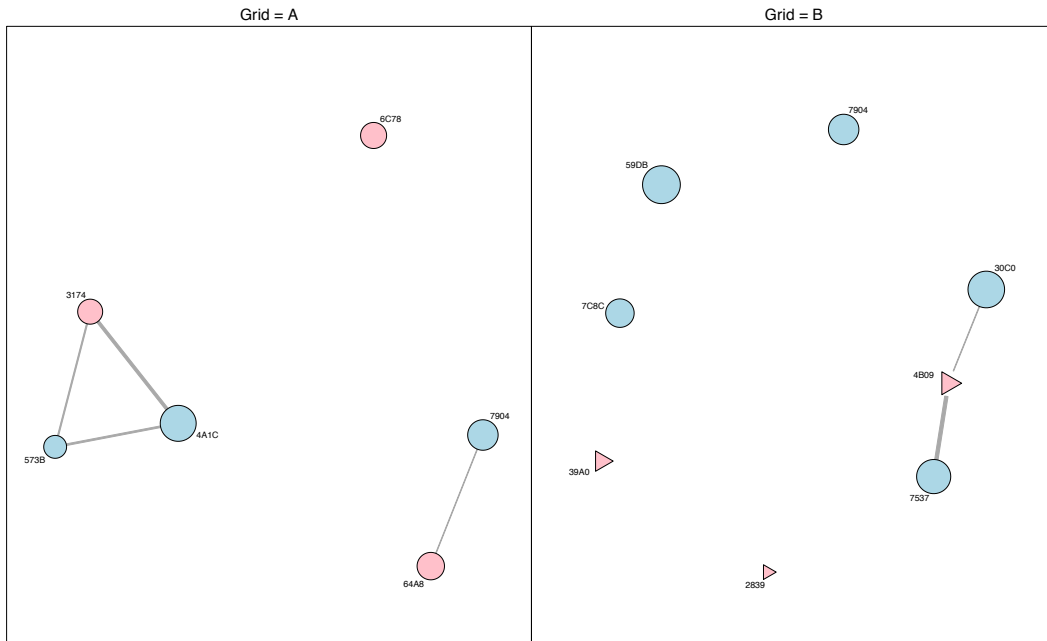
#### 4. Contact network graphs

For each enclosure, a contact network graph was plotted. One enclosure contained 4 recording antennas. Because, in some cases, an animal had contacts in two different antennas, we opted to plot one network graph for each enclosure, that contains all 4 antennas. Although this often resulted in 4 distinct clusters, this method does ensure that all contacts are shown. An additional advantage is that less network graphs are needed than when plotting the network for each antenna separately (20 instead of 80).



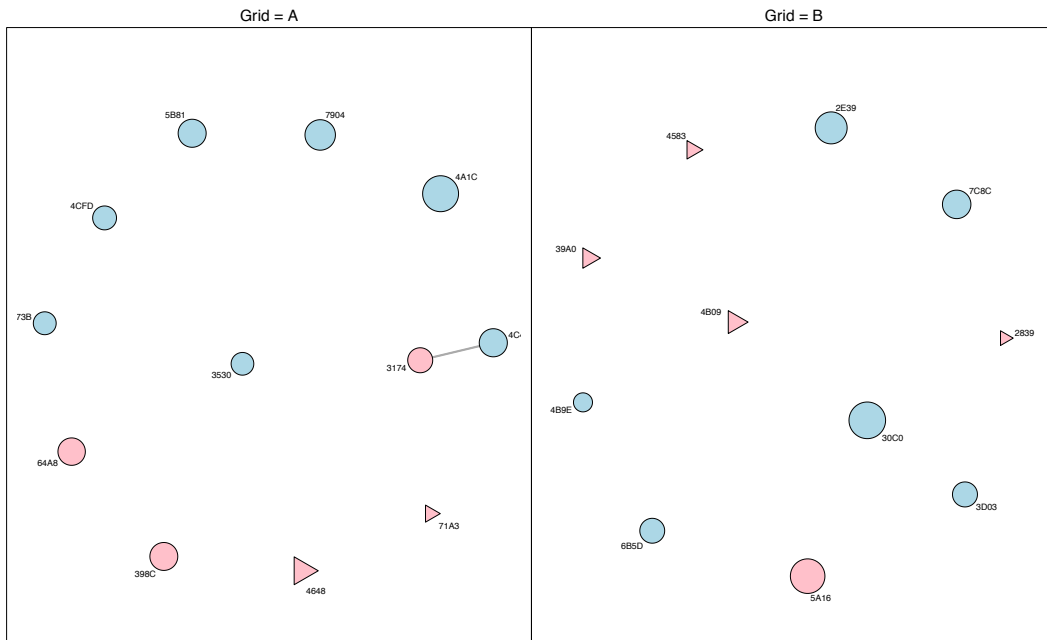
**Figure A5.** Social networks for  $N = 5$ , divided per density treatment. Node colour depicts sex (pink = female, blue = male), node shape depicts reproductive status (circle = sexually active, triangle = not sexually active), node size depicts body weight (larger = heavier), node label depicts individual IDs, edge width depicts the number of contacts (wider = more contacts).

### Density = 10



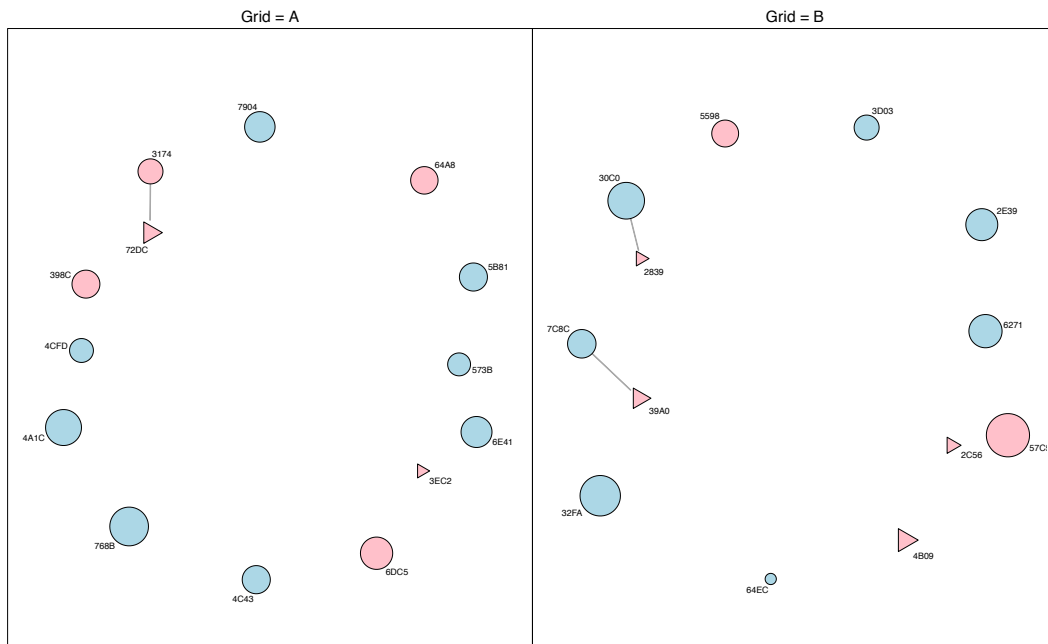
**Figure A6.** Social networks for N = 10, divided per density treatment. Node colour depicts sex (pink = female, blue = male), node shape depicts reproductive status (circle = sexually active, triangle = not sexually active), node size depicts body weight (larger = heavier), node label depicts individual IDs, edge width depicts the number of contacts (wider = more contacts).

### Density = 20



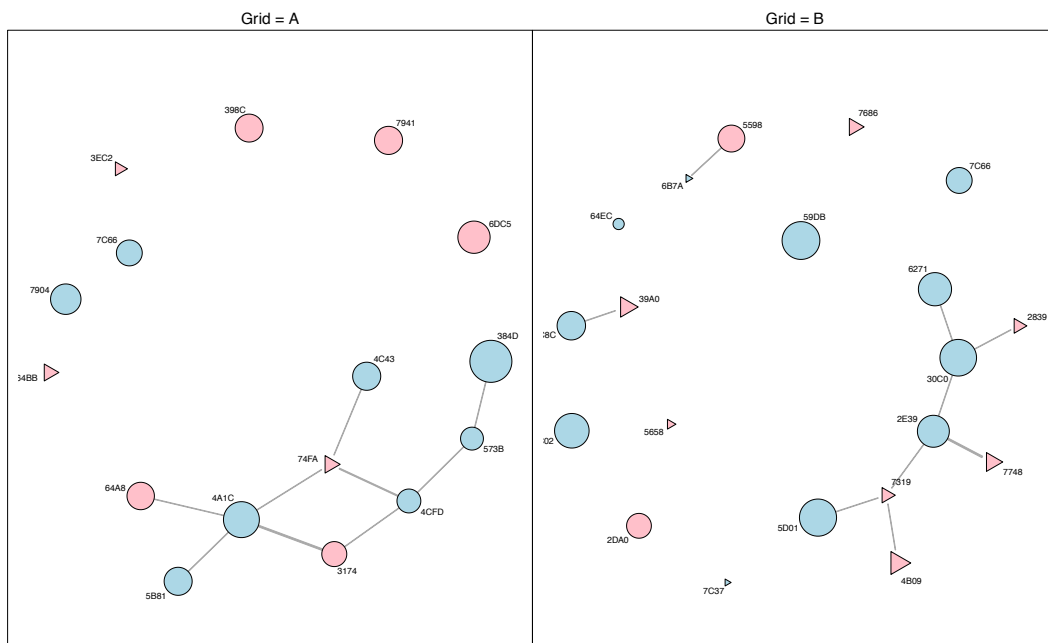
**Figure A7.** Social networks for N = 20, divided per density treatment. Node colour depicts sex (pink = female, blue = male), node shape depicts reproductive status (circle = sexually active, triangle = not sexually active), node size depicts body weight (larger = heavier), node label depicts individual IDs, edge width depicts the number of contacts (wider = more contacts).

### Density = 30



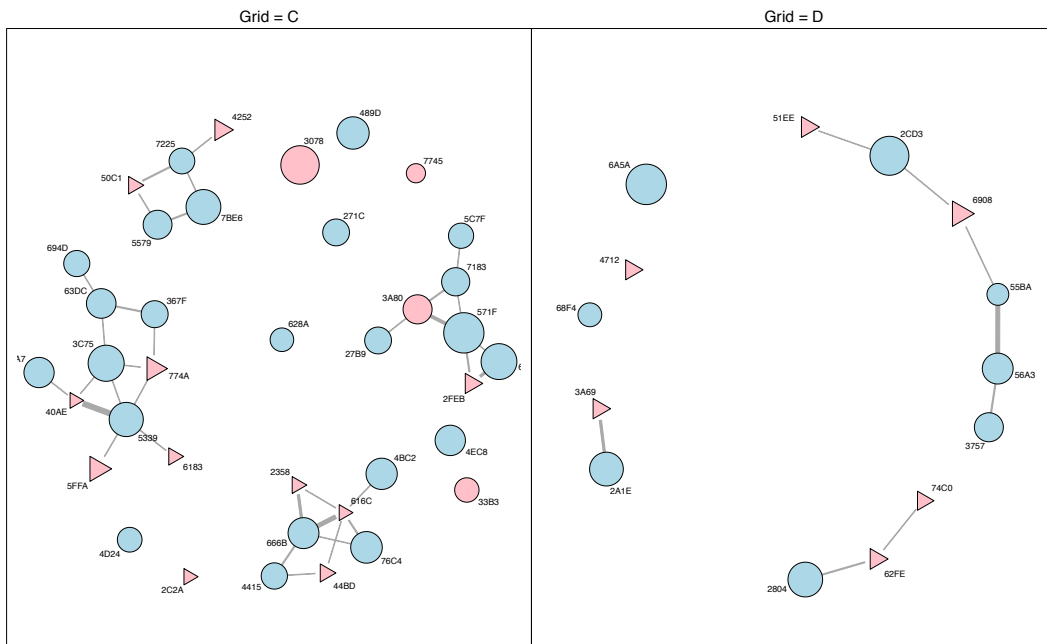
**Figure A8.** Social networks for  $N = 30$ , divided per density treatment. Node colour depicts sex (pink = female, blue = male), node shape depicts reproductive status (circle = sexually active, triangle = not sexually active), node size depicts body weight (larger = heavier), node label depicts individual IDs, edge width depicts the number of contacts (wider = more contacts).

### Density = 40



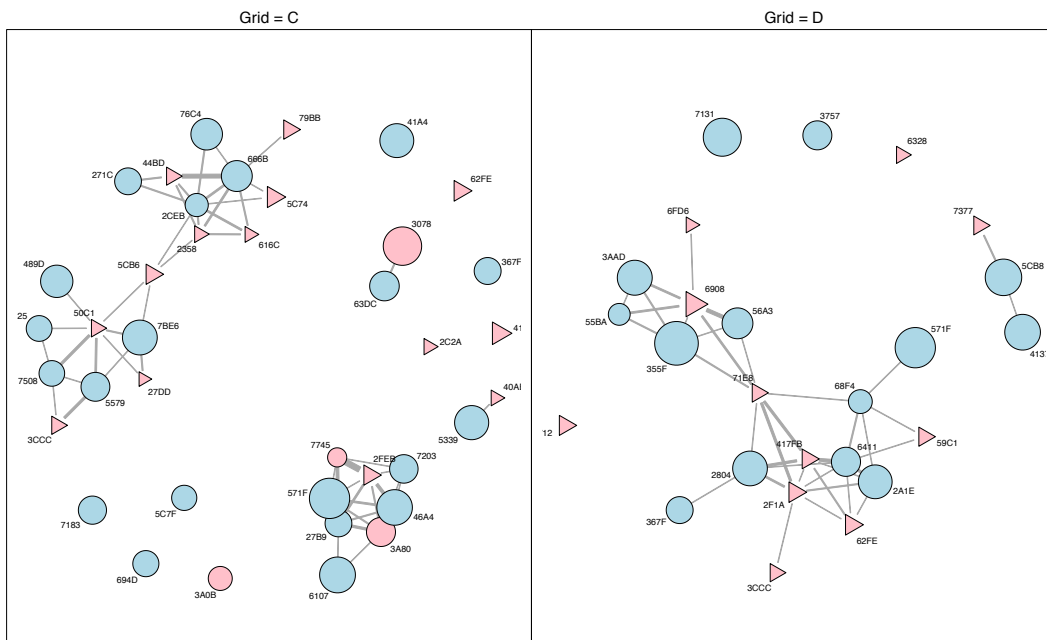
**Figure A9.** Social networks for  $N = 40$ , divided per density treatment. Node colour depicts sex (pink = female, blue = male), node shape depicts reproductive status (circle = sexually active, triangle = not sexually active), node size depicts body weight (larger = heavier), node label depicts individual IDs, edge width depicts the number of contacts (wider = more contacts).

### Density = 60



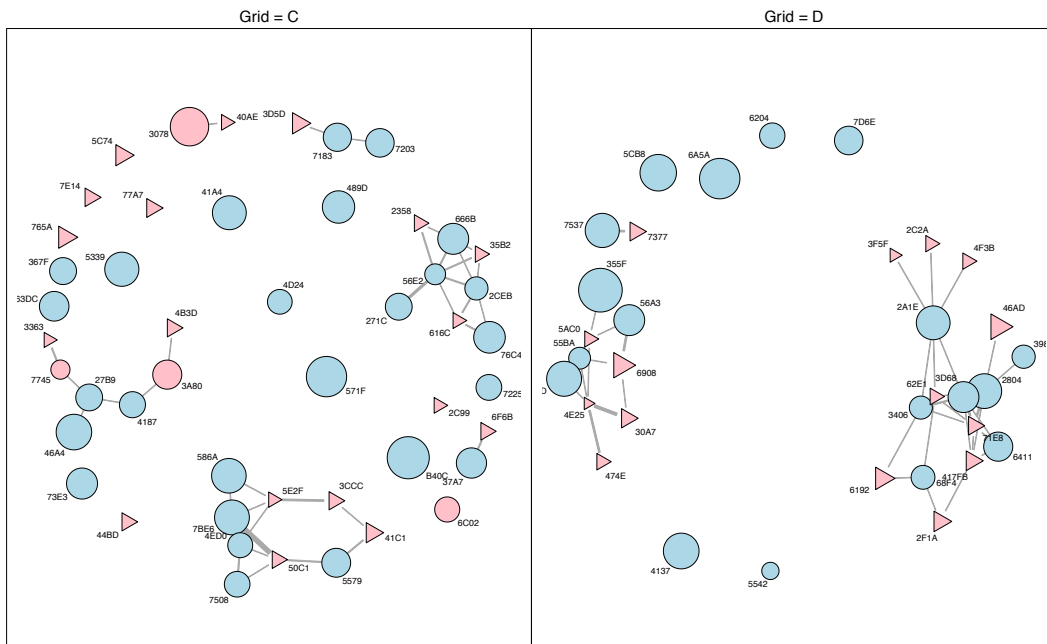
**Figure A10.** Social networks for  $N = 60$ , divided per density treatment. Node colour depicts sex (pink = female, blue = male), node shape depicts reproductive status (circle = sexually active, triangle = not sexually active), node size depicts body weight (larger = heavier), node label depicts individual IDs, edge width depicts the number of contacts (wider = more contacts).

### Density = 80



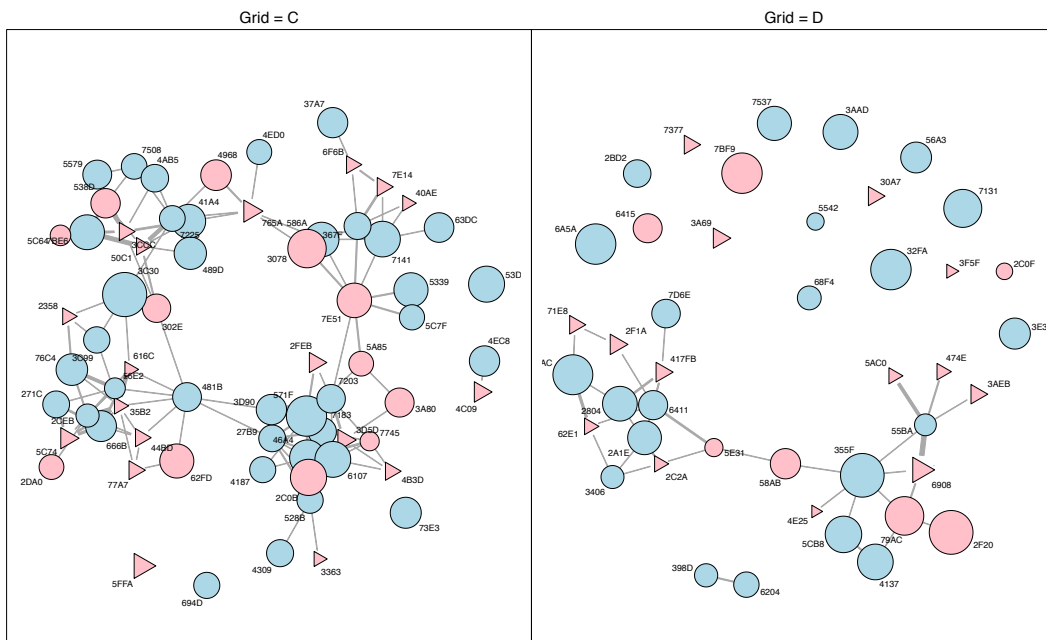
**Figure A11.** Social networks for  $N = 80$ , divided per density treatment. Node colour depicts sex (pink = female, blue = male), node shape depicts reproductive status (circle = sexually active, triangle = not sexually active), node size depicts body weight (larger = heavier), node label depicts individual IDs, edge width depicts the number of contacts (wider = more contacts).

### Density = 100



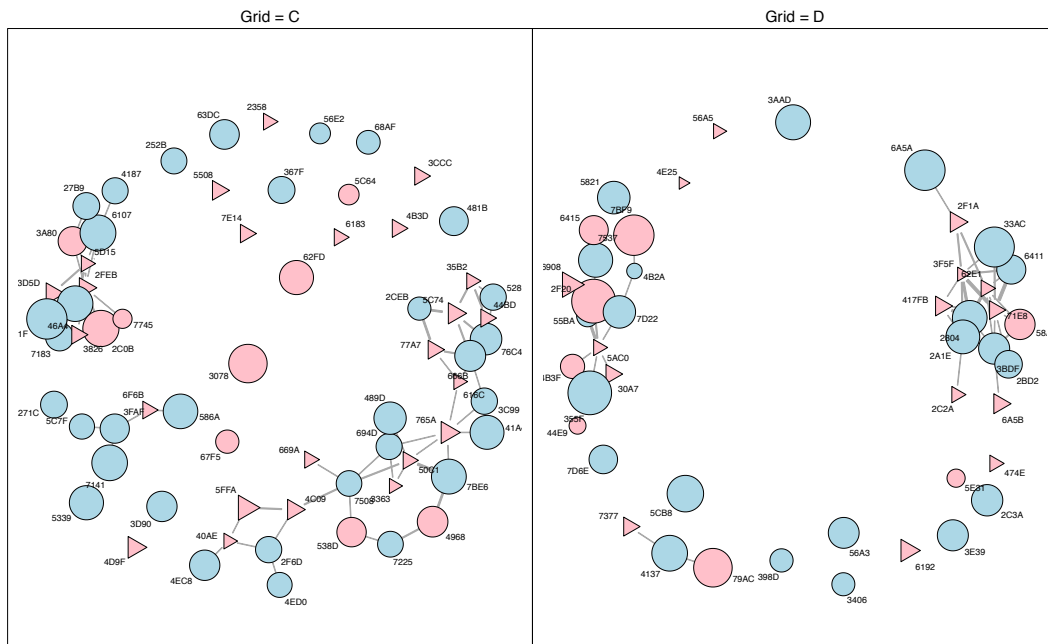
**Figure A12.** Social networks for  $N = 100$ , divided per density treatment. Node colour depicts sex (pink = female, blue = male), node shape depicts reproductive status (circle = sexually active, triangle = not sexually active), node size depicts body weight (larger = heavier), node label depicts individual IDs, edge width depicts the number of contacts (wider = more contacts).

### Density = 120



**Figure A13.** Social networks for  $N = 120$ , divided per density treatment. Node colour depicts sex (pink = female, blue = male), node shape depicts reproductive status (circle = sexually active, triangle = not sexually active), node size depicts body weight (larger = heavier), node label depicts individual IDs, edge width depicts the number of contacts (wider = more contacts).

Density = 136



**Figure A14.** Social networks for  $N = 136$ , divided per density treatment. Node colour depicts sex (pink = female, blue = male), node shape depicts reproductive status (circle = sexually active, triangle = not sexually active), node size depicts body weight (larger = heavier), node label depicts individual IDs, edge width depicts the number of contacts (wider = more contacts).

5. Activity time

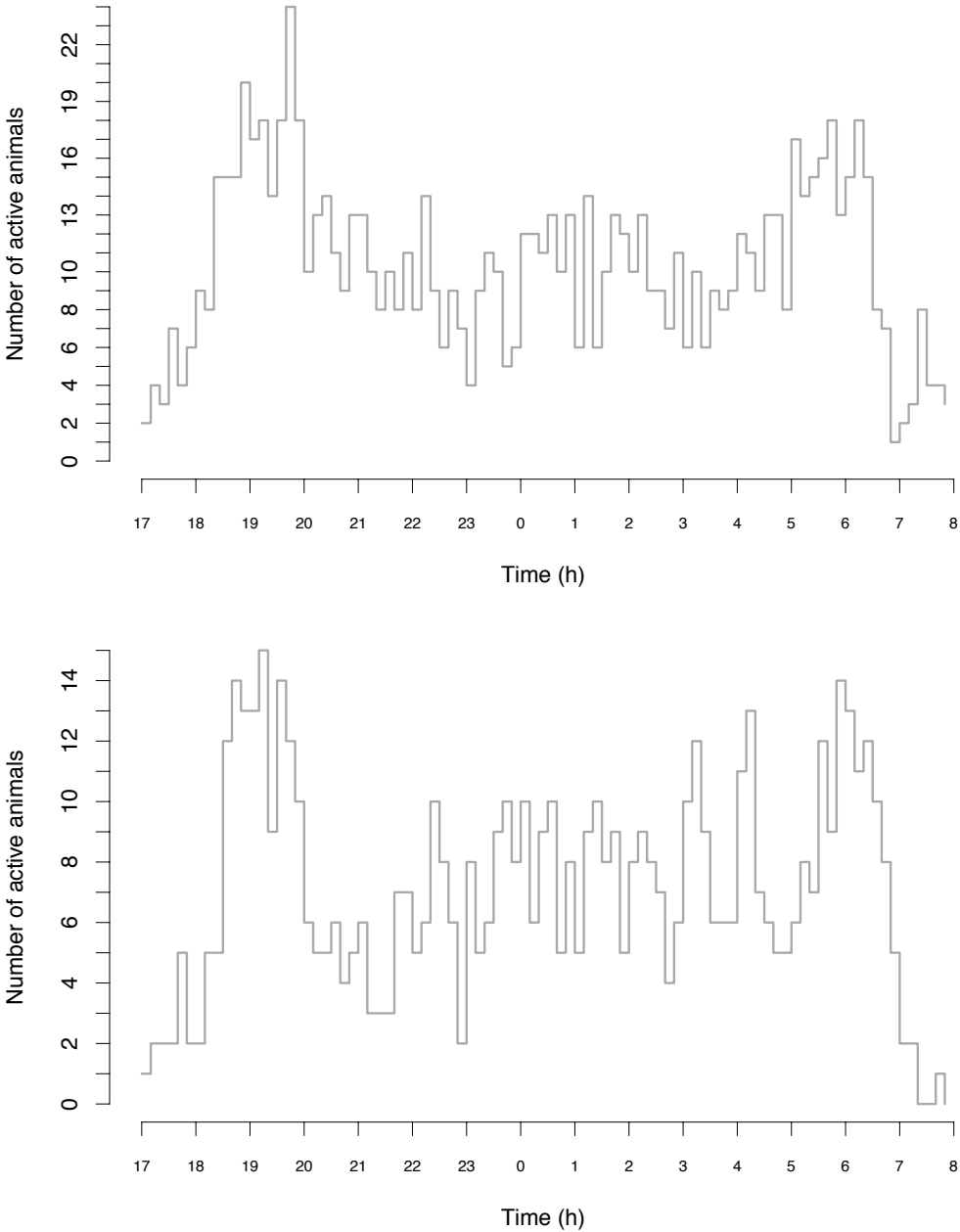


Figure A15. Activity plots for N = 136, enclosure C (top) and D (bottom), showing the number of active animals within 10-min blocks.