

1 **Supplemental File S4. Spatial distribution during instances of high bunching**

2 For completeness, here we compare the space-use intensity distribution and median position of
3 the full herd over the entire study period to instances of high bunching according to each
4 bunching metric separately (the lowest 10% of values for any bunching metric, see Section
5 ‘Bunching and Barn Location’ in main paper for details; $n = 127$ hours).

6 During instances of high bunching, the median position of the herd according to each bunching
7 metric ($x = 31.68$ m to 33.22 and $y = 4.43$ m to 4.60 m; Supplemental Table A4.1) is similar to
8 the median position of the herd across the entire study period ($x = 31.77$ m and $y = 4.52$ m, Fig
9 6A in main text), and during instances of high bunching according to all the bunching metrics
10 combined ($n = 127$ hours; $x = 31.98$ m and $y = 4.63$ m, Fig 6B in main text).

11 The space-use distributions of the herd during instances of high bunching according to each
12 bunching metric are similar (Supplemental Figure S4.1), except for in the case of ICD where
13 the core range extends further into the feeding zone (Supplemental Figure S4.1C).

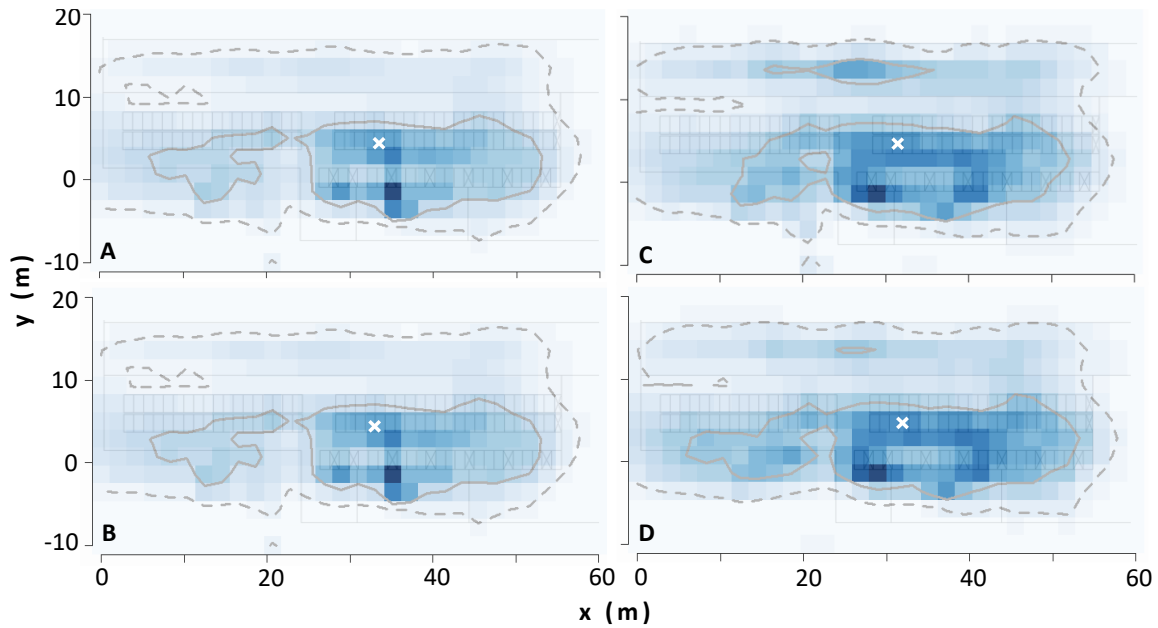
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15 **Supplemental Table S4.1.** The median position of the herd during instances of high bunching,
16 according to each bunching metric ($n = 127$ hours per metric)¹

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Metric	Median position (x, y) (m)
Core range	33.24, 4.41
Full range	33.06, 4.30
Intercow distance	31.71, 4.73
Nearest neighbor distance	31.87, 4.60

18 ¹Bunching metrics: CR = core range, FR = full range, ICD = intercow distance, NND = nearest-
19 neighbor distance.



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 21 **Supplemental Figure S4.1.** Aggregated space-use distribution for the full herd during the highest hours
 22 of bunching defined as the lowest 10% of any bunching metric: (A) core range, (B) full range, (C)
 23 intercow distance and (D) nearest neighbor distance ($n = 127$ hours per metric). The median positions
 24 are marked with a white cross. A color gradient represents the average per 2.25-m² virtual cell, with
 25 lighter shades of blue indicating areas of low density or space-use, whereas darker shades of blue
 26 indicating areas of high density. The highest density 2.25-m² cells cumulatively adding to 50% (core
 27 range) and 95% (full range) are shown within a solid grey boundary and a dashed grey boundary,
 28 respectively. Milking times are not included in any of the calculations. The non-feeding zone is where
 29 $1.62 \text{ m} \leq y \leq 10.5 \text{ m}$, $-1.6 \text{ m} \leq x \leq 58.6 \text{ m}$ and the feeding zone is where $10.5 \text{ m} \leq y \leq 17.2 \text{ m}$.