# Appendix A: PM Sampling Schedule

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## A.1 Overall Sampling Schedule

### Table A-1. Open Source Sampling Schedule by Monitoring Period

| Site | Phase[1] | Source Type | Manure Collection | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IA3A | Finisher | Basin | PP[4] | | 8/30/07 – 9/26/07 | 12/19/07 – 1/15/08 | 5/16/08 - 5/31/08 | 6/1/08 - 6/24/08 | 11/14/08 - 11/30/08 | 12/1/08 - 12/16/08 | 4/8/09 - 4/23/09 | 7/28/09 - 8/18/09 | |
| IN4A | Sow | Lagoon | PPR[3] | 6/19/07 – 8/31/07 | 9/1/07 – 11/30/07 | 12/1/07 – 3/5/08 | 3/6/08 - 6/6/08 | 6/7/08 - 7/16/08 | | | | | |
| NC3A | Finisher | Lagoon | Flush | | 10/24/07 – 11/7/07 | 2/13/08 – 3/5/08 | 3/6/08 - 3/26/08 | | 9/25/08 - 10/14/08 | 2/4/09 - 2/23/09 | 5/12/09 - 6/2/09 | 6/2/09 - 6/22/09 | 9/24/09 - 12/1/09 |
| NC4A[5] | Sow | Lagoon[2] | Flush | | 10/4/07 – 10/22/07 | 1/29/08 – 2/11/08 | 3/31/08 - 4/16/08 | 8/13/08 - 9/2/08 | 9/4/08 - 9/23/08 | 1/14/09 - 2/2/09 | 4/28/09 - 5/11/09 | 7/1/09 - 7/21/09 | |
| OK3A | Finisher | Lagoon | PPR | | 8/30/07 – 9/18/07 | 1/24/08 – 2/19/08 | 5/7/08 - 5/29/08 | 5/29/08 - 6/10/08 | 11/5/08 - 12/2/08 | 12/2/08 - 12/16/08 | 4/23/09 - 5/14/09 | 7/15/09 - 8/4/09 | |
| OK4A[5] | Sow | Lagoon | PPR | 6/27/07 – 8/29/07 | 11/7/07 – 11/27/07 | 11/28/07 – 12/18/07 | 4/23/08 - 5/6/08 | | 10/1/08 - 10/15/08 | 1/8/09 - 1/27/09 | 4/1/09 - 4/21/09 | 6/25/09 - 7/14/09 | |

[1] Characterizes type of farm.
[2] Lagoon can be single or double stage.
[3] PPR = pull plug with recharge
[4] PP= pull plug
[5] Area site that also had barns sites

## A.2 PM Sampling Schedule

### Table A-2. PM Sampling Schedule IA4B

| Start Date | End Date | $PM_{10}$ Test Duration (d) | TSP Test Duration (d) | $PM_{2.5}$ Test Duration (d) |
|---|---|---|---|---|
| 9/28/07 | 1/17/08 | 111.6 | | |
| 1/17/08 | 2/7/08 | | | 21.1 |
| 2/7/08 | 4/10/08 | 62.9 | | |
| 4/10/08 | 4/24/08 | | 13.9 | |
| 4/24/08 | 6/12/08 | 49.1 | | |
| 6/12/08 | 6/18/08 | | 6.0 | |
| 6/18/08 | 7/10/08 | 22.0 | | |
| 7/10/08 | 7/23/08 | | | 12.9 |
| 7/23/08 | 9/12/08 | 50.9 | | |
| 9/12/08 | 9/18/08 | | 6.0 | |
| 9/18/08 | 11/13/08 | 56.0 | | |
| 11/13/08 | 11/21/08 | | 8.0 | |
| 11/21/08 | 1/29/09 | 68.0 | | |
| 1/29/09 | 2/12/09 | | | 13.0 |
| 2/12/09 | 2/19/09 | | 7.4 | |
| 2/19/09 | 4/16/09 | 57.0 | | |
| 4/16/09 | 4/23/09 | | 6.9 | |
| 4/23/09 | 6/18/09 | 56.1 | | |
| 6/18/09 | 6/25/09 | | 7.1 | |
| 6/25/09 | 7/16/09 | 20.8 | | |
| 7/16/09 | 7/30/09 | | | 14.2 |
| 7/30/09 | 9/30/09 | 62.3 | | |
| Totals | | 617 | 55 | 61 |

## Table A-3. PM Sampling Schedule IN3B

| Start Date | End Date | $PM_{10}$ Test Duration (d) | TSP Test Duration (d) | $PM_{2.5}$ Test Duration (d) |
|---|---|---|---|---|
| 7/13/07 | 10/2/07 | 81.0 | | |
| 10/2/07 | 10/10/07 | | 7.9 | |
| 10/10/07 | 12/11/07 | 62.0 | | |
| 12/11/07 | 12/19/07 | | 8.0 | |
| 12/19/07 | 1/10/08 | 22.0 | | |
| 1/10/08 | 1/24/08 | | | 13.9 |
| 4/23/08 | 5/7/08 | | 14.0 | |
| 5/7/08 | 6/30/08 | 53.9 | | |
| 6/30/08 | 7/7/08 | | 7.1 | |
| 7/7/08 | 9/22/08 | 77.2 | | |
| 9/22/08 | 10/8/08 | | | 16.0 |
| 10/8/08 | 10/17/08 | 8.7 | | |
| 10/17/08 | 10/21/08 | | | 4.0 |
| 10/21/08 | 10/28/08 | | 7.1 | |
| 10/28/08 | 12/8/08 | 40.9 | | |
| 10/28/08 | 10/31/08 | 2.9 | | |
| 10/31/08 | 11/3/08 | | | 3.0 |
| 11/3/08 | 11/14/08 | | 10.9 | |
| 11/14/08 | 12/8/08 | 24.0 | | |
| 12/8/08 | 12/11/08 | | 3.0 | |
| 12/8/08 | 12/15/08 | | 6.8 | |
| 12/15/08 | 12/18/08 | | | 3.0 |
| 12/11/08 | 2/4/09 | 55.1 | | |
| 2/4/09 | 2/12/09 | | | 8.1 |
| 2/12/09 | 3/9/09 | 24.9 | | |
| 3/9/09 | 3/11/09 | | | 2.0 |
| 3/11/09 | 3/23/09 | | 12.0 | |
| 3/23/09 | 3/27/09 | | | 3.9 |
| 3/27/09 | 6/1/09 | 66.1 | | |
| 6/1/09 | 6/4/09 | | 3.0 | |
| 6/4/09 | 7/1/09 | 26.8 | | |
| 7/1/09 | 7/13/09 | | | 12.2 |
| 7/13/09 | 7/14/09 | 0.7 | | |
| 7/14/09 | 7/14/09 | | 0.3 | |
| 7/14/09 | 7/20/09 | | | 5.9 |
| 7/20/09 | 7/24/09 | | 4.1 | |

## Table A-4. PM Sampling Schedule NC3B

| Start Date | End Date | $PM_{10}$ Test Duration (d) | TSP Test Duration (d) | $PM_{2.5}$ Test Duration (d) |
|---|---|---|---|---|
| 12/4/07 | 5/31/08 | 179.5 | | |
| 5/31/08 | 6/7/08 | | 6.9 | |
| 6/7/08 | 6/15/08 | | | 8.0 |
| 6/15/08 | 10/5/08 | 112.1 | | |
| 10/5/08 | 10/19/08 | | | 13.9 |
| 10/19/08 | 2/22/09 | 126.1 | | |
| 2/22/09 | 2/27/09 | | 5.1 | |
| 2/27/09 | 4/4/09 | 35.8 | | |
| 4/4/09 | 4/19/09 | | | 15.0 |
| 4/19/09 | 4/25/09 | 6.0 | | |
| 4/25/09 | 5/3/09 | | 7.9 | |
| 5/3/09 | 6/21/09 | 49.1 | | |
| 6/21/09 | 6/27/09 | | 6.0 | |
| 6/27/09 | 7/26/09 | 28.9 | | |
| 7/26/09 | 8/8/09 | | | 13.2 |
| 8/8/09 | 8/27/09 | | 19.0 | |
| 8/27/09 | 11/28/09 | 93.0 | | |
| 11/28/09 | 12/2/09 | | | 4.0 |
| 12/2/09 | 12/26/09 | | 24.0 | |
| 12/26/09 | 1/1/10 | 5.5 | | |

## Table A-5. PM Sampling Schedule NC4B

| Start Date | End Date | $PM_{10}$ Test Duration (d) | TSP Test Duration (d) | $PM_{2.5}$ Test Duration (d) |
|---|---|---|---|---|
| 12/15/07 | 1/16/08 | 32.6 | | |
| 1/16/08 | 1/31/08 | | 14.9 | |
| 1/31/08 | 9/29/08 | 242.1 | | |
| 9/29/08 | 10/5/08 | 5.9** | | |
| 9/29/08 | 10/5/08 | | | 5.9* |
| 10/5/08 | 10/23/08 | | | 19.1 |
| 10/23/08 | 1/15/09 | 97.1 | | |
| 1/15/09 | 1/19/09 | 4.2** | | |
| 1/15/09 | 1/19/09 | | 4.2* | |
| 1/19/09 | 1/23/09 | | 3.8 | |
| 1/23/09 | 1/27/09 | | 4.0** | |
| 1/23/09 | 1/27/09 | 4.0* | | |
| 1/27/09 | 4/7/09 | 69.8 | | |
| 4/7/09 | 4/21/09 | | | 14.0 |
| 4/21/09 | 4/28/09 | | 7.0 | |
| 4/30/09 | 6/29/09 | 61.9 | | |
| 6/29/09 | 7/11/09 | | 11.8 | |
| 7/11/09 | 8/5/09 | 24.9 | | |
| 8/5/09 | 8/6/09 | 1.1* | | |
| 8/5/09 | 8/6/09 | | 1.1** | |
| 8/6/09 | 8/25/09 | | 19.0 | |
| 8/25/09 | 10/14/09 | 49.8 | | |
| 10/14/09 | 10/27/09 | | 13.0 | |
| 10/27/09 | 12/2/09 | 36.2 | | |
| 12/2/09 | 12/15/09 | | | 13.0 |
| | Total | 614 | 70 | 46 |

All except inlet
*Only inlet

## Table A-6. PM Sampling Schedule OK4B

| Start Date | End Date | $PM_{10}$ Test Duration (d) | TSP Test Duration (d) | $PM_{2.5}$ Test Duration (d) |
|---|---|---|---|---|
| 7/20/07 | 8/8/07 | | 19.5 | |
| 8/8/07 | 9/6/07 | 28.9 | | |
| 9/6/07 | 9/11/07 | 5.2† | | |
| 9/6/07 | 9/11/07 | | | 5.0‡ |
| 9/11/07 | 9/28/07 | | | 16.8 |
| 9/28/07 | 10/22/07 | | | 24.1† |
| 9/28/07 | 10/22/07 | 24.1‡ | | |
| 10/22/07 | 11/6/07 | 15.0 | | |
| 11/6/07 | 11/13/07 | | 6.9 | |
| 11/13/07 | 1/15/08 | 62.9 | | |
| 1/15/08 | 1/31/08 | | | 16.0 |
| 1/31/08 | 2/7/08 | | 6.7 | |
| 2/7/08 | 4/7/08 | 59.9 | | |
| 4/7/08 | 4/14/08 | | 7.0 | |
| 4/14/08 | 6/25/08 | 71.9 | | |
| 6/25/08 | 7/16/08 | | 20.7 | |
| 7/16/08 | 7/24/08 | 8.0 | | |
| 7/24/08 | 8/7/08 | | | 14.0 |
| 8/7/08 | 9/12/08 | 35.8 | | |
| 9/12/08 | 9/24/08 | | 11.8 | |
| 9/24/08 | 12/3/08 | 70.0 | | |
| 12/3/08 | 12/12/08 | | 9.0 | |
| 12/12/08 | 2/5/09 | 54.9 | | |
| 2/5/09 | 2/18/09 | | 13.0 | |
| 2/18/09 | 4/8/09 | 49.0 | | |
| 4/8/09 | 4/15/09 | | 6.8 | |
| 4/15/09 | 6/10/09 | 55.8 | | |
| 6/10/09 | 6/18/09 | | 8.0 | |
| 6/18/09 | 7/24/09 | 35.5 | | |
| | Total | 576.7 | 109.3 | 75.9 |

†Only B3; ‡All except B3

# Appendix B: Data Processing

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## B.1 Confinement Data Processing

### B.1.1 Excessive Negative Removal in Confinement Data

Section 6.1.1 of the overview report outlined noted one step of data processing was to remove excess negatives. The cutoffs used for each pollutant for each swine confinement site are listed in Table B-1, with the counts of negative daily emission values removed in Table B-2. As noted in section 2.1.1 of this report, most datasets did not have any daily averages removed as excessive negatives. Removals only occurred in the farrowing $NH_3$ dataset, grow-finish $PM_{10}$ dataset, and the $PM_{2.5}$ dataset for both gestation and grow-finish barns. These removals represent less than 1% of the farrowing $NH_3$ dataset. Less than 1% of the grow-finish $PM_{10}$ dataset, and 3% and 7% of the gestation and grow-finish $PM_{2.5}$ datasets, respectively.

**Table B-1. Summary of the negative emission cut-off applied to swine barn emissions data.**

| Pollutant | Units | Farrowing Room | Gestation barns | Grow-Finish barns |
|---|---|---|---|---|
| $NH_3$ | kg/d | -0.06 | -2.70039 | -1.565 |
| $H_2S$ | g/d | -20.14 | -213.282 | -45.053 |
| $PM_{10}$ | g/d | -9.84 | -123.078 | -53.050 |
| $PM_{2.5}$ | g/d | -0.74 | -13.197 | -3.546 |
| TSP | g/d | -27.83 | -218.97 | -210.894 |

**Table B-2. Number of daily emission values removed from swine barn emissions data.**

| Site | Pollutant | Number of Days removed |
|---|---|---|
| IA4BF | $NH_3$ | 2 |
| NC4BF | $NH_3$ | 1 |
| OK4BB1 | $PM_{2.5}$ | 3 |
| OK4BB2 | $PM_{2.5}$ | 3 |
| IN3BR7 | $PM_{10}$ | 1 |
| IN3BR5 | $PM_{2.5}$ | 3 |
| IN3BR6 | $PM_{2.5}$ | 6 |
| IN3BR7 | $PM_{2.5}$ | 9 |
| IN3BR8 | $PM_{2.5}$ | 1 |

## B.2 Comparison between the 2010 and Revised Barn Data Sets

Section 2.2 of this report compares the original 2010 dataset to the data set that includes all reprocessing applied to the data. A full comparison of the original dataset to the revised dataset for $NH_3$ (Table B-3), $H_2S$ (Table B-4), $PM_{10}$ (Table B-5), $PM_{2.5}$ (Table B-6), and TSP (Table B-7) follow.

## Table B-3. Summary of the effect of applying the revisions to swine barn $NH_3$ emissions (kg/d) data.

| Site - Dataset | Mean | Std Dev | Median | Minimum | Maximum | N | N<0 | CV (%) |
|---|---|---|---|---|---|---|---|---|
| IA4B F9 - Original data set | 0.24 | 0.20 | 0.20 | -0.16 | 1.74 | 528 | 1 | 0.83 |
| IA4B F9 - Revised dataset | 0.25 | 0.21 | 0.21 | 0.01 | 1.77 | 511 | 0 | 0.81 |
| Difference | 5.7% | 3.6% | 7.1% | -106.3% | 1.7% | -3.2% | -100.0% | -2.0% |
| NC4B F15 - Original data set | 0.14 | 0.06 | 0.13 | -0.10 | 0.36 | 410 | 3 | 0.43 |
| NC4B F15 - Revised dataset | 0.13 | 0.06 | 0.12 | -0.01 | 0.36 | 514 | 1 | 0.44 |
| Difference | -5.2% | -3.1% | -6.2% | -94.7% | 0.9% | 25.4% | -66.7% | 2.2% |
| OK4B F9 - Original data set | 0.46 | 0.14 | 0.46 | 0.10 | 1.03 | 571 | 0 | 0.31 |
| OK4B F9 - Revised dataset | 0.51 | 0.15 | 0.50 | 0.08 | 1.04 | 487 | 0 | 0.29 |
| Difference | 10.6% | 2.0% | 9.8% | -22.3% | 0.8% | -14.7% | 0.0% | -7.8% |
| IA4BB1 - Original dataset | 31.33 | 25.15 | 21.90 | 6.10 | 109.00 | 379 | 0 | 0.80 |
| IA4BB1 - Revised dataset | 31.49 | 25.34 | 21.99 | 6.14 | 110.24 | 378 | 0 | 0.80 |
| Difference | 0.5% | 0.8% | 0.4% | 0.7% | 1.1% | -0.3% | 0.0% | 0.3% |
| IA4BB2 - Original dataset | 20.12 | 10.07 | 20.40 | 3.66 | 59.00 | 433 | 0 | 0.50 |
| IA4BB2 - Revised dataset | 20.41 | 10.25 | 20.51 | 5.45 | 60.01 | 432 | 0 | 0.50 |
| Difference | 1.5% | 1.8% | 0.5% | 48.9% | 1.7% | -0.2% | 0.0% | 0.3% |
| NC4BB1 - Original dataset | 5.87 | 2.15 | 5.59 | -0.99 | 11.90 | 419 | 1 | 0.37 |
| NC4BB1 - Revised dataset | 5.58 | 1.82 | 5.37 | -0.89 | 11.14 | 554 | 1 | 0.33 |
| Difference | -4.9% | -15.1% | -3.9% | -9.9% | -6.4% | 32.2% | 0.0% | -10.7% |
| NC4BB2 - Original dataset | 7.25 | 2.62 | 7.26 | 0.43 | 15.70 | 444 | 0 | 0.36 |
| NC4BB2 - Revised dataset | 6.80 | 2.19 | 6.79 | 0.15 | 12.95 | 578 | 0 | 0.32 |
| Difference | -6.2% | -16.5% | -6.5% | -65.4% | -17.5% | 30.2% | 0.0% | -11.0% |
| OK4BB1 - Original dataset | 10.83 | 2.16 | 10.40 | 6.85 | 21.60 | 612 | 0 | 0.20 |
| OK4BB1 - Revised dataset | 10.80 | 2.14 | 10.35 | 6.88 | 21.39 | 610 | 0 | 0.20 |
| Difference | -0.3% | -1.1% | -0.5% | 0.4% | -1.0% | -0.3% | 0.0% | -0.8% |
| OK4BB2 - Original dataset | 11.25 | 1.47 | 11.20 | 6.94 | 16.30 | 581 | 0 | 0.13 |
| OK4BB2 - Revised dataset | 11.23 | 1.43 | 11.14 | 6.93 | 17.03 | 579 | 0 | 0.13 |
| Difference | -0.2% | -3.1% | -0.5% | -0.2% | 4.5% | -0.3% | 0.0% | -3.0% |
| IN3BR5 - Original dataset | 7.35 | 2.71 | 7.16 | 0.00 | 17.30 | 375 | 0 | 0.37 |
| IN3BR5 - Revised dataset | 7.50 | 2.68 | 7.30 | 1.95 | 18.70 | 373 | 0 | 0.36 |
| Difference | 2.0% | -1.1% | 2.0% | * | 8.1% | -0.5% | 0.0% | -3.1% |
| IN3BR6 - Original dataset | 7.66 | 2.97 | 7.53 | 0.00 | 16.10 | 340 | 0 | 0.39 |
| IN3BR6 - Revised dataset | 7.87 | 2.78 | 7.64 | 0.01 | 16.00 | 336 | 0 | 0.35 |
| Difference | 2.8% | -6.4% | 1.5% | * | -0.6% | -1.2% | 0.0% | -8.9% |
| IN3BR7 - Original dataset | 6.63 | 3.33 | 7.01 | 0.00 | 23.40 | 334 | 0 | 0.50 |
| IN3BR7 - Revised dataset | 6.74 | 3.31 | 7.21 | 0.00 | 23.32 | 331 | 0 | 0.49 |
| Difference | 1.8% | -0.3% | 2.8% | * | -0.3% | -0.9% | 0.0% | -2.1% |
| IN3BR8 - Original dataset | 6.23 | 3.63 | 6.79 | 0.00 | 25.50 | 337 | 0 | 0.58 |
| IN3BR8 - Revised dataset | 6.93 | 3.16 | 7.23 | 0.56 | 25.29 | 307 | 0 | 0.46 |
| Difference | 11.3% | -13.1% | 6.5% | * | -0.8% | -8.9% | 0.0% | -21.9% |
| NC3BB1 - Original dataset | 5.49 | 2.54 | 5.26 | 0.81 | 15.00 | 528 | 0 | 0.46 |
| NC3BB1 - Revised dataset | 5.20 | 2.53 | 4.79 | 0.75 | 14.90 | 571 | 0 | 0.49 |
| Difference | -5.4% | -0.4% | -9.0% | -7.8% | -0.7% | 8.1% | 0.0% | 5.3% |
| NC3BB2 - Original dataset | 5.24 | 1.93 | 5.10 | 1.16 | 11.70 | 510 | 0 | 0.37 |
| NC3BB2 - Revised dataset | 4.97 | 1.94 | 4.95 | 0.83 | 10.66 | 561 | 0 | 0.39 |
| Difference | -5.2% | 0.5% | -2.9% | -28.5% | -8.9% | 10.0% | 0.0% | 6.0% |
| NC3BB3 - Original dataset | 5.64 | 2.06 | 5.45 | 0.88 | 13.10 | 451 | 0 | 0.37 |
| NC3BB3 - Revised dataset | 5.00 | 2.16 | 4.93 | 0.64 | 11.93 | 556 | 0 | 0.43 |
| Difference | -11.4% | 4.5% | -9.5% | -27.8% | -8.9% | 23.3% | 0.0% | 18.0% |

## Table B-4. Summary of the effect of applying the revisions to swine barn $H_2S$ emissions (g/d) data.

| Site - Dataset | Mean | Std Dev | Median | Minimum | Maximum | N | N<0 | CV |
|---|---|---|---|---|---|---|---|---|
| IA4B F9 - Original data set | 89.70 | 168.64 | 17.65 | 0.35 | 1180.00 | 566 | 0 | 1.88 |
| IA4B F9 - Revised dataset | 91.04 | 170.01 | 18.17 | 0.26 | 1183.47 | 550 | 0 | 1.87 |
| Difference | 1.5% | 0.8% | 2.9% | -25.7% | 0.3% | -2.8% | 0.0% | -0.7% |
| NC4B F15 - Original data set | 142.65 | 92.02 | 131.00 | 0.00 | 403.00 | 447 | 0 | 0.65 |
| NC4B F15 - Revised dataset | 131.81 | 90.38 | 118.00 | 1.61 | 483.38 | 562 | 0 | 0.69 |
| Difference | -7.6% | -1.8% | -9.9% | * | 19.9% | 25.7% | 0.0% | 6.3% |
| OK4B F9 - Original data set | 90.88 | 74.81 | 78.50 | -0.63 | 294.00 | 584 | 1 | 0.82 |
| OK4B F9 - Revised dataset | 103.29 | 81.48 | 91.70 | -1.86 | 351.92 | 498 | 2 | 0.79 |
| Difference | 13.7% | 8.9% | 16.8% | 195.1% | 19.7% | -14.7% | 100.0% | -4.2% |
| IA4BB1 - Original dataset | 8585.22 | 5654.86 | 7040.00 | 1900.00 | 27100.00 | 391 | 0 | 0.66 |
| IA4BB1 - Revised dataset | 8591.20 | 5658.22 | 7040.00 | 1900.00 | 27070.00 | 391 | 0 | 0.66 |
| Difference | 0.1% | 0.1% | 0.0% | 0.0% | -0.1% | 0.0% | 0.0% | 0.0% |
| IA4BB2 - Original dataset | 5721.81 | 3569.99 | 5100.00 | 1320.00 | 42500.00 | 464 | 0 | 0.62 |
| IA4BB2 - Revised dataset | 5735.75 | 3572.42 | 5100.00 | 1320.00 | 42530.00 | 463 | 0 | 0.62 |
| Difference | 0.2% | 0.1% | 0.0% | 0.0% | 0.1% | -0.2% | 0.0% | -0.2% |
| NC4BB1 - Original dataset | 293.64 | 236.21 | 228.00 | 0.00 | 1360.00 | 452 | 0 | 0.80 |
| NC4BB1 - Revised dataset | 278.85 | 213.07 | 217.38 | -27.24 | 1366.48 | 592 | 2 | 0.76 |
| Difference | -5.0% | -9.8% | -4.7% | * | 0.5% | 31.0% | * | -5.0% |
| NC4BB2 - Original dataset | 239.80 | 211.54 | 164.50 | 17.80 | 1310.00 | 486 | 0 | 0.88 |
| NC4BB2 - Revised dataset | 219.79 | 189.90 | 155.60 | -4.56 | 1301.91 | 633 | 1 | 0.86 |
| Difference | -8.3% | -10.2% | -5.4% | -125.6% | -0.6% | 30.2% | * | -2.1% |
| OK4BB1 - Original dataset | 864.07 | 226.85 | 852.00 | 307.00 | 2210.00 | 621 | 0 | 0.26 |
| OK4BB1 - Revised dataset | 862.41 | 225.62 | 853.30 | 297.79 | 2192.53 | 619 | 0 | 0.26 |
| Difference | -0.2% | -0.5% | 0.2% | -3.0% | -0.8% | -0.3% | 0.0% | -0.4% |
| OK4BB2 - Original dataset | 885.48 | 205.51 | 875.00 | 392.00 | 1570.00 | 591 | 0 | 0.23 |
| OK4BB2 - Revised dataset | 884.09 | 203.46 | 875.28 | 451.48 | 1585.17 | 589 | 0 | 0.23 |
| Difference | -0.2% | -1.0% | 0.0% | 15.2% | 1.0% | -0.3% | 0.0% | -0.8% |
| IN3BR5 - Original dataset | 419.27 | 488.97 | 184.00 | -8.58 | 2260.00 | 500 | 3 | 1.17 |
| IN3BR5 - Revised dataset | 418.48 | 479.29 | 189.56 | 0.93 | 2129.88 | 498 | 0 | 1.15 |
| Difference | -0.2% | -2.0% | 3.0% | -110.8% | -5.8% | -0.4% | -100.0% | -1.8% |
| IN3BR6 - Original dataset | 617.97 | 598.31 | 479.00 | 0.00 | 5480.00 | 449 | 0 | 0.97 |
| IN3BR6 - Revised dataset | 624.56 | 590.55 | 488.16 | 0.80 | 5366.17 | 447 | 0 | 0.95 |
| Difference | 1.1% | -1.3% | 1.9% | * | -2.1% | -0.4% | 0.0% | -2.3% |
| IN3BR7 - Original dataset | 400.60 | 505.78 | 163.50 | -1.49 | 2420.00 | 440 | 2 | 1.26 |
| IN3BR7 - Revised dataset | 406.15 | 504.80 | 174.22 | -10.52 | 2376.04 | 438 | 3 | 1.24 |
| Difference | 1.4% | -0.2% | 6.6% | 606.2% | -1.8% | -0.5% | 50.0% | -1.6% |
| IN3BR8 - Original dataset | 637.31 | 627.04 | 363.00 | 0.00 | 3090.00 | 419 | 0 | 0.98 |
| IN3BR8 - Revised dataset | 690.21 | 614.22 | 439.48 | 21.57 | 2975.55 | 386 | 0 | 0.89 |
| Difference | 8.3% | -2.0% | 21.1% | * | -3.7% | -7.9% | 0.0% | -9.6% |
| NC3BB1 - Original dataset | 156.74 | 140.43 | 126.00 | -1.84 | 784.00 | 509 | 2 | 0.90 |
| NC3BB1 - Revised dataset | 144.64 | 131.48 | 118.21 | -2.22 | 712.55 | 555 | 5 | 0.91 |
| Difference | -7.7% | -6.4% | -6.2% | 20.6% | -9.1% | 9.0% | 150.0% | 1.5% |
| NC3BB2 - Original dataset | 170.48 | 142.59 | 140.00 | -51.00 | 737.00 | 494 | 2 | 0.84 |
| NC3BB2 - Revised dataset | 160.68 | 138.25 | 131.48 | -11.16 | 722.54 | 543 | 2 | 0.86 |
| Difference | -5.7% | -3.0% | -6.1% | -78.1% | -2.0% | 9.9% | 0.0% | 2.9% |
| NC3BB3 - Original dataset | 193.13 | 141.10 | 170.50 | -0.86 | 703.00 | 448 | 2 | 0.73 |
| NC3BB3 - Revised dataset | 164.99 | 134.58 | 143.12 | -2.89 | 698.53 | 541 | 2 | 0.82 |
| Difference | -14.6% | -4.6% | -16.1% | 235.8% | -0.6% | 20.8% | 0.0% | 11.6% |

## Table B-5. Summary of the effect of applying the revisions to swine barn $PM_{10}$ emissions (g/d) data.

| Site - Dataset | Mean | Std Dev | Median | Minimum | Maximum | N | N<0 | CV |
|---|---|---|---|---|---|---|---|---|
| IA4B F9 - Original | 28.09 | 16.89 | 26.40 | -0.22 | 91.50 | 399.0 | 1.0 | 0.60 |
| IA4B F9 - Revised | 28.41 | 16.87 | 27.25 | -0.22 | 91.46 | 395.0 | 1.0 | 0.59 |
| Difference | 1.1% | -0.1% | 3.2% | 0.0% | 0.0% | -1.0% | 0.0% | -1.2% |
| NC4B F15 - Original | 30.43 | 15.62 | 29.00 | 0.00 | 74.80 | 181.0 | 0.0 | 0.51 |
| NC4B F15 - Revised | 27.82 | 15.04 | 25.84 | 3.85 | 75.41 | 230.0 | 0.0 | 0.54 |
| Difference | -8.6% | -3.7% | -10.9% | * | 0.8% | 27.1% | 0.0% | 5.3% |
| OK4B F9 - Original | 40.45 | 25.12 | 38.80 | -4.560 | 116.00 | 431.0 | 2.0 | 0.62 |
| OK4B F9 - Revised | 46.21 | 26.67 | 44.43 | -4.565 | 122.13 | 369.0 | 2.0 | 0.58 |
| Difference | 14.2% | 6.2% | 14.5% | 0.1% | 5.3% | -14.4% | 0.0% | -7.1% |
| IA4BB1 - Original dataset | 465.56 | 224.91 | 505.00 | -41.30 | 1020.00 | 359 | 3 | 0.48 |
| IA4BB1 - Revised dataset | 465.54 | 225.02 | 505.01 | -41.33 | 1024.29 | 359 | 3 | 0.48 |
| Difference | 0.0% | 0.0% | 0.0% | 0.1% | 0.4% | 0.0% | 0.0% | 0.0% |
| IA4BB2 - Original dataset | 526.02 | 224.38 | 506.50 | 8.29 | 1080.00 | 342 | 0 | 0.43 |
| IA4BB2 - Revised dataset | 526.88 | 224.15 | 507.57 | 8.29 | 1080.62 | 341 | 0 | 0.43 |
| Difference | 0.2% | -0.1% | 0.2% | 0.0% | 0.1% | -0.3% | 0.0% | -0.3% |
| NC4BB1 - Original dataset | 260.15 | 117.07 | 256.00 | 0.00 | 638.00 | 315 | 0 | 0.45 |
| NC4BB1 - Revised dataset | 251.91 | 101.77 | 244.51 | 32.08 | 642.97 | 379 | 0 | 0.40 |
| Difference | -3.2% | -13.1% | -4.5% | * | 0.8% | 20.3% | 0.0% | -10.2% |
| NC4BB2 - Original dataset | 405.61 | 204.59 | 401.50 | 29.30 | 1100.00 | 256 | 0 | 0.50 |
| NC4BB2 - Revised dataset | 385.23 | 183.92 | 378.43 | 29.57 | 1113.36 | 305 | 0 | 0.48 |
| Difference | -5.0% | -10.1% | -5.7% | 0.9% | 1.2% | 19.1% | 0.0% | -5.3% |
| OK4BB1 - Original dataset | 345.35 | 122.87 | 329.00 | 62.90 | 971.00 | 495 | 0 | 0.36 |
| OK4BB1 - Revised dataset | 345.48 | 122.99 | 329.39 | 62.90 | 971.44 | 494 | 0 | 0.36 |
| Difference | 0.0% | 0.1% | 0.1% | 0.0% | 0.0% | -0.2% | 0.0% | 0.1% |
| OK4BB2 - Original dataset | 493.53 | 152.38 | 483.00 | 93.80 | 1080.00 | 435 | 0 | 0.31 |
| OK4BB2 - Revised dataset | 493.39 | 152.48 | 482.69 | 93.77 | 1076.71 | 434 | 0 | 0.31 |
| Difference | 0.0% | 0.1% | -0.1% | 0.0% | -0.3% | -0.2% | 0.0% | 0.1% |
| IN3BR5 - Original dataset | 211.89 | 117.31 | 200.00 | 14.40 | 624.00 | 303 | 0 | 0.55 |
| IN3BR5 - Revised dataset | 211.02 | 114.54 | 197.87 | 14.56 | 614.93 | 301 | 0 | 0.54 |
| Difference | -0.4% | -2.4% | -1.1% | 1.1% | -1.5% | -0.7% | 0.0% | -2.0% |
| IN3BR6 - Original dataset | 225.77 | 134.30 | 200.00 | -29.70 | 812.00 | 271 | 2 | 0.59 |
| IN3BR6 - Revised dataset | 223.35 | 132.45 | 199.98 | -29.74 | 810.05 | 271 | 2 | 0.59 |
| Difference | -1.1% | -1.4% | 0.0% | 0.1% | -0.2% | 0.0% | 0.0% | -0.3% |
| IN3BR7 - Original dataset | 185.14 | 132.37 | 159.50 | -66.40 | 1200.00 | 296 | 14 | 0.72 |
| IN3BR7 - Revised dataset | 183.89 | 129.51 | 159.23 | -22.30 | 1179.59 | 296 | 15 | 0.70 |
| Difference | -0.7% | -2.2% | -0.2% | -66.4% | -1.7% | 0.0% | 7.1% | -1.5% |
| IN3BR8 - Original dataset | 172.15 | 175.39 | 120.50 | -10.10 | 1120.00 | 230 | 13 | 1.02 |
| IN3BR8 - Revised dataset | 185.19 | 171.15 | 137.65 | -10.15 | 1093.20 | 210 | 12 | 0.92 |
| Difference | 7.6% | -2.4% | 14.2% | 0.5% | -2.4% | -8.7% | -7.7% | -9.3% |
| NC3BB1 - Original dataset | 188.23 | 111.78 | 173.50 | -7.60 | 642.00 | 466 | 2 | 0.59 |
| NC3BB1 - Revised dataset | 189.57 | 112.23 | 174.84 | -7.67 | 645.47 | 466 | 2 | 0.59 |
| Difference | 0.7% | 0.4% | 0.8% | 0.9% | 0.5% | 0.0% | 0.0% | -0.3% |
| NC3BB2 - Original dataset | 187.47 | 110.96 | 164.00 | -5.60 | 568.00 | 427 | 3 | 0.59 |
| NC3BB2 - Revised dataset | 174.25 | 108.74 | 149.23 | -7.01 | 555.41 | 473 | 3 | 0.62 |
| Difference | -7.1% | -2.0% | -9.0% | 25.3% | -2.2% | 10.8% | 0.0% | 5.4% |
| NC3BB3 - Original dataset | 166.78 | 90.99 | 154.00 | 2.30 | 490.00 | 247 | 0 | 0.55 |
| NC3BB3 - Revised dataset | 145.24 | 83.47 | 129.31 | 2.30 | 492.21 | 342 | 0 | 0.57 |
| Difference | -12.9% | -8.3% | -16.0% | 0.0% | 0.5% | 38.5% | 0.0% | 5.3% |

## Table B-6. Summary of the effect of applying the revisions to swine barn $PM_{2.5}$ emissions (g/d) data.

| Site - Dataset | Mean | Std Dev | Median | Minimum | Maximum | N | N<0 | CV |
|---|---|---|---|---|---|---|---|---|
| IA4B F9 - Original | 3.13 | 2.70 | 2.32 | 0.09 | 11.60 | 51 | 0 | 0.86 |
| IA4B F9 - Revised | 3.13 | 2.70 | 2.32 | 0.09 | 11.62 | 51 | 0 | 0.86 |
| Difference | 0.0% | 0.0% | 0.0% | 0.0% | 0.2% | 0.0% | 0.0% | 0.0% |
| NC4B F15 - Original | 2.80 | 1.06 | 2.58 | 1.48 | 5.21 | 21 | 0 | 0.38 |
| NC4B F15 - Revised | 2.54 | 1.01 | 2.24 | 0.96 | 4.70 | 24 | 0 | 0.40 |
| Difference | -9.2% | -5.5% | -13.1% | -35.0% | -9.9% | 14.3% | 0.0% | 4.1% |
| OK4B F9 - Original | 5.20 | 4.49 | 2.15 | 1.26 | 12.90 | 11 | 0 | 0.86 |
| OK4B F9 - Revised | 6.75 | 5.25 | 7.36 | 1.44 | 14.78 | 9 | 0 | 0.78 |
| Difference | 29.8% | 17.1% | 242.1% | 14.2% | 14.6% | -18.2% | 0.0% | -9.8% |
| IA4BB1 - Original dataset | 48.31 | 17.33 | 46.55 | 4.93 | 107.00 | 36 | 0 | 0.36 |
| IA4BB1 - Revised dataset | 48.31 | 17.34 | 46.58 | 4.93 | 107.07 | 36 | 0 | 0.36 |
| Difference | 0.0% | 0.1% | 0.1% | 0.0% | 0.1% | 0.0% | 0.0% | 0.1% |
| IA4BB2 - Original dataset | 52.41 | 28.58 | 50.50 | -5.31 | 117.00 | 39 | 1 | 0.55 |
| IA4BB2 - Revised dataset | 52.41 | 28.58 | 50.55 | -5.31 | 117.15 | 39 | 1 | 0.55 |
| Difference | 0.0% | 0.0% | 0.1% | 0.0% | 0.1% | 0.0% | 0.0% | 0.0% |
| NC4BB1 - Original dataset | 39.34 | 11.98 | 40.50 | 0.20 | 52.00 | 20 | 0 | 0.30 |
| NC4BB1 - Revised dataset | 34.64 | 12.50 | 38.25 | 0.21 | 52.06 | 28 | 0 | 0.36 |
| Difference | -11.9% | 4.4% | -5.6% | 7.5% | 0.1% | 40.0% | 0.0% | 18.5% |
| NC4BB2 - Original dataset | 47.95 | 23.04 | 43.50 | 30.10 | 117.00 | 12 | 0 | 0.48 |
| NC4BB2 - Revised dataset | 40.65 | 17.07 | 37.06 | 23.62 | 116.41 | 25 | 0 | 0.42 |
| Difference | -15.2% | -25.9% | -14.8% | -21.5% | -0.5% | 108.3% | 0.0% | -12.6% |
| OK4BB1 - Original dataset | 27.72 | 19.94 | 28.00 | -27.60 | 94.20 | 43 | 3 | 0.72 |
| OK4BB1 - Revised dataset | 31.29 | 15.43 | 28.13 | 4.50 | 94.18 | 40 | 0 | 0.49 |
| Difference | 12.9% | -22.6% | 0.5% | -116.3% | 0.0% | -7.0% | -100.0% | -31.4% |
| OK4BB2 - Original dataset | 48.98 | 37.90 | 56.65 | -113.00 | 146.00 | 42 | 3 | 0.77 |
| OK4BB2 - Revised dataset | 56.64 | 23.50 | 56.78 | 6.36 | 145.72 | 39 | 0 | 0.41 |
| Difference | 15.6% | -38.0% | 0.2% | -105.6% | -0.2% | -7.1% | -100.0% | -46.4% |
| IN3BR5 - Original dataset | 9.51 | 14.38 | 5.00 | -15.20 | 37.30 | 27 | 5 | 1.51 |
| IN3BR5 - Revised dataset | 8.71 | 9.70 | 4.37 | -2.67 | 29.43 | 29 | 3 | 1.11 |
| Difference | -8.4% | -32.5% | -12.6% | -82.4% | -21.1% | 7.4% | -40.0% | -26.3% |
| IN3BR6 - Original dataset | 5.20 | 17.01 | 2.60 | -36.90 | 30.70 | 27 | 8 | 3.27 |
| IN3BR6 - Revised dataset | 10.96 | 9.68 | 9.75 | -1.56 | 30.68 | 25 | 2 | 0.88 |
| Difference | 110.7% | -43.1% | 275.1% | -95.8% | -0.1% | -7.4% | -75.0% | -73.0% |
| IN3BR7 - Original dataset | -14.88 | 45.92 | 0.70 | -180.00 | 22.20 | 27 | 12 | -3.09 |
| IN3BR7 - Revised dataset | 7.29 | 6.49 | 6.95 | -2.07 | 21.75 | 22 | 3 | 0.89 |
| Difference | -149.0% | -85.9% | 892.9% | -98.9% | -2.0% | -18.5% | -75.0% | -128.9% |
| IN3BR8 - Original dataset | 2.35 | 5.54 | 0.10 | -6.70 | 18.50 | 24 | 10 | 2.35 |
| IN3BR8 - Revised dataset | 3.39 | 5.16 | 0.74 | -3.09 | 16.85 | 27 | 11 | 1.52 |
| Difference | 44.1% | -6.7% | 641.6% | -53.8% | -8.9% | 12.5% | 10.0% | -35.3% |
| NC3BB1 - Original dataset | 24.14 | 8.18 | 24.45 | 9.40 | 45.30 | 48 | 0 | 0.34 |
| NC3BB1 - Revised dataset | 21.46 | 9.49 | 21.82 | 6.55 | 45.56 | 59 | 0 | 0.44 |
| Difference | -11.1% | 16.0% | -10.8% | -30.3% | 0.6% | 22.9% | 0.0% | 30.5% |
| NC3BB2 - Original dataset | 13.40 | 5.10 | 12.50 | 5.50 | 25.30 | 55 | 0 | 0.38 |
| NC3BB2 - Revised dataset | 12.98 | 5.29 | 12.52 | 4.20 | 25.40 | 59 | 0 | 0.41 |
| Difference | -3.1% | 3.6% | 0.1% | -23.6% | 0.4% | 7.3% | 0.0% | 7.0% |
| NC3BB3 - Original dataset | 9.55 | 3.28 | 8.85 | 4.50 | 16.80 | 24 | 0 | 0.34 |
| NC3BB3 - Revised dataset | 8.58 | 3.70 | 7.97 | 3.76 | 17.06 | 33 | 0 | 0.43 |
| Difference | -10.1% | 12.6% | -9.9% | -16.4% | 1.6% | 37.5% | 0.0% | 25.3% |

## Table B-7. Summary of the effect of applying the revisions to swine barn TSP emissions (g/d) data.

| Site - Dataset | Mean | Std Dev | Median | Minimum | Maximum | N | N<0 | CV |
|---|---|---|---|---|---|---|---|---|
| IA4B F9 - Original | 64.72 | 36.79 | 55.00 | 15.30 | 149.00 | 48.00 | 0.00 | 0.57 |
| IA4B F9 - Revised | 67.45 | 36.39 | 60.61 | 15.34 | 148.66 | 45.00 | 0.00 | 0.54 |
| Difference | 4.2% | -1.1% | 10.2% | 0.3% | -0.2% | -6.3% | 0.0% | -5.1% |
| NC4B F15 - Original | 96.23 | 59.70 | 113.00 | 11.30 | 191.00 | 30.00 | 0.00 | 0.62 |
| NC4B F15 - Revised | 90.69 | 60.08 | 89.91 | 11.41 | 192.90 | 33.00 | 0.00 | 0.66 |
| Difference | -5.8% | 0.6% | -20.4% | 1.0% | 1.0% | 10.0% | 0.0% | 6.8% |
| OK4B F9 - Original | 116.76 | 72.32 | 96.80 | 18.70 | 296.00 | 65.00 | 0.00 | 0.62 |
| OK4B F9 - Revised | 125.17 | 83.37 | 100.17 | 18.72 | 317.09 | 58.00 | 0.00 | 0.67 |
| Difference | 7.2% | 15.3% | 3.5% | 0.1% | 7.1% | -10.8% | 0.0% | 7.5% |
| IA4BB1 - Original dataset | 727.74 | 444.94 | 772.00 | 109.00 | 1600.00 | 39 | 0 | 0.61 |
| IA4BB1 - Revised dataset | 727.69 | 445.15 | 772.24 | 109.38 | 1603.84 | 39 | 0 | 0.61 |
| Difference | 0.0% | 0.0% | 0.0% | 0.3% | 0.2% | 0.0% | 0.0% | 0.1% |
| IA4BB2 - Original dataset | 1068.64 | 462.43 | 1130.00 | 318.00 | 2110.00 | 45 | 0 | 0.43 |
| IA4BB2 - Revised dataset | 1068.21 | 462.09 | 1130.09 | 317.62 | 2108.26 | 45 | 0 | 0.43 |
| Difference | 0.0% | -0.1% | 0.0% | -0.1% | -0.1% | 0.0% | 0.0% | 0.0% |
| NC4BB1 - Original dataset | 441.44 | 339.83 | 409.00 | 39.00 | 1500.00 | 35 | 0 | 0.77 |
| NC4BB1 - Revised dataset | 445.44 | 283.21 | 412.91 | 55.92 | 1206.44 | 39 | 0 | 0.64 |
| Difference | 0.9% | -16.7% | 1.0% | 43.4% | -19.6% | 11.4% | 0.0% | -17.4% |
| NC4BB2 - Original dataset | 541.50 | 297.93 | 501.50 | 161.00 | 1170.00 | 32 | 0 | 0.55 |
| NC4BB2 - Revised dataset | 549.74 | 266.59 | 557.65 | 162.18 | 1005.73 | 35 | 0 | 0.48 |
| Difference | 1.5% | -10.5% | 11.2% | 0.7% | -14.0% | 9.4% | 0.0% | -11.9% |
| OK4BB1 - Original dataset | 629.72 | 277.31 | 575.50 | 216.00 | 1260.00 | 88 | 0 | 0.44 |
| OK4BB1 - Revised dataset | 629.64 | 277.23 | 575.40 | 216.09 | 1260.71 | 88 | 0 | 0.44 |
| Difference | 0.0% | 0.0% | 0.0% | 0.0% | 0.1% | 0.0% | 0.0% | 0.0% |
| OK4BB2 - Original dataset | 787.07 | 301.54 | 795.00 | 256.00 | 1550.00 | 81 | 0 | 0.38 |
| OK4BB2 - Revised dataset | 787.30 | 301.80 | 795.42 | 256.36 | 1545.41 | 81 | 0 | 0.38 |
| Difference | 0.0% | 0.1% | 0.1% | 0.1% | -0.3% | 0.0% | 0.0% | 0.1% |
| IN3BR5 - Original dataset | 898.75 | 387.36 | 907.50 | 225.00 | 1670.00 | 24 | 0 | 0.43 |
| IN3BR5 - Revised dataset | 891.94 | 380.60 | 907.27 | 224.57 | 1646.60 | 24 | 0 | 0.43 |
| Difference | -0.8% | -1.7% | 0.0% | -0.2% | -1.4% | 0.0% | 0.0% | -1.0% |
| IN3BR6 - Original dataset | 1092.58 | 281.44 | 1035.00 | 759.00 | 1700.00 | 24 | 0 | 0.26 |
| IN3BR6 - Revised dataset | 1078.95 | 269.34 | 1024.90 | 756.34 | 1661.43 | 24 | 0 | 0.25 |
| Difference | -1.2% | -4.3% | -1.0% | -0.4% | -2.3% | 0.0% | 0.0% | -3.1% |
| IN3BR7 - Original dataset | 978.38 | 284.46 | 983.50 | 436.00 | 1460.00 | 34 | 0 | 0.29 |
| IN3BR7 - Revised dataset | 968.73 | 278.38 | 974.83 | 436.07 | 1450.09 | 34 | 0 | 0.29 |
| Difference | -1.0% | -2.1% | -0.9% | 0.0% | -0.7% | 0.0% | 0.0% | -1.2% |
| IN3BR8 - Original dataset | 1041.55 | 242.41 | 1070.00 | 479.00 | 1310.00 | 22 | 0 | 0.23 |
| IN3BR8 - Revised dataset | 1026.63 | 238.34 | 1061.08 | 479.42 | 1284.23 | 22 | 0 | 0.23 |
| Difference | -1.4% | -1.7% | -0.8% | 0.1% | -2.0% | 0.0% | 0.0% | -0.2% |
| NC3BB1 - Original dataset | 428.77 | 217.66 | 356.00 | 11.00 | 976.00 | 53 | 0 | 0.51 |
| NC3BB1 - Revised dataset | 444.41 | 195.83 | 355.95 | 188.45 | 978.46 | 52 | 0 | 0.44 |
| Difference | 3.6% | -10.0% | 0.0% | 1613.2% | 0.3% | -1.9% | 0.0% | -13.2% |
| NC3BB2 - Original dataset | 410.82 | 283.37 | 327.00 | 6.00 | 1190.00 | 61 | 0 | 0.69 |
| NC3BB2 - Revised dataset | 473.77 | 235.61 | 383.20 | 202.73 | 1158.18 | 52 | 0 | 0.50 |
| Difference | 15.3% | -16.9% | 17.2% | 3278.9% | -2.7% | -14.8% | 0.0% | -27.9% |
| NC3BB3 - Original dataset | 375.30 | 246.46 | 394.00 | 5.00 | 901.00 | 27 | 0 | 0.66 |
| NC3BB3 - Revised dataset | 432.12 | 167.79 | 391.62 | 197.42 | 906.48 | 23 | 0 | 0.39 |
| Difference | 15.1% | -31.9% | -0.6% | 3848.5% | 0.6% | -14.8% | 0.0% | -40.9% |

## B.3 Open Source Data Processing

The 2012 data sets for dairy open sources (lagoons, basins, and corrals) were provided to EPA by the principal investigator for the National Air Emissions Monitoring Study (NAEMS). The datasets contain 30-Minimumute data values for ammonia ($NH_3$), obtained using the backward Lagrangian Stochastics (bLS) model and vertical radial plume mapping (VRPM), and hydrogen sulfide ($H_2S$) emissions, obtained using the bLS model only. The 2012 NAEMS data sets also included 30-Minimumute data values for meteorological conditions (e.g., air temperature, relative humidity) for the dairy lagoon/basin and corral sites and lagoon/basin conditions (e.g., pH).

Section 6.1.2 of Volume 1: Overview Report outlines the process for reviewing the validation criteria (VC) for the open source data. In summary, this analysis adjusted the criteria for touchdown fraction (TD), background concentration (Cbg), and the standard deviation of the wind direction (WD-SD) to develop site specific criteria. All sets of criteria were compared to the strictest set of criteria, referred to as the "reference" criteria. If a set of criteria has summary statistics within 25% of the reference criteria, it was considered as a revised set of criteria. The following sections identify the reference and revised criteria set and provide a summary of the statistical comparison for each sites, for each pollutant. The sec

### B.3.1 $NH_3$

For the $NH_3$ emissions, criteria set 19 (19bLS) was chosen as the reference. Overall, the review of the validation criteria yielded an additional 44 day of valid $NH_3$ daily averages across all the swine lagoons. Table B-8 provides a summary of the number of daily averages gained at each site.

**Table B-8. Summary of the effect of new acceptance criteria on counts of daily average $NH_3$ emission values.**

| Site ID | Draft EPA report | Revised VC | Change in daily values |
|---|---|---|---|
| NC3A | 16 | 25 | +9 |
| OK3A | 64 | 79 | +15 |
| IN4A | 72 | 83 | +11 |
| NC4A | 34 | 35 | +1 |
| OK4A | 73 | 78 | +5 |
| IA3A | 42 | 45 | +3 |

#### B.3.1.1 IA3A

For IA3A, 04bLS (Table B-9) was selected as there was a 32% increase in 30 minute data availability accompanied by a difference in summary statistics, or error from the reference, that ranged from -17 to 7% (Table B-10). There were other criteria sets (Table B-11) with more days; however, this came with larger minimum values and error in the 25$^{th}$ percentile values (q25) that

exceeded the set thresholds for replacement. Similarly, 01bLS (Table B-11) offer the same number of days as the selected criteria set, but had greater error (i.e., differences between the summary statistics).

**Table B-9. Summary of the $NH_3$ reference and revised validation criteria for IA3A.**

| VC Name | VC ID | TD | Cbg | WD-SD | N (Daily BLS+VRPM) |
|---|---|---|---|---|---|
| Reference | 19bls | >0.3 | <0.1 | <30 | 15 |
| Revised | 29bls | >0.15 | <0.15 | | 25 |

**Table B-10. Statistical comparison of the reference and revised validation criteria for $NH_3$ at IA3A.**

| Statistic | Reference (19bls) | Revised EPA (04bls) | Percent Difference |
|---|---|---|---|
| N (30-min) | 1610 | 2124 | 31.925 |
| Mean | 0.062 | 0.062 | -0.401 |
| Std. Dev. | 0.211 | 0.219 | 3.736 |
| CV | 0.308 | 0.33 | 7.081 |
| Minimum | -0.096 | -0.189 | 96.262 |
| Maximum | 2.03 | 2.47 | 21.675 |
| q25 | 0.011 | 0.009 | -17.292 |
| Median | 0.318 | 0.334 | 5.193 |
| q75 | 1.456 | 1.503 | 3.225 |
| N (daily) BLS | 26 | 39 | 33.33 |
| N (daily) BLS+VRPM | 35 | 45 | 22.22 |

**Table B-11. Statistical summary of all validation criteria tested for $NH_3$ at IA3A.**

| Site ID | VC ID | Median | Mean | count | SD | Min | Max | q25 | q75 | CV |
|---|---|---|---|---|---|---|---|---|---|---|
| IA3A | 01bls | 0.060 | 0.214 | 2087 | 0.324 | -0.189 | 2.470 | 0.008 | 0.331 | 1.513 |
| IA3A | 02bls | 0.056 | 0.195 | 1861 | 0.298 | -0.096 | 2.030 | 0.009 | 0.288 | 1.531 |
| IA3A | 03bls | 0.071 | 0.214 | 2867 | 0.341 | -1.010 | 2.470 | 0.007 | 0.342 | 1.594 |
| IA3A | 04bls | 0.062 | 0.219 | 2124 | 0.330 | -0.189 | 2.470 | 0.009 | 0.334 | 1.503 |
| IA3A | 05bls | 0.059 | 0.200 | 1895 | 0.305 | -0.096 | 2.030 | 0.010 | 0.294 | 1.523 |
| IA3A | 06bls | 0.074 | 0.216 | 2949 | 0.342 | -1.010 | 2.470 | 0.008 | 0.342 | 1.585 |
| IA3A | 07bls | 0.055 | 0.192 | 1940 | 0.299 | -0.131 | 2.030 | 0.008 | 0.280 | 1.560 |
| IA3A | 08bls | 0.059 | 0.214 | 2184 | 0.330 | -0.189 | 2.470 | 0.007 | 0.324 | 1.540 |
| IA3A | 09bls | 0.069 | 0.213 | 3003 | 0.353 | -1.560 | 2.470 | 0.004 | 0.345 | 1.659 |
| IA3A | 10bls | 0.056 | 0.197 | 1976 | 0.306 | -0.131 | 2.030 | 0.008 | 0.288 | 1.550 |
| IA3A | 11bls | 0.060 | 0.219 | 2224 | 0.335 | -0.189 | 2.470 | 0.008 | 0.333 | 1.529 |
| IA3A | 12bls | 0.070 | 0.215 | 3088 | 0.354 | -1.560 | 2.470 | 0.005 | 0.344 | 1.648 |
| IA3A | 13bls | 0.055 | 0.191 | 1935 | 0.298 | -0.131 | 2.030 | 0.008 | 0.280 | 1.563 |
| IA3A | 14bls | 0.058 | 0.214 | 2176 | 0.330 | -0.189 | 2.470 | 0.007 | 0.322 | 1.543 |
| IA3A | 15bls | 0.069 | 0.213 | 2991 | 0.353 | -1.560 | 2.470 | 0.004 | 0.345 | 1.659 |
| IA3A | 16bls | 0.056 | 0.197 | 1971 | 0.306 | -0.131 | 2.030 | 0.008 | 0.288 | 1.553 |
| IA3A | 17bls | 0.060 | 0.218 | 2216 | 0.335 | -0.189 | 2.470 | 0.008 | 0.332 | 1.532 |
| IA3A | 18bls | 0.070 | 0.215 | 3076 | 0.354 | -1.560 | 2.470 | 0.005 | 0.344 | 1.648 |

**Table B-11. Statistical summary of all validation criteria tested for $NH_3$ at IA3A.**

| Site ID | VC ID | Median | Mean | count | SD | Min | Max | q25 | q75 | CV |
|---|---|---|---|---|---|---|---|---|---|---|
| **IA3A** | **19bls** | **0.062** | **0.211** | **1610** | **0.308** | **-0.096** | **2.030** | **0.011** | **0.318** | **1.456** |
| IA3A | 20bls | 0.066 | 0.227 | 1818 | 0.327 | -0.189 | 2.470 | 0.009 | 0.356 | 1.441 |
| IA3A | 21bls | 0.085 | 0.222 | 2550 | 0.336 | -1.010 | 2.470 | 0.008 | 0.354 | 1.514 |
| IA3A | 22bls | 0.065 | 0.218 | 1643 | 0.315 | -0.096 | 2.030 | 0.012 | 0.334 | 1.448 |
| IA3A | 23bls | 0.068 | 0.232 | 1854 | 0.333 | -0.189 | 2.470 | 0.010 | 0.360 | 1.432 |
| IA3A | 24bls | 0.089 | 0.224 | 2630 | 0.338 | -1.010 | 2.470 | 0.009 | 0.354 | 1.506 |
| IA3A | 25bls | 0.055 | 0.190 | 1917 | 0.296 | -0.131 | 2.030 | 0.008 | 0.280 | 1.554 |
| IA3A | 26bls | 0.058 | 0.212 | 2155 | 0.325 | -0.189 | 2.470 | 0.007 | 0.321 | 1.536 |
| IA3A | 27bls | 0.069 | 0.210 | 2959 | 0.348 | -1.560 | 2.470 | 0.004 | 0.341 | 1.652 |
| IA3A | 28bls | 0.056 | 0.196 | 1953 | 0.303 | -0.131 | 2.030 | 0.009 | 0.288 | 1.545 |
| IA3A | 29bls | 0.060 | 0.217 | 2195 | 0.330 | -0.189 | 2.470 | 0.008 | 0.332 | 1.526 |
| IA3A | 30bls | 0.070 | 0.213 | 3044 | 0.349 | -1.560 | 2.470 | 0.005 | 0.340 | 1.641 |

### B.3.1.2 NC3A

For NC3A, 29bLS (Table B-12) was selected as the criteria set for $NH_3$ emissions. This criteria set produced a 42% increase in 30 minute data, with the percent difference in summary statistics ranging from -22% to 11%, for all statistics except minimum (Table B-13). The percent difference between the minimum for the two criteria sets is quite large; however, the absolute difference is only 0.173 kg. Criteria set 17bLS (TD>0.1, Cbg <0.15) was also considered, as it had more 30 minute values and the same number of days as 29bLS. However, there were larger percent differences in summary statistics, and therefore more error associated with 17bLS.

**Table B-12. Summary of the $NH_3$ reference and revised validation criteria for NC3A.**

| VC Name | VC ID | TD | Cbg | WD-SD | N (Daily BLS+VRPM) |
|---|---|---|---|---|---|
| Reference | 19bls | >0.3 | <0.1 | <30 | 15 |
| Revised | 29bls | >0.15 | <0.15 | | 25 |

**Table B-13. Statistical comparison of the reference and revised validation criteria for $NH_3$ at NC3A.**

| Statistic | Reference (19bls) | Revised (29bls) | Percent Difference |
|---|---|---|---|
| N (30-min) | 1057 | 1499 | 41.816 |
| Mean | 0.321 | 0.321 | -0.049 |
| Std. Dev. | 0.317 | 0.352 | 11.034 |
| CV | 0.987 | 1.096 | 11.089 |
| Minimum | -0.05 | -0.223 | 348.692 |
| Maximum | 2.73 | 2.9 | 6.227 |
| q25 | 0.102 | 0.08 | -21.912 |
| Median | 0.24 | 0.227 | -5.417 |
| q75 | 0.443 | 0.448 | -0.113 |
| N (daily) BLS | 9 | 21 | 57.14 |
| N (daily) BLS+VRPM | 15 | 25 | 40.00 |

**Table B-14. Statistical summary of all validation criteria tested for $NH_3$ at NC3A.**

| Site ID | VC ID | Median | Mean | count | SD | Min | Max | q25 | q75 | CV |
|---|---|---|---|---|---|---|---|---|---|---|
| NC3A | 01bls | 0.240 | 0.332 | 1307 | 0.344 | -0.130 | 2.730 | 0.096 | 0.448 | 1.038 |
| NC3A | 02bls | 0.244 | 0.325 | 1083 | 0.324 | -0.050 | 2.730 | 0.104 | 0.446 | 0.995 |
| NC3A | 03bls | 0.240 | 0.333 | 1487 | 0.350 | -0.304 | 2.730 | 0.093 | 0.456 | 1.052 |
| NC3A | 04bls | 0.226 | 0.318 | 1459 | 0.344 | -0.130 | 2.900 | 0.081 | 0.440 | 1.081 |
| NC3A | 05bls | 0.235 | 0.317 | 1175 | 0.328 | -0.050 | 2.900 | 0.091 | 0.439 | 1.036 |
| NC3A | 06bls | 0.217 | 0.310 | 1756 | 0.344 | -0.304 | 2.900 | 0.073 | 0.432 | 1.109 |
| NC3A | 07bls | 0.259 | 0.408 | 1191 | 0.543 | -0.223 | 4.690 | 0.112 | 0.477 | 1.331 |
| NC3A | 08bls | 0.263 | 0.426 | 1459 | 0.571 | -0.223 | 5.860 | 0.102 | 0.510 | 1.339 |
| NC3A | 09bls | 0.262 | 0.411 | 1656 | 0.630 | -10.400 | 5.860 | 0.101 | 0.511 | 1.534 |
| NC3A | 10bls | 0.246 | 0.392 | 1291 | 0.533 | -0.223 | 4.690 | 0.095 | 0.463 | 1.360 |
| NC3A | 11bls | 0.241 | 0.402 | 1623 | 0.555 | -0.223 | 5.860 | 0.085 | 0.484 | 1.378 |
| NC3A | 12bls | 0.233 | 0.371 | 1941 | 0.630 | -10.400 | 5.860 | 0.076 | 0.474 | 1.701 |
| NC3A | 13bls | 0.247 | 0.341 | 1137 | 0.370 | -0.223 | 2.860 | 0.103 | 0.448 | 1.086 |
| NC3A | 14bls | 0.247 | 0.351 | 1385 | 0.388 | -0.223 | 2.860 | 0.096 | 0.465 | 1.106 |
| NC3A | 15bls | 0.247 | 0.342 | 1579 | 0.492 | -10.400 | 2.860 | 0.093 | 0.476 | 1.441 |
| NC3A | 16bls | 0.236 | 0.331 | 1232 | 0.371 | -0.223 | 2.900 | 0.090 | 0.444 | 1.120 |
| NC3A | 17bls | 0.231 | 0.335 | 1543 | 0.384 | -0.223 | 2.900 | 0.079 | 0.448 | 1.145 |
| NC3A | 18bls | 0.220 | 0.315 | 1857 | 0.489 | -10.400 | 2.900 | 0.072 | 0.447 | 1.553 |
| **NC3A** | **19bls** | **0.240** | **0.321** | **1057** | **0.317** | **-0.050** | **2.730** | **0.102** | **0.443** | **0.987** |
| NC3A | 20bls | 0.239 | 0.329 | 1278 | 0.340 | -0.130 | 2.730 | 0.094 | 0.448 | 1.033 |
| NC3A | 21bls | 0.238 | 0.331 | 1446 | 0.347 | -0.304 | 2.730 | 0.092 | 0.452 | 1.050 |
| NC3A | 22bls | 0.233 | 0.313 | 1144 | 0.322 | -0.050 | 2.900 | 0.090 | 0.432 | 1.031 |
| NC3A | 23bls | 0.223 | 0.316 | 1425 | 0.340 | -0.130 | 2.900 | 0.079 | 0.434 | 1.079 |
| NC3A | 24bls | 0.214 | 0.308 | 1702 | 0.342 | -0.304 | 2.900 | 0.072 | 0.429 | 1.109 |
| NC3A | 25bls | 0.246 | 0.329 | 1108 | 0.335 | -0.223 | 2.730 | 0.104 | 0.447 | 1.018 |
| NC3A | 26bls | 0.244 | 0.335 | 1344 | 0.354 | -0.223 | 2.730 | 0.095 | 0.452 | 1.055 |
| NC3A | 27bls | 0.244 | 0.337 | 1531 | 0.359 | -0.304 | 2.730 | 0.093 | 0.465 | 1.066 |
| NC3A | 28bls | 0.235 | 0.320 | 1201 | 0.338 | -0.223 | 2.900 | 0.092 | 0.440 | 1.056 |
| NC3A | 29bls | 0.227 | 0.321 | 1499 | 0.352 | -0.223 | 2.900 | 0.080 | 0.443 | 1.096 |
| NC3A | 30bls | 0.219 | 0.314 | 1804 | 0.352 | -0.304 | 2.900 | 0.073 | 0.438 | 1.121 |

### B.3.1.3 OK3A

At OK3A, 17bLS (Table B-15) was selected as there is a 35% increase in 30 minute data availability coupled with a -5 to 16% difference in summary statistics (Table B-16), except for the minimum. The minimum values from both datasets are small and have an absolute difference of 0.22 kg; however, their small size produces a large percent difference. Criteria set 29bLS was also considered, as it had the same number of daily average emission values; N-daily, however, the percent differences between the summary statistics were larger.

**Table B-15. Summary of the $NH_3$ reference and revised validation criteria for OK3A.**

| VC Name | VC ID | TD | Cbg | WD-SD | N (Daily BLS+VRPM) |
|---|---|---|---|---|---|
| Reference | 19bls | >0.3 | <0.1 | <30 | 60 |
| Revised | 17bls | >0.1 | <0.15 | | 79 |

**Table B-16. Statistical comparison of the reference and revised validation criteria for $NH_3$ at OK3A.**

| Statistic | Reference (19bls) | Revised EPA (17bls) | Percent Difference |
|---|---|---|---|
| N (30-min) | 2456 | 3318 | 35.098 |
| Mean | 0.356 | 0.413 | 16.174 |
| Std. Dev. | 0.588 | 0.575 | -2.264 |
| CV | 0.607 | 0.576 | -5.045 |
| Minimum | -0.252 | -0.472 | 87.302 |
| Maximum | 4.8 | 4.8 | 0 |
| q25 | 0.104 | 0.11 | 6.024 |
| Median | 0.936 | 0.886 | -5.318 |
| q75 | 1.031 | 1.002 | -2.845 |
| N (daily) BLS | 44 | 72 | 38.89 |
| N (daily) BLS+VRPM | 60 | 79 | 24.05 |

**Table B-17. Statistical summary of all validation criteria tested for $NH_3$ at OK3A.**

| Site ID | VC | Median | Mean | count | SD | Min | Max | q25 | q75 | CV |
|---|---|---|---|---|---|---|---|---|---|---|
| OK3A | 02bls | 0.357 | 0.581 | 2572 | 0.598 | -0.472 | 4.800 | 0.107 | 0.913 | 1.028 |
| OK3A | 03bls | 0.507 | 0.629 | 3569 | 0.588 | -1.150 | 4.800 | 0.133 | 0.962 | 0.934 |
| OK3A | 04bls | 0.431 | 0.587 | 3174 | 0.581 | -0.472 | 4.800 | 0.112 | 0.907 | 0.989 |
| OK3A | 05bls | 0.354 | 0.580 | 2664 | 0.598 | -0.472 | 4.800 | 0.106 | 0.912 | 1.032 |
| OK3A | 06bls | 0.498 | 0.622 | 3698 | 0.587 | -1.150 | 4.800 | 0.130 | 0.954 | 0.944 |
| OK3A | 07bls | 0.328 | 0.556 | 2791 | 0.592 | -0.949 | 4.800 | 0.097 | 0.879 | 1.066 |
| OK3A | 08bls | 0.395 | 0.563 | 3333 | 0.578 | -2.190 | 4.800 | 0.103 | 0.877 | 1.028 |
| OK3A | 09bls | 0.479 | 0.603 | 3860 | 0.587 | -2.190 | 4.800 | 0.121 | 0.934 | 0.975 |
| OK3A | 10bls | 0.321 | 0.554 | 2889 | 0.592 | -0.949 | 4.800 | 0.096 | 0.877 | 1.069 |
| OK3A | 11bls | 0.389 | 0.561 | 3440 | 0.579 | -2.190 | 4.800 | 0.101 | 0.876 | 1.032 |
| OK3A | 12bls | 0.465 | 0.596 | 3998 | 0.587 | -2.190 | 4.800 | 0.117 | 0.928 | 0.984 |
| OK3A | 13bls | 0.344 | 0.570 | 2687 | 0.592 | -0.472 | 4.800 | 0.104 | 0.889 | 1.040 |
| OK3A | 14bls | 0.418 | 0.578 | 3213 | 0.576 | -0.472 | 4.800 | 0.112 | 0.888 | 0.996 |
| OK3A | 15bls | 0.493 | 0.618 | 3733 | 0.585 | -1.150 | 4.800 | 0.129 | 0.947 | 0.947 |
| OK3A | 16bls | 0.338 | 0.568 | 2784 | 0.593 | -0.472 | 4.800 | 0.102 | 0.888 | 1.044 |
| OK3A | 17bls | 0.413 | 0.575 | 3318 | 0.576 | -0.472 | 4.800 | 0.110 | 0.886 | 1.002 |
| OK3A | 18bls | 0.483 | 0.611 | 3868 | 0.584 | -1.150 | 4.800 | 0.126 | 0.941 | 0.957 |
| **OK3A** | **19bls** | **0.356** | **0.588** | **2456** | **0.607** | **-0.252** | **4.800** | **0.104** | **0.936** | **1.031** |
| OK3A | 20bls | 0.444 | 0.599 | 2929 | 0.589 | -0.291 | 4.800 | 0.111 | 0.939 | 0.983 |
| OK3A | 21bls | 0.516 | 0.637 | 3392 | 0.596 | -1.150 | 4.800 | 0.129 | 0.984 | 0.936 |
| OK3A | 22bls | 0.354 | 0.587 | 2544 | 0.606 | -0.252 | 4.800 | 0.102 | 0.934 | 1.034 |
| OK3A | 23bls | 0.438 | 0.597 | 3025 | 0.589 | -0.291 | 4.800 | 0.110 | 0.935 | 0.988 |

**Table B-17. Statistical summary of all validation criteria tested for $NH_3$ at OK3A.**

| Site ID | VC | Median | Mean | count | SD | Min | Max | q25 | q75 | CV |
|---|---|---|---|---|---|---|---|---|---|---|
| OK3A | 24bls | 0.502 | 0.630 | 3514 | 0.595 | -1.150 | 4.800 | 0.126 | 0.975 | 0.944 |
| OK3A | 25bls | 0.350 | 0.574 | 2631 | 0.595 | -0.472 | 4.800 | 0.106 | 0.897 | 1.036 |
| OK3A | 26bls | 0.425 | 0.583 | 3146 | 0.578 | -0.472 | 4.800 | 0.113 | 0.893 | 0.991 |
| OK3A | 27bls | 0.498 | 0.622 | 3652 | 0.586 | -1.150 | 4.800 | 0.131 | 0.952 | 0.941 |
| OK3A | 28bls | 0.347 | 0.572 | 2726 | 0.595 | -0.472 | 4.800 | 0.104 | 0.892 | 1.040 |
| OK3A | 29bls | 0.420 | 0.581 | 3249 | 0.578 | -0.472 | 4.800 | 0.111 | 0.892 | 0.996 |
| OK3A | 30bls | 0.489 | 0.616 | 3784 | 0.585 | -1.150 | 4.800 | 0.127 | 0.943 | 0.951 |

### B.3.1.4 IN4A

The criteria set 17bLS (Table B-18) was selected for IN4A because there is a 42% increase in 30 min data availability, resulting in a 40% increase in daily average emissions values in combination with the difference in summary statistics ranging from -22 to 3% (Table B-19). The difference in summary statistics were within the 25% difference threshold set for selection. Other criteria sets (Table B-20) with 88 days (11bLS, 12bLS) were considered, but had differences outside what was deemed an acceptable range (Q25 error over 25%).

**Table B-18. Summary of the $NH_3$ reference and revised validation criteria for IN4A.**

| VC Name | VC ID | TD | Cbg | WD-SD | N (Daily BLS+VRPM) |
|---|---|---|---|---|---|
| Reference | 19bls | >0.3 | <0.1 | <30 | 51 |
| Revised | 17bls | >0.1 | <0.15 | | 83 |

**Table B-19. Statistical comparison of the reference and revised validation criteria for $NH_3$ at IN4A.**

| Statistic | Reference (19bls) | Revised EPA (17bls) | Percent Difference |
|---|---|---|---|
| N (30-min) | 3034 | 4302 | 41.793 |
| Mean | 0.25 | 0.246 | -1.403 |
| Std. Dev. | 0.384 | 0.374 | -2.554 |
| CV | 0.438 | 0.44 | 0.314 |
| Minimum | -0.108 | -0.404 | 274.074 |
| Maximum | 3.71 | 3.71 | 0 |
| q25 | 0.039 | 0.031 | -22.441 |
| Median | 0.578 | 0.567 | -1.861 |
| q75 | 1.142 | 1.176 | 2.944 |
| N (daily) BLS | 49 | 82 | 40.24 |
| N (daily) BLS+VRPM | 49 | 83 | 40.96 |

**Table B-20. Statistical summary of all validation criteria tested for $NH_3$ at IN4A.**

| Site ID | VC | Median | Mean | count | SD | Min | Max | q25 | q75 | CV |
|---|---|---|---|---|---|---|---|---|---|---|
| IN4A | 01bls | 0.246 | 0.375 | 3671 | 0.439 | -0.340 | 3.710 | 0.032 | 0.568 | 1.171 |
| IN4A | 02bls | 0.261 | 0.386 | 3552 | 0.441 | -0.267 | 3.710 | 0.036 | 0.579 | 1.144 |
| IN4A | 03bls | 0.245 | 0.374 | 3696 | 0.439 | -0.683 | 3.710 | 0.032 | 0.568 | 1.174 |
| IN4A | 04bls | 0.241 | 0.372 | 3818 | 0.438 | -0.340 | 3.710 | 0.032 | 0.562 | 1.176 |
| IN4A | 05bls | 0.256 | 0.383 | 3692 | 0.440 | -0.267 | 3.710 | 0.036 | 0.573 | 1.149 |
| IN4A | 06bls | 0.238 | 0.370 | 3853 | 0.438 | -0.683 | 3.710 | 0.032 | 0.559 | 1.182 |
| IN4A | 07bls | 0.260 | 0.385 | 4291 | 0.448 | -0.560 | 3.710 | 0.031 | 0.581 | 1.165 |
| IN4A | 08bls | 0.246 | 0.375 | 4416 | 0.447 | -0.999 | 3.710 | 0.028 | 0.571 | 1.193 |
| IN4A | 09bls | 0.244 | 0.372 | 4447 | 0.450 | -1.830 | 3.710 | 0.028 | 0.571 | 1.210 |
| IN4A | 10bls | 0.252 | 0.380 | 4465 | 0.446 | -0.560 | 3.710 | 0.031 | 0.574 | 1.173 |
| IN4A | 11bls | 0.238 | 0.371 | 4597 | 0.445 | -0.999 | 3.710 | 0.028 | 0.563 | 1.201 |
| IN4A | 12bls | 0.236 | 0.368 | 4638 | 0.448 | -1.830 | 3.710 | 0.027 | 0.562 | 1.219 |
| IN4A | 13bls | 0.269 | 0.388 | 4009 | 0.443 | -0.404 | 3.710 | 0.034 | 0.584 | 1.143 |
| IN4A | 14bls | 0.253 | 0.378 | 4131 | 0.441 | -0.404 | 3.710 | 0.031 | 0.573 | 1.167 |
| IN4A | 15bls | 0.253 | 0.376 | 4160 | 0.443 | -1.160 | 3.710 | 0.031 | 0.572 | 1.178 |
| IN4A | 16bls | 0.260 | 0.383 | 4173 | 0.441 | -0.404 | 3.710 | 0.034 | 0.577 | 1.152 |
| IN4A | 17bls | 0.246 | 0.374 | 4302 | 0.440 | -0.404 | 3.710 | 0.031 | 0.567 | 1.176 |
| IN4A | 18bls | 0.244 | 0.371 | 4341 | 0.441 | -1.160 | 3.710 | 0.030 | 0.563 | 1.188 |
| **IN4A** | **19bls** | **0.250** | **0.384** | **3034** | **0.438** | **-0.108** | **3.710** | **0.039** | **0.578** | **1.142** |
| IN4A | 20bls | 0.233 | 0.372 | 3142 | 0.436 | -0.221 | 3.710 | 0.035 | 0.564 | 1.171 |
| IN4A | 21bls | 0.232 | 0.372 | 3163 | 0.436 | -0.221 | 3.710 | 0.035 | 0.564 | 1.172 |
| IN4A | 22bls | 0.244 | 0.381 | 3157 | 0.437 | -0.108 | 3.710 | 0.040 | 0.571 | 1.148 |
| IN4A | 23bls | 0.230 | 0.370 | 3272 | 0.435 | -0.221 | 3.710 | 0.035 | 0.558 | 1.178 |
| IN4A | 24bls | 0.228 | 0.368 | 3302 | 0.435 | -0.221 | 3.710 | 0.035 | 0.556 | 1.182 |
| IN4A | 25bls | 0.271 | 0.389 | 3758 | 0.441 | -0.267 | 3.710 | 0.036 | 0.586 | 1.135 |
| IN4A | 26bls | 0.254 | 0.379 | 3878 | 0.439 | -0.340 | 3.710 | 0.032 | 0.575 | 1.160 |
| IN4A | 27bls | 0.253 | 0.377 | 3905 | 0.440 | -0.734 | 3.710 | 0.032 | 0.574 | 1.166 |
| IN4A | 28bls | 0.264 | 0.385 | 3907 | 0.440 | -0.267 | 3.710 | 0.036 | 0.579 | 1.142 |
| IN4A | 29bls | 0.248 | 0.375 | 4034 | 0.438 | -0.340 | 3.710 | 0.032 | 0.569 | 1.167 |
| IN4A | 30bls | 0.245 | 0.373 | 4071 | 0.438 | -0.734 | 3.710 | 0.031 | 0.568 | 1.175 |

### B.3.1.5 NC4A

Validation criteria 26 (26bLS; Table B-21) was selected as it offered a 13% increase in 30 minute data availability with the changes in summary statistics ranging from -2 to 18% (Table B-22). Validation criteria sets 9, 12, 15, and 18 (Table B-23) offered more valid average daily values (32), however minimum were more than 5 times the refence values, which exceeded set thresholds.

**Table B-21. Summary of the $NH_3$ reference and revised validation criteria for NC4A.**

| VC Name | VC ID | TD | Cbg | WD-SD | N (Daily BLS+VRPM) |
|---|---|---|---|---|---|
| Reference | vc19_bls | >0.3 | <0.1 | <30 | 31 |
| Revised | vc26_bls | >0.15 | <0.15 | <30 | 35 |

**Table B-22. Statistical comparison of the reference and revised validation criteria for $NH_3$ at NC4A.**

| Statistic | Reference (vc19_bls) | Revised EPA (vc26_bls) | Percent Difference |
|---|---|---|---|
| N (30-min) | 1828 | 2058 | 12.582 |
| Mean | 0.766 | 0.754 | -1.502 |
| Std. Dev. | 0.945 | 0.982 | 3.963 |
| CV | 0.802 | 0.944 | 17.64 |
| Minimum | -0.06 | -0.249 | 315.693 |
| Maximum | 8.78 | 9.54 | 8.656 |
| q25 | 0.248 | 0.248 | 0 |
| Median | 1.49 | 1.49 | 0 |
| q75 | 0.849 | 0.961 | 13.156 |
| N (daily) BLS | 30 | 34 | 11.76 |
| N (daily) BLS+VRPM | 31 | 35 | 11.43 |

**Table B-23. Statistical summary of all validation criteria tested for $NH_3$ at NC4A.**

| Site ID | VC | Median | Mean | count | SD | Min | Max | q25 | q75 | CV |
|---|---|---|---|---|---|---|---|---|---|---|
| NC4A | 01bls | 0.759 | 0.968 | 2010 | 0.897 | -0.249 | 9.540 | 0.248 | 1.490 | 0.926 |
| NC4A | 02bls | 0.738 | 0.964 | 1938 | 0.902 | -0.060 | 9.540 | 0.245 | 1.490 | 0.936 |
| NC4A | 03bls | 0.759 | 0.964 | 2097 | 0.901 | -0.825 | 9.540 | 0.249 | 1.480 | 0.935 |
| NC4A | 04bls | 0.750 | 0.966 | 2082 | 0.903 | -0.249 | 9.540 | 0.247 | 1.490 | 0.935 |
| NC4A | 05bls | 0.721 | 0.962 | 2003 | 0.906 | -0.060 | 9.540 | 0.245 | 1.485 | 0.942 |
| NC4A | 06bls | 0.730 | 0.952 | 2192 | 0.909 | -1.640 | 9.540 | 0.244 | 1.470 | 0.955 |
| NC4A | 07bls | 0.674 | 0.993 | 2132 | 1.062 | -0.280 | 12.800 | 0.235 | 1.490 | 1.069 |
| NC4A | 08bls | 0.703 | 0.996 | 2213 | 1.058 | -0.535 | 12.800 | 0.236 | 1.490 | 1.062 |
| NC4A | 09bls | 0.704 | 0.984 | 2321 | 1.062 | -3.070 | 12.800 | 0.236 | 1.480 | 1.079 |
| NC4A | 10bls | 0.666 | 0.988 | 2210 | 1.058 | -0.280 | 12.800 | 0.234 | 1.480 | 1.071 |
| NC4A | 11bls | 0.679 | 0.989 | 2301 | 1.056 | -0.535 | 12.800 | 0.235 | 1.480 | 1.068 |
| NC4A | 12bls | 0.672 | 0.968 | 2436 | 1.061 | -3.070 | 12.800 | 0.229 | 1.460 | 1.096 |
| NC4A | 13bls | 0.697 | 0.984 | 2055 | 1.009 | -0.083 | 12.800 | 0.241 | 1.490 | 1.025 |
| NC4A | 14bls | 0.726 | 0.986 | 2130 | 1.001 | -0.535 | 12.800 | 0.242 | 1.490 | 1.015 |
| NC4A | 15bls | 0.726 | 0.975 | 2235 | 1.008 | -3.070 | 12.800 | 0.242 | 1.480 | 1.034 |
| NC4A | 16bls | 0.685 | 0.982 | 2124 | 1.009 | -0.083 | 12.800 | 0.241 | 1.480 | 1.028 |
| NC4A | 17bls | 0.714 | 0.983 | 2207 | 1.003 | -0.535 | 12.800 | 0.242 | 1.480 | 1.020 |
| NC4A | 18bls | 0.695 | 0.963 | 2337 | 1.011 | -3.070 | 12.800 | 0.236 | 1.470 | 1.050 |
| **NC4A** | **19bls** | **0.766** | **0.945** | **1828** | **0.802** | **-0.060** | **8.780** | **0.248** | **1.490** | **0.849** |
| NC4A | 20bls | 0.780 | 0.950 | 1892 | 0.800 | -0.115 | 8.780 | 0.250 | 1.493 | 0.842 |
| NC4A | 21bls | 0.787 | 0.952 | 1958 | 0.809 | -0.698 | 8.780 | 0.253 | 1.490 | 0.849 |
| NC4A | 22bls | 0.759 | 0.945 | 1887 | 0.811 | -0.060 | 8.780 | 0.248 | 1.490 | 0.858 |

**Table B-23. Statistical summary of all validation criteria tested for $NH_3$ at NC4A.**

| Site ID | VC | Median | Mean | count | SD | Min | Max | q25 | q75 | CV |
|---|---|---|---|---|---|---|---|---|---|---|
| NC4A | 23bls | 0.772 | 0.950 | 1958 | 0.812 | -0.115 | 8.780 | 0.249 | 1.490 | 0.854 |
| NC4A | 24bls | 0.765 | 0.945 | 2045 | 0.822 | -1.640 | 8.780 | 0.249 | 1.480 | 0.870 |
| NC4A | 25bls | 0.726 | 0.979 | 1985 | 0.951 | -0.083 | 9.540 | 0.245 | 1.490 | 0.972 |
| NC4A | 26bls | 0.754 | 0.982 | 2058 | 0.944 | -0.249 | 9.540 | 0.248 | 1.490 | 0.961 |
| NC4A | 27bls | 0.754 | 0.973 | 2154 | 0.953 | -3.070 | 9.540 | 0.247 | 1.480 | 0.980 |
| NC4A | 28bls | 0.717 | 0.977 | 2052 | 0.953 | -0.083 | 9.540 | 0.245 | 1.490 | 0.976 |
| NC4A | 29bls | 0.743 | 0.980 | 2132 | 0.948 | -0.249 | 9.540 | 0.247 | 1.490 | 0.968 |
| NC4A | 30bls | 0.726 | 0.962 | 2251 | 0.958 | -3.070 | 9.540 | 0.243 | 1.470 | 0.996 |

### B.3.1.6 OK4A

For OK4A, criteria set 29bLS (Table B-24) was selected. This criteria set provided a 22% increase in 30 min data availability combined with percent difference between summary statistics of -13 to 8% (Table B-25). Other criteria sets (Table B-26) that offered more days (i.e., 12bLS) were considered, but ruled out due to large differences in minimum values and differences of more than 25% between the median values.

**Table B-24. Summary of the $NH_3$ reference and revised validation criteria for OK4A.**

| VC Name | VC ID | TD | Cbg | WD-SD | N (Daily BLS+VRPM) |
|---|---|---|---|---|---|
| Reference | vc19_bls | >0.3 | <0.1 | <30 | 64 |
| Revised | vc29_bls | >0.15 | <0.15 | | 78 |

**Table B-25. Statistical comparison of the reference and revised validation criteria for $NH_3$ at OK4A.**

| Statistic | Reference (vc19_bls) | Revised EPA (vc29_bls) | Percent Difference |
|---|---|---|---|
| N (30-min) | 2692 | 3274 | 21.62 |
| Mean | 1.19 | 1.17 | -1.681 |
| Std. Dev. | 1.604 | 1.637 | 2.042 |
| CV | 1.476 | 1.547 | 4.822 |
| Minimum | -0.381 | -1.22 | 220.21 |
| Maximum | 13.6 | 13.6 | 0 |
| q25 | 0.435 | 0.38 | -12.536 |
| Median | 2.37 | 2.55 | 7.595 |
| q75 | 0.92 | 0.945 | 2.725 |
| N (daily) BLS | 48 | 65 | 26.15 |
| N (daily) BLS+VRPM | 64 | 78 | 17.95 |

**Table B-26. Statistical summary of all validation criteria tested for $NH_3$ at OK4A.**

| Site ID | VC | Median | Mean | count | SD | Min | Max | q25 | q75 | CV |
|---|---|---|---|---|---|---|---|---|---|---|
| OK4A | 01bls | 1.210 | 1.641 | 3064 | 1.516 | -1.220 | 13.600 | 0.409 | 2.553 | 0.924 |
| OK4A | 02bls | 1.105 | 1.564 | 2870 | 1.477 | -0.413 | 13.600 | 0.398 | 2.330 | 0.944 |
| OK4A | 03bls | 1.680 | 1.889 | 3795 | 1.541 | -2.780 | 13.600 | 0.539 | 2.910 | 0.816 |
| OK4A | 04bls | 1.190 | 1.643 | 3172 | 1.532 | -1.220 | 13.600 | 0.401 | 2.553 | 0.933 |
| OK4A | 05bls | 1.095 | 1.566 | 2970 | 1.494 | -0.413 | 13.600 | 0.383 | 2.330 | 0.954 |
| OK4A | 06bls | 1.640 | 1.871 | 3958 | 1.555 | -2.780 | 13.600 | 0.524 | 2.900 | 0.831 |
| OK4A | 07bls | 1.040 | 1.572 | 3140 | 1.669 | -1.350 | 19.300 | 0.347 | 2.330 | 1.062 |
| OK4A | 08bls | 1.130 | 1.644 | 3340 | 1.696 | -3.670 | 19.300 | 0.360 | 2.540 | 1.031 |
| OK4A | 09bls | 1.620 | 1.903 | 4151 | 1.767 | -4.410 | 21.300 | 0.481 | 2.920 | 0.928 |
| OK4A | 10bls | 1.040 | 1.575 | 3246 | 1.679 | -1.350 | 19.300 | 0.337 | 2.330 | 1.066 |
| OK4A | 11bls | 1.120 | 1.646 | 3454 | 1.705 | -3.670 | 19.300 | 0.354 | 2.540 | 1.035 |
| OK4A | 12bls | 1.590 | 1.873 | 4325 | 1.904 | -42.500 | 21.300 | 0.461 | 2.910 | 1.017 |
| OK4A | 13bls | 1.050 | 1.552 | 3044 | 1.536 | -1.060 | 13.600 | 0.359 | 2.330 | 0.990 |
| OK4A | 14bls | 1.150 | 1.627 | 3242 | 1.569 | -1.220 | 13.600 | 0.374 | 2.540 | 0.964 |
| OK4A | 15bls | 1.640 | 1.880 | 4022 | 1.594 | -2.780 | 13.600 | 0.505 | 2.920 | 0.848 |
| OK4A | 16bls | 1.040 | 1.555 | 3150 | 1.552 | -1.060 | 13.600 | 0.351 | 2.330 | 0.998 |
| OK4A | 17bls | 1.140 | 1.630 | 3356 | 1.584 | -1.220 | 13.600 | 0.364 | 2.540 | 0.971 |
| OK4A | 18bls | 1.610 | 1.860 | 4195 | 1.617 | -10.400 | 13.600 | 0.484 | 2.910 | 0.869 |
| **OK4A** | **19bls** | **1.190** | **1.604** | **2692** | **1.476** | **-0.381** | **13.600** | **0.435** | **2.370** | **0.920** |
| OK4A | 20bls | 1.270 | 1.684 | 2879 | 1.515 | -0.381 | 13.600 | 0.452 | 2.600 | 0.900 |
| OK4A | 21bls | 1.725 | 1.931 | 3590 | 1.530 | -0.709 | 13.600 | 0.592 | 2.940 | 0.792 |
| OK4A | 22bls | 1.170 | 1.603 | 2783 | 1.493 | -0.381 | 13.600 | 0.421 | 2.370 | 0.931 |
| OK4A | 23bls | 1.260 | 1.682 | 2978 | 1.530 | -0.439 | 13.600 | 0.440 | 2.598 | 0.910 |
| OK4A | 24bls | 1.695 | 1.913 | 3740 | 1.544 | -2.560 | 13.600 | 0.568 | 2.923 | 0.807 |
| OK4A | 25bls | 1.080 | 1.556 | 2966 | 1.492 | -0.809 | 13.600 | 0.376 | 2.330 | 0.959 |
| OK4A | 26bls | 1.180 | 1.633 | 3163 | 1.531 | -1.220 | 13.600 | 0.392 | 2.550 | 0.937 |
| OK4A | 27bls | 1.650 | 1.883 | 3919 | 1.559 | -2.780 | 13.600 | 0.524 | 2.915 | 0.828 |
| OK4A | 28bls | 1.070 | 1.560 | 3069 | 1.511 | -0.809 | 13.600 | 0.363 | 2.330 | 0.968 |
| OK4A | 29bls | 1.170 | 1.637 | 3274 | 1.547 | -1.220 | 13.600 | 0.380 | 2.550 | 0.945 |
| OK4A | 30bls | 1.620 | 1.864 | 4089 | 1.585 | -10.400 | 13.600 | 0.507 | 2.910 | 0.850 |

### B.3.2 $H_2S$

For hydrogen sulfide ($H_2S$) criteria set 10 (10h2s) was selected for the reference data set. Criteria sets 13,14, and 15 (contain TD fraction criteria of >0.3) were also considered; however, these criteria sets produced a daily count that was substantially lower and therefore were considered to be unrepresentative. Table B-27 provides a summary of the change in daily averages at each site. For all sites except OK4A, there was a decrease in the number of daily values compared to the 2020 draft report. This is because the draft swine report did not include the attack angle (WD-Perpendicular <60°) criteria.

**Table B-27. Summary of the effect of new acceptance criteria on counts of daily average $H_2S$ emission values.**

| Site ID | Draft EPA report | Revised VC | Change in daily values |
|---|---|---|---|
| NC3A | 15 | 9 | -6 |
| OK3A | 60 | 50 | -10 |
| IN4A | 40 | 31 | -9 |
| NC4A | 38 | 18 | -20 |
| OK4A | 39 | 49 | +10 |
| IA3A | 29 | 18 | -11 |

### B.3.2.1 IA3A

For IA3A, criteria set 2 (02h2s; Table B-28) was selected as there is a 12% increase in 30 minute data availability combined with only a -6 to 5% difference in summary statistics (i.e., mean, standard deviation, 25$^{th}$ percentile, median, and 75$^{th}$ percentile) and no difference in minimum and maximum values (Table B-29). Criteria set 17h2s (Table B-30) was also considered, as it has the same number of 30-minute values and summary stats, but it is suggested that it would be better to choose 02 over 17 as it includes the touchdown criteria.

**Table B-28. Summary of the $H_2S$ reference and revised validation criteria for IA3A.**

| VC Name | VC ID | TD | Cbg | WD-SD | N (Daily BLS+VRPM) |
|---|---|---|---|---|---|
| Reference | vc10_bls | >0.2 | <3.4 | <30 | 14 |
| Revised | vc2_bls | >0.05 | <3.4 | | 18 |

**Table B-29. Statistical comparison of the reference and revised validation criteria for $H_2S$ at IA3A.**

| Statistic | Reference (10h2s) | Revised EPA (02h2s) | Percent Difference |
|---|---|---|---|
| N (30-min) | 951 | 1064 | 11.882 |
| Mean | 0.006 | 0.0058 | -2.596 |
| Std. Dev. | 0.0595 | 0.0608 | 2.033 |
| CV | 0.3179 | 0.3052 | -3.994 |
| Minimum | -0.0042 | -0.0042 | 0 |
| Maximum | 7.17 | 7.17 | 0 |
| q25 | 0.0006 | 0.0006 | 4.501 |
| Median | 0.0439 | 0.0445 | 1.482 |
| q75 | 5.339 | 5.023 | -5.907 |
| N (daily) BLS | 14 | 18 | 22.22 |

**Table B-30. Statistical summary of all validation criteria tested for $H_2S$ at IA3A.**

| Site ID | VC | Median | Mean | count | SD | Min | Max | q25 | q75 | CV |
|---|---|---|---|---|---|---|---|---|---|---|
| IA3A | 01h2s | 0.027 | 0.061 | 23 | 0.097 | 0.000 | 0.343 | 0.001 | 0.078 | 1.582 |
| IA3A | 02h2s | 0.027 | 0.062 | 23 | 0.096 | 0.000 | 0.343 | 0.001 | 0.081 | 1.565 |
| IA3A | 03h2s | 0.028 | 0.060 | 31 | 0.085 | -0.010 | 0.343 | 0.001 | 0.089 | 1.420 |
| IA3A | 04h2s | 0.015 | 0.041 | 20 | 0.061 | 0.000 | 0.231 | 0.001 | 0.058 | 1.501 |
| IA3A | 05h2s | 0.015 | 0.041 | 20 | 0.061 | 0.000 | 0.227 | 0.001 | 0.059 | 1.485 |
| IA3A | 06h2s | 0.024 | 0.046 | 28 | 0.061 | -0.010 | 0.203 | 0.001 | 0.066 | 1.326 |
| IA3A | 07h2s | 0.015 | 0.038 | 18 | 0.059 | 0.000 | 0.217 | 0.001 | 0.049 | 1.537 |
| IA3A | 08h2s | 0.015 | 0.038 | 18 | 0.058 | 0.000 | 0.214 | 0.001 | 0.049 | 1.520 |
| IA3A | 09h2s | 0.015 | 0.044 | 24 | 0.064 | -0.010 | 0.203 | 0.001 | 0.058 | 1.454 |
| **IA3A** | **10h2s** | **0.024** | **0.041** | **15** | **0.063** | **0.000** | **0.217** | **0.001** | **0.043** | **1.529** |
| IA3A | 11h2s | 0.024 | 0.043 | 16 | 0.061 | 0.000 | 0.214 | 0.001 | 0.059 | 1.413 |
| IA3A | 12h2s | 0.013 | 0.042 | 20 | 0.066 | -0.010 | 0.203 | 0.001 | 0.052 | 1.553 |
| IA3A | 13h2s | 0.002 | 0.034 | 8 | 0.053 | 0.001 | 0.138 | 0.001 | 0.046 | 1.575 |
| IA3A | 14h2s | 0.003 | 0.033 | 9 | 0.049 | 0.001 | 0.138 | 0.001 | 0.031 | 1.500 |
| IA3A | 15h2s | 0.003 | 0.048 | 11 | 0.069 | 0.001 | 0.203 | 0.001 | 0.074 | 1.443 |
| IA3A | 16h2s | 0.028 | 0.059 | 29 | 0.084 | -0.007 | 0.309 | 0.001 | 0.092 | 1.444 |
| IA3A | 17h2s | 0.021 | 0.057 | 30 | 0.083 | -0.007 | 0.302 | 0.001 | 0.090 | 1.453 |
| IA3A | 18h2s | 0.028 | 0.096 | 40 | 0.272 | -0.010 | 1.709 | 0.001 | 0.090 | 2.817 |

### B.3.2.2 NC3A

The selected the reference criteria (Table B-31), therefore there is no difference in the statistical summaries (Table B-32). Criteria sets 07h2s and 11h2s were also considered, which had same number of valid daily averages. The maximum number of days (14) occurred for criteria sets 03h2s and 18h2s (Table B-33). However, the q25 and median values exceeded selection thresholds of 25%.

**Table B-31. Summary of the $H_2S$ reference and revised validation criteria for NC3A.**

| VC Name | VC ID | TD | Cbg | WD-SD | N (Daily BLS+VRPM) |
|---|---|---|---|---|---|
| Reference | vc10_bls | >0.2 | <3.4 | <30 | 9 |
| Revised | vc10_bls | >0.2 | <3.4 | <30 | 9 |

**Table B-32. Statistical comparison of the reference and revised validation criteria for $H_2S$ at NC3A.**

| Statistic | Reference (vc10_bls) | Revised EPA (vc10_bls) | Percent Difference |
|---|---|---|---|
| N (30-min) | 743 | 743 | 0 |
| Mean | 0.0009 | 0.0009 | 0 |
| Std. Dev. | 0.0159 | 0.0159 | 0 |
| CV | 0.0639 | 0.0639 | 0 |
| Minimum | -0.009 | -0.009 | 0 |
| Maximum | 1.23 | 1.23 | 0 |
| q25 | -0.0001 | -0.0001 | 0 |
| Median | 0.0054 | 0.0054 | 0 |
| q75 | 4.0268 | 4.0268 | 0.00 |
| N (daily) BLS | 9 | 9 | 0.00 |

**Table B-33. Statistical summary of all validation criteria tested for $H_2S$ at NC3A.**

| Site ID | VC | Median | Mean | count | SD | Min | Max | q25 | q75 | CV |
|---|---|---|---|---|---|---|---|---|---|---|
| NC3A | 01h2s | 0.001 | 0.013 | 16 | 0.030 | -0.001 | 0.116 | 0.000 | 0.009 | 2.246 |
| NC3A | 02h2s | 0.001 | 0.012 | 17 | 0.029 | -0.001 | 0.116 | 0.000 | 0.008 | 2.330 |
| NC3A | 03h2s | 0.001 | 0.017 | 19 | 0.036 | -0.001 | 0.116 | 0.000 | 0.010 | 2.123 |
| NC3A | 04h2s | 0.001 | 0.013 | 14 | 0.033 | -0.001 | 0.122 | 0.000 | 0.007 | 2.483 |
| NC3A | 05h2s | 0.001 | 0.012 | 15 | 0.032 | -0.001 | 0.122 | 0.000 | 0.006 | 2.576 |
| NC3A | 06h2s | 0.001 | 0.019 | 15 | 0.041 | -0.001 | 0.118 | 0.001 | 0.006 | 2.146 |
| NC3A | 07h2s | 0.001 | 0.019 | 10 | 0.040 | -0.001 | 0.129 | 0.000 | 0.012 | 2.154 |
| NC3A | 08h2s | 0.001 | 0.019 | 10 | 0.040 | -0.001 | 0.129 | 0.000 | 0.012 | 2.154 |
| NC3A | 09h2s | 0.001 | 0.027 | 11 | 0.048 | -0.001 | 0.128 | 0.001 | 0.024 | 1.799 |
| NC3A | 10h2s | 0.005 | 0.027 | 8 | 0.053 | -0.001 | 0.153 | 0.001 | 0.019 | 1.973 |
| NC3A | 11h2s | 0.005 | 0.027 | 8 | 0.053 | -0.001 | 0.153 | 0.001 | 0.019 | 1.973 |
| NC3A | 12h2s | 0.001 | 0.035 | 9 | 0.057 | -0.001 | 0.151 | 0.001 | 0.034 | 1.623 |
| NC3A | 16h2s | 0.001 | 0.013 | 16 | 0.029 | -0.001 | 0.116 | 0.000 | 0.009 | 2.254 |
| NC3A | 17h2s | 0.001 | 0.012 | 17 | 0.029 | -0.001 | 0.116 | 0.000 | 0.008 | 2.338 |
| NC3A | 18h2s | 0.001 | 0.017 | 19 | 0.036 | -0.001 | 0.116 | 0.000 | 0.010 | 2.130 |

### B.3.2.3 OK3A

Criteria set 04h2s was selected for OK3A because there is a 37% increase in 30 minute data availability accompanied by -21 to 9% difference in statistical summary values. This criteria set also had an acceptable difference in minimum values and no difference in maximum values. The maximum days from any criteria set is 67 (18h2s; Table B-36), but the minimum and median values differences exceeded the acceptance thresholds.

**Table B-34. Summary of the $H_2S$ reference and revised validation criteria for OK3A.**

| VC Name | VC ID | TD | Cbg | WD-SD | N (Daily BLS+VRPM) |
|---|---|---|---|---|---|
| Reference | vc10_bls | >0.2 | <3.4 | <30 | 27 |
| Revised | vc4_bls | >0.1 | <3.4 | <30 | 50 |

**Table B-35. Statistical comparison of the reference and revised validation criteria for $H_2S$ at OK3A.**

| Statistic | Reference (10h2s) | Revised EPA (04h2s) | Percent Difference |
|---|---|---|---|
| N (30-min) | 1878 | 2573 | 37.0075 |
| Mean | 0.0269 | 0.0211 | -21.415 |
| Std. Dev. | 0.0638 | 0.0595 | -6.864 |
| CV | 0.0998 | 0.1009 | 1.058 |
| Minimum | -0.0065 | -0.0101 | 54.671 |
| Maximum | 1.06 | 1.06 | 0 |
| q25 | 0.0029 | 0.0025 | -14.556 |
| Median | 0.0821 | 0.0744 | -9.324 |
| q75 | 1.5639 | 1.6969 | 8.506 |
| N (daily) BLS | 27 | 50 | 46.00 |

**Table B-36. Statistical summary of all validation criteria tested for $H_2S$ at OK3A.**

| Site ID | VC | Median | Mean | count | SD | Min | Max | q25 | q75 | CV |
|---|---|---|---|---|---|---|---|---|---|---|
| OK3A | 01h2s | 0.029 | 0.056 | 69 | 0.068 | 0.000 | 0.292 | 0.004 | 0.082 | 1.207 |
| OK3A | 02h2s | 0.028 | 0.054 | 73 | 0.067 | 0.000 | 0.292 | 0.003 | 0.083 | 1.233 |
| OK3A | 03h2s | 0.028 | 0.059 | 74 | 0.075 | -0.001 | 0.351 | 0.004 | 0.087 | 1.274 |
| OK3A | 04h2s | 0.051 | 0.059 | 51 | 0.064 | 0.000 | 0.292 | 0.004 | 0.089 | 1.072 |
| OK3A | 05h2s | 0.049 | 0.057 | 53 | 0.063 | 0.000 | 0.292 | 0.003 | 0.088 | 1.115 |
| OK3A | 06h2s | 0.049 | 0.062 | 57 | 0.067 | 0.000 | 0.307 | 0.005 | 0.093 | 1.084 |
| OK3A | 07h2s | 0.056 | 0.072 | 33 | 0.069 | 0.000 | 0.325 | 0.009 | 0.112 | 0.967 |
| OK3A | 08h2s | 0.055 | 0.068 | 36 | 0.067 | 0.000 | 0.325 | 0.008 | 0.107 | 0.991 |
| OK3A | 09h2s | 0.058 | 0.078 | 37 | 0.074 | 0.000 | 0.339 | 0.020 | 0.114 | 0.943 |
| OK3A | 10h2s | 0.061 | 0.079 | 26 | 0.078 | 0.000 | 0.338 | 0.011 | 0.125 | 0.985 |
| OK3A | 11h2s | 0.060 | 0.077 | 27 | 0.077 | 0.000 | 0.338 | 0.014 | 0.125 | 0.996 |
| OK3A | 12h2s | 0.073 | 0.088 | 28 | 0.085 | 0.000 | 0.352 | 0.017 | 0.127 | 0.970 |
| OK3A | 13h2s | 0.059 | 0.068 | 13 | 0.058 | 0.000 | 0.175 | 0.026 | 0.110 | 0.863 |
| OK3A | 14h2s | 0.059 | 0.067 | 13 | 0.058 | 0.000 | 0.175 | 0.026 | 0.110 | 0.867 |
| OK3A | 15h2s | 0.090 | 0.083 | 17 | 0.059 | 0.000 | 0.172 | 0.034 | 0.127 | 0.717 |
| OK3A | 16h2s | 0.029 | 0.060 | 81 | 0.092 | -0.002 | 0.598 | 0.004 | 0.080 | 1.518 |
| OK3A | 17h2s | 0.028 | 0.059 | 85 | 0.090 | -0.002 | 0.598 | 0.003 | 0.080 | 1.539 |
| OK3A | 18h2s | 0.026 | 0.046 | 88 | 0.164 | -1.218 | 0.559 | 0.003 | 0.081 | 3.547 |

### B.3.2.4 IN4A

For IN4A, 02h2s (Table B-37), as there is a 130% increase in 30 min data availability over the reference criteria set, with -20 to 17% differences in the summary statistics (Table B-38) and no or minor differences in min and max values. Criteria set 17h2s (Table B-38) also had similar 30 minute data availability and summary statistics; however, retaining a criteria set with a touchdown fraction evaluation was preferable.

**Table B-37. Summary of the $H_2S$ reference and revised validation criteria for IN4A.**

| VC Name | VC ID | TD | Cbg | WD-SD | N (Daily BLS+VRPM) |
|---|---|---|---|---|---|
| Reference | vc10_bls | >0.2 | <3.4 | <30 | 8 |
| Revised | vc2_bls | >0.05 | <3.4 | | 31 |

**Table B-38. Statistical comparison of the reference and revised validation criteria for $H_2S$ at IN4A.**

| Statistic | Reference (10h2s) | Revised EPA (02h2s) | Percent Difference |
|---|---|---|---|
| N (30-min) | 685 | 1574 | 129.781 |
| Mean | 0.0006 | 0.0007 | 4.992 |
| Std. Dev. | 0.0092 | 0.0073 | -20.613 |
| CV | 0.0392 | 0.0326 | -16.86 |
| Minimum | -0.0157 | -0.0157 | 0 |
| Maximum | 0.318 | 0.319 | 0.314 |
| q25 | -0.0009 | -0.0011 | 17.631 |
| Median | 0.0029 | 0.003 | 5.662 |
| q75 | 4.25 | 4.4509 | 4.726 |
| N (daily) BLS | 8 | 31 | 74.19 |

**Table B-39. Statistical summary of all validation criteria tested for $H_2S$ at IN4A.**

| Site ID | VC | Median | Mean | count | SD | Min | Max | q25 | q75 | CV |
|---|---|---|---|---|---|---|---|---|---|---|
| IN4A | 01h2s | 0.001 | 0.007 | 48 | 0.027 | -0.001 | 0.176 | 0.000 | 0.003 | 3.851 |
| IN4A | 02h2s | 0.001 | 0.006 | 51 | 0.026 | -0.001 | 0.176 | 0.000 | 0.002 | 3.979 |
| IN4A | 03h2s | 0.000 | 0.000 | 48 | 0.046 | -0.254 | 0.176 | 0.000 | 0.001 | 149.002 |
| IN4A | 04h2s | 0.001 | 0.007 | 37 | 0.029 | -0.001 | 0.176 | 0.000 | 0.002 | 4.174 |
| IN4A | 05h2s | 0.001 | 0.008 | 41 | 0.029 | -0.001 | 0.176 | 0.000 | 0.002 | 3.705 |
| IN4A | 06h2s | 0.000 | 0.006 | 38 | 0.029 | -0.011 | 0.176 | 0.000 | 0.002 | 4.739 |
| IN4A | 07h2s | 0.001 | 0.011 | 23 | 0.037 | -0.001 | 0.176 | 0.000 | 0.002 | 3.454 |
| IN4A | 08h2s | 0.001 | 0.010 | 24 | 0.036 | -0.001 | 0.176 | 0.000 | 0.002 | 3.530 |
| IN4A | 09h2s | 0.001 | 0.011 | 23 | 0.037 | -0.001 | 0.176 | 0.000 | 0.002 | 3.454 |
| IN4A | 10h2s | 0.000 | 0.023 | 8 | 0.057 | 0.000 | 0.162 | 0.000 | 0.006 | 2.463 |
| IN4A | 11h2s | 0.000 | 0.023 | 8 | 0.057 | -0.001 | 0.162 | 0.000 | 0.006 | 2.462 |
| IN4A | 12h2s | 0.000 | 0.023 | 8 | 0.057 | 0.000 | 0.162 | 0.000 | 0.006 | 2.463 |
| IN4A | 16h2s | 0.001 | 0.007 | 48 | 0.027 | -0.001 | 0.176 | 0.000 | 0.003 | 3.777 |
| IN4A | 17h2s | 0.001 | 0.007 | 51 | 0.026 | -0.001 | 0.176 | 0.000 | 0.003 | 3.903 |
| IN4A | 18h2s | 0.000 | 0.000 | 48 | 0.046 | -0.254 | 0.176 | 0.000 | 0.002 | 100.005 |

### B.3.2.5 NC4A

For NC4A, criteria set 08h2s (Table B-40) was selected as there is a 35% increase in 30 minute data availability coupled with -12 to 23% differences in summary statistics and no difference in min and max values (Table B-41). The maximum number of days possible from the

criteria sets tested is 21 from criteria sets 03h2s, 06h2s, and 18h2s (Table B-42). However, the q25 percent differences exceed the acceptance threshold of 25% for all sets.

**Table B-40. Summary of the $H_2S$ reference and revised validation criteria for NC4A.**

| VC Name | VC ID | TD | Cbg | WD-SD | N (Daily BLS+VRPM) |
|---|---|---|---|---|---|
| Reference | vc10_bls | >0.2 | <3.4 | <30 | 14 |
| Revised | vc8_bls | >0.15 | <3.4 | | 18 |

**Table B-41. Statistical comparison of the reference and revised validation criteria for $H_2S$ at NC4A.**

| Statistic | Reference (10h2s) | Revised EPA (08h2s) | Percent Difference |
|---|---|---|---|
| N (30-min) | 1192 | 1607 | 34.815 |
| Mean | 0.0014 | 0.0013 | -7.473 |
| Std. Dev. | 0.0086 | 0.0086 | 0.167 |
| CV | 0.1059 | 0.0928 | -12.341 |
| Minimum | -0.0159 | -0.0159 | 0 |
| Maximum | 2.99 | 2.99 | 0 |
| q25 | -0.0004 | -0.0005 | 22.874 |
| Median | 0.0039 | 0.0041 | 3.505 |
| q75 | 12.3644 | 10.8205 | -12.487 |
| N (daily) BLS | 14 | 18 | 22.22 |

**Table B-42. Statistical summary of all validation criteria tested for $H_2S$ at NC4A.**

| Site ID | VC | Median | Mean | count | SD | Min | Max | q25 | q75 | CV |
|---|---|---|---|---|---|---|---|---|---|---|
| NC4A | 01h2s | 0.002 | 0.003 | 30 | 0.004 | -0.001 | 0.020 | 0.001 | 0.004 | 1.418 |
| NC4A | 02h2s | 0.002 | 0.028 | 33 | 0.141 | -0.001 | 0.815 | 0.001 | 0.004 | 4.986 |
| NC4A | 03h2s | 0.001 | 0.006 | 34 | 0.024 | -0.025 | 0.137 | 0.000 | 0.003 | 4.379 |
| NC4A | 04h2s | 0.001 | 0.003 | 27 | 0.004 | -0.001 | 0.020 | 0.001 | 0.003 | 1.508 |
| NC4A | 05h2s | 0.003 | 0.038 | 30 | 0.186 | -0.001 | 1.019 | 0.001 | 0.004 | 4.947 |
| NC4A | 06h2s | 0.001 | 0.005 | 31 | 0.023 | -0.025 | 0.122 | 0.000 | 0.003 | 4.420 |
| NC4A | 07h2s | 0.001 | 0.003 | 19 | 0.005 | -0.001 | 0.018 | 0.001 | 0.003 | 1.497 |
| NC4A | 08h2s | 0.001 | 0.062 | 22 | 0.278 | -0.001 | 1.305 | 0.001 | 0.003 | 4.469 |
| NC4A | 09h2s | 0.001 | 0.002 | 22 | 0.007 | -0.019 | 0.018 | 0.000 | 0.003 | 4.293 |
| NC4A | 10h2s | 0.002 | 0.004 | 14 | 0.005 | -0.001 | 0.017 | 0.001 | 0.004 | 1.340 |
| NC4A | 11h2s | 0.002 | 0.004 | 14 | 0.005 | -0.001 | 0.017 | 0.001 | 0.004 | 1.341 |
| NC4A | 12h2s | 0.002 | 0.004 | 14 | 0.005 | -0.001 | 0.017 | 0.001 | 0.003 | 1.353 |
| NC4A | 16h2s | 0.002 | 0.003 | 30 | 0.005 | -0.001 | 0.020 | 0.001 | 0.004 | 1.390 |
| NC4A | 17h2s | 0.002 | 0.029 | 33 | 0.141 | -0.001 | 0.815 | 0.001 | 0.004 | 4.951 |
| NC4A | 18h2s | 0.001 | 0.006 | 34 | 0.024 | -0.025 | 0.137 | 0.001 | 0.004 | 4.228 |

### B.3.2.6 OK4A

For OK4A, criteria set 17h2s (Table B-43) was selected as it provided a 62% increase in 30 minute data availability with differences in summary statistics ranging from -15 to 10%

(Table B-44) along with an acceptable difference in minimum and maximum values. Criteria set 17h2s also provides the maximum number of any of the criteria sets tested (Table B-45).

**Table B-43. Summary of the $H_2S$ reference and revised validation criteria for OK4A.**

| VC Name | VC ID | TD | Cbg | WD-SD | N (Daily BLS+VRPM) |
|---|---|---|---|---|---|
| Reference | vc10_bls | >0.2 | <3.4 | <30 | 21 |
| Revised | vc17_bls | None | <3.4 | | 49 |

**Table B-44. Statistical comparison of the reference and revised validation criteria for $H_2S$ at OK4A.**

| Statistic | Reference (10h2s) | Revised EPA (17h2s) | Percent Difference |
|---|---|---|---|
| N (30-min) | 1335 | 2161 | 61.873 |
| Mean | 0.0535 | 0.0508 | -5.047 |
| Std. Dev. | 0.1222 | 0.1084 | -11.299 |
| CV | 0.1877 | 0.1671 | -10.967 |
| Minimum | -0.0071 | -0.0191 | 169.014 |
| Maximum | 1.85 | 1.85 | 0 |
| q25 | 0.012 | 0.0132 | 10 |
| Median | 0.155 | 0.132 | -14.839 |
| q75 | 1.5357 | 1.5415 | 0.374 |
| N (daily) BLS | 21 | 49 | 57.14 |

**Table B-45. Statistical summary of all validation criteria tested for $H_2S$ at NC4A.**

| Site ID | VC | Median | Mean | count | SD | Min | Max | q25 | q75 | CV |
|---|---|---|---|---|---|---|---|---|---|---|
| OK4A | 01h2s | 0.091 | 0.120 | 47 | 0.118 | 0.001 | 0.523 | 0.036 | 0.154 | 0.982 |
| OK4A | 02h2s | 0.078 | 0.109 | 52 | 0.114 | 0.001 | 0.503 | 0.025 | 0.134 | 1.054 |
| OK4A | 03h2s | 0.088 | 0.117 | 48 | 0.118 | 0.001 | 0.523 | 0.025 | 0.153 | 1.008 |
| OK4A | 04h2s | 0.103 | 0.137 | 36 | 0.133 | 0.001 | 0.523 | 0.040 | 0.187 | 0.970 |
| OK4A | 05h2s | 0.093 | 0.129 | 38 | 0.131 | 0.001 | 0.503 | 0.027 | 0.182 | 1.013 |
| OK4A | 06h2s | 0.104 | 0.136 | 36 | 0.134 | 0.001 | 0.523 | 0.027 | 0.188 | 0.982 |
| OK4A | 07h2s | 0.111 | 0.144 | 27 | 0.136 | 0.006 | 0.523 | 0.033 | 0.203 | 0.943 |
| OK4A | 08h2s | 0.098 | 0.129 | 32 | 0.128 | 0.006 | 0.503 | 0.029 | 0.190 | 0.988 |
| OK4A | 09h2s | 0.111 | 0.145 | 27 | 0.136 | 0.006 | 0.523 | 0.032 | 0.204 | 0.944 |
| OK4A | 10h2s | 0.117 | 0.135 | 20 | 0.127 | 0.001 | 0.528 | 0.027 | 0.215 | 0.940 |
| OK4A | 11h2s | 0.103 | 0.128 | 21 | 0.124 | 0.001 | 0.508 | 0.020 | 0.215 | 0.965 |
| OK4A | 12h2s | 0.119 | 0.136 | 20 | 0.128 | 0.001 | 0.528 | 0.027 | 0.218 | 0.940 |
| OK4A | 13h2s | 0.028 | 0.046 | 4 | 0.049 | 0.010 | 0.118 | 0.018 | 0.056 | 1.068 |
| OK4A | 14h2s | 0.028 | 0.044 | 4 | 0.045 | 0.010 | 0.110 | 0.018 | 0.054 | 1.025 |
| OK4A | 15h2s | 0.028 | 0.046 | 4 | 0.049 | 0.010 | 0.118 | 0.018 | 0.056 | 1.070 |
| OK4A | 16h2s | 0.082 | 0.113 | 50 | 0.116 | 0.002 | 0.523 | 0.028 | 0.147 | 1.030 |
| OK4A | 17h2s | 0.077 | 0.106 | 53 | 0.114 | 0.002 | 0.503 | 0.020 | 0.125 | 1.074 |
| OK4A | 18h2s | 0.081 | 0.110 | 51 | 0.117 | 0.002 | 0.523 | 0.021 | 0.142 | 1.057 |

# Appendix C: Data Completeness

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## C.1 Data Completeness Criteria for the Revised Dataset

As noted in Section 4.2.3 of Volume 1: Overview report, the data completeness criteria used was reviewed to see how much the data completeness criteria could be relaxed, but still have data that had acceptable error. Grant et al. (2013) suggested an error of ±25% to be acceptable and by using an emission model determined that a daily data completeness of 52% (or 25 out of 48 30-minute periods) gave less than ±25% error. Confinement datasets were reviewed to see if dropping to 50% completeness criteria would increase the number of day with valid average daily means enough to justify a potential 25% increase in error.

### C.1.1 Data Completeness Review and Conclusions for Breeding and Gestation Data Sets

The number of average daily means (ADM) for $NH_3$ emissions at varying percentages of data completeness for the revised data set are shown in Table C-1. For the swine breeding and gestation site data set, decreasing the daily completeness criteria from 75% to 50% would increase the number of valid days by 774 (17 %), but based on the Grant et al. (2013) study there would be an approximate 15% increase in error. Since the small increase in the number of ADM values does not justify the 15% increase in error, a daily completeness criterion of 75% was chosen for the revised $NH_3$ breeding and gestation site data set.

**Table C-1. The number of ADM for breeding and gestation $NH_3$ at varying percentages of data completeness.**

| % Valid Data | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 75 | 80 | 90 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IA4B B1 | 549 | 535 | 530 | 517 | 495 | 495 | 440 | 396 | 378 | 353 | 307 | 139 |
| IA4B B2 | 640 | 631 | 618 | 602 | 574 | 574 | 503 | 449 | 432 | 414 | 353 | 159 |
| IA4B F | 645 | 640 | 636 | 620 | 607 | 607 | 571 | 533 | 512 | 490 | 467 | 304 |
| NC4B B1 | 661 | 651 | 648 | 645 | 625 | 610 | 595 | 566 | 554 | 542 | 517 | 341 |
| NC4B B2 | 673 | 660 | 652 | 643 | 634 | 619 | 605 | 590 | 578 | 572 | 560 | 404 |
| NC4B F | 633 | 620 | 611 | 606 | 586 | 566 | 544 | 518 | 516 | 510 | 491 | 349 |
| OK4B B1 | 711 | 711 | 710 | 704 | 691 | 676 | 659 | 630 | 610 | 580 | 530 | 203 |
| OK4B B2 | 710 | 709 | 707 | 697 | 682 | 664 | 647 | 607 | 579 | 547 | 460 | 151 |
| OK4B F | 670 | 669 | 664 | 653 | 630 | 609 | 570 | 522 | 487 | 454 | 331 | 136 |
| Total | 5,892 | 5,826 | 5,776 | 5,687 | 5,524 | 5,420 | 5,134 | 4,811 | 4,646 | 4,462 | 4,016 | 2,186 |

For $H_2S$, the number of ADM at varying percentages of data completeness for the revised data set are shown in Table C-2. For the swine breeding and gestation site data set, decreasing the daily completeness criteria from 75% to 50% would increase the number of valid days by 786 (16%), but based on the Grant et al. (2013) study there would be an approximate 15% increase in error. Since the small increase in the number of ADM values does not justify the 15% increase in error, a daily completeness criterion of 75% was chosen for the revised $H_2S$ breeding and gestation site data set.

**Table C-2. The number of ADM for breeding and gestation $H_2S$ at varying percentages of data completeness.**

| % Valid Data | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 75 | 80 | 90 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IA4B B1 | 561 | 551 | 547 | 536 | 514 | 514 | 455 | 412 | 391 | 369 | 323 | 149 |
| IA4B B2 | 678 | 669 | 655 | 637 | 611 | 611 | 539 | 484 | 463 | 442 | 374 | 162 |
| IA4B F | 679 | 677 | 672 | 658 | 646 | 646 | 607 | 572 | 550 | 529 | 507 | 334 |
| NC4B B1 | 688 | 681 | 677 | 677 | 663 | 650 | 633 | 604 | 592 | 579 | 553 | 364 |
| NC4B B2 | 695 | 692 | 688 | 687 | 682 | 673 | 661 | 646 | 633 | 627 | 615 | 444 |
| NC4B F | 661 | 657 | 653 | 657 | 633 | 614 | 593 | 565 | 562 | 556 | 533 | 381 |
| OK4B B1 | 717 | 717 | 716 | 710 | 697 | 685 | 667 | 638 | 619 | 589 | 538 | 204 |
| OK4B B2 | 716 | 715 | 713 | 703 | 688 | 673 | 655 | 618 | 589 | 557 | 468 | 154 |
| OK4B F | 676 | 675 | 671 | 659 | 638 | 617 | 581 | 534 | 498 | 466 | 339 | 137 |
| Total | 6,071 | 6,034 | 5,992 | 5,924 | 5,772 | 5,683 | 5,391 | 5,073 | 4,897 | 4,714 | 4,250 | 2,329 |

For $PM_{10}$, the number of ADM at varying percentages of data completeness for the revised data set are shown in Table C-3. For the swine breeding and gestation site data set, decreasing the daily completeness criteria from 75% to 50% would increase the number of valid days by 456 (14 %). The number of ADM for $PM_{2.5}$ are presented in

Table C-4, and show the number of valid ADM would increase by 63 (21%). TSP (Table C-5) had an increase of 92 days (20%), when shifting to 50% completeness criteria. Again, the small increase in the number of ADM values does not justify the 15% increase in error, a daily completeness criterion of 75% was chosen for the all the PM species for the breeding and gestation data set.

**Table C-3. The number of ADM for breeding and gestation $PM_{10}$ at varying percentages of data completeness.**

| % Valid Data | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 75 | 80 | 90 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IA4B B1 | 478 | 469 | 465 | 454 | 437 | 437 | 391 | 369 | 359 | 337 | 279 | 102 |
| IA4B B2 | 478 | 469 | 460 | 444 | 421 | 421 | 373 | 349 | 341 | 321 | 257 | 97 |
| IA4B F | 498 | 492 | 488 | 476 | 464 | 464 | 430 | 410 | 395 | 391 | 359 | 186 |
| NC4B B1 | 423 | 422 | 421 | 426 | 416 | 404 | 391 | 381 | 379 | 378 | 367 | 220 |
| NC4B B2 | 332 | 331 | 330 | 334 | 327 | 321 | 309 | 308 | 305 | 304 | 302 | 198 |
| NC4B F | 287 | 283 | 281 | 286 | 271 | 251 | 249 | 232 | 230 | 233 | 202 | 59 |
| OK4B B1 | 570 | 569 | 569 | 564 | 548 | 531 | 519 | 500 | 494 | 478 | 425 | 134 |
| OK4B B2 | 533 | 532 | 530 | 520 | 502 | 483 | 473 | 449 | 434 | 411 | 335 | 104 |
| OK4B F | 494 | 493 | 493 | 483 | 465 | 450 | 423 | 393 | 369 | 336 | 227 | 66 |
| Total | 4,093 | 4,060 | 4,037 | 3,987 | 3,851 | 3,762 | 3,558 | 3,391 | 3,306 | 3,189 | 2,753 | 1,166 |

**Table C-4. The number ADM for breeding and gestation $PM_{2.5}$ at varying percentages of data completeness.**

| % Valid Data | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 75 | 80 | 90 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IA4B B1 | 51 | 51 | 51 | 51 | 49 | 49 | 40 | 38 | 36 | 34 | 31 | 6 |
| IA4B B2 | 59 | 58 | 57 | 53 | 52 | 52 | 44 | 42 | 39 | 35 | 28 | 9 |
| IA4B F | 66 | 66 | 66 | 66 | 63 | 63 | 54 | 52 | 51 | 51 | 49 | 25 |
| NC4B B1 | 39 | 37 | 37 | 37 | 36 | 34 | 31 | 30 | 28 | 28 | 26 | 10 |
| NC4B B2 | 31 | 29 | 29 | 29 | 28 | 26 | 25 | 25 | 25 | 24 | 24 | 12 |
| NC4B F | 28 | 28 | 28 | 27 | 26 | 24 | 24 | 24 | 24 | 24 | 23 | 4 |
| OK4B B1 | 55 | 55 | 55 | 55 | 51 | 50 | 48 | 45 | 43 | 41 | 40 | 22 |
| OK4B B2 | 55 | 54 | 54 | 54 | 52 | 50 | 48 | 43 | 42 | 40 | 37 | 18 |
| OK4B F | 17 | 17 | 17 | 16 | 13 | 12 | 12 | 10 | 9 | 8 | 1 | 0 |
| Total | 401 | 395 | 394 | 388 | 370 | 360 | 326 | 309 | 297 | 285 | 259 | 106 |

**Table C-5. The number of ADM for breeding and gestation TSP at varying percentages of data completeness.**

| % Valid Data | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 75 | 80 | 90 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IA4B B1 | 59 | 58 | 56 | 52 | 50 | 50 | 40 | 39 | 39 | 36 | 35 | 16 |
| IA4B B2 | 68 | 67 | 67 | 66 | 62 | 62 | 46 | 46 | 45 | 45 | 40 | 18 |
| IA4B F | 70 | 70 | 68 | 67 | 60 | 60 | 48 | 47 | 45 | 45 | 45 | 30 |
| NC4B B1 | 60 | 58 | 58 | 56 | 54 | 50 | 42 | 41 | 39 | 38 | 35 | 17 |
| NC4B B2 | 47 | 45 | 45 | 45 | 43 | 40 | 36 | 36 | 35 | 35 | 32 | 18 |
| NC4B F | 43 | 43 | 43 | 42 | 40 | 37 | 33 | 33 | 33 | 33 | 32 | 11 |
| OK4B B1 | 120 | 120 | 120 | 119 | 109 | 100 | 95 | 91 | 88 | 87 | 75 | 40 |
| OK4B B2 | 109 | 109 | 109 | 107 | 101 | 90 | 87 | 84 | 81 | 77 | 67 | 24 |
| OK4B F | 86 | 86 | 86 | 80 | 72 | 66 | 66 | 61 | 58 | 56 | 36 | 19 |
| Total | 662 | 656 | 652 | 634 | 591 | 555 | 493 | 478 | 463 | 452 | 397 | 193 |

### C.1.2 Data Completeness Review and Conclusions for Finishing Data Sets

For $NH_3$, the number of ADM for $NH_3$ emissions at varying percentages of data completeness for the revised data set are shown in Table C-6. For the swine confinement data set in this study, decreasing the daily completeness criteria from 75% to 50% would increase the number of valid days by 311 (10 %), but based on the Grant et al. (2013) study there would be an approximate 15% increase in error. Since the small increase in the number of ADM values does not justify the 15% increase in error, a daily completeness criterion of 75% was chosen for the revised $NH_3$ swine data set.

For $H_2S$, the number of ADM for $H_2S$ emissions at varying percentages of data completeness for the revised data set are shown in Table C-7. For the swine confinement data set in this study, decreasing the daily completeness criteria from 75% to 50% would increase the number of valid days by 395 (12%). This 12% increase in the number of ADM available would come at a cost of an approximate 15% increase in error. This small increase in the number of

ADM values does not justify the increase in error. As such the daily completeness criterion of 75% was retained for the revised $H_2S$ swine data set.

**Table C-6. The number of grow-finish ADM for grow-finish $NH_3$ at varying percentages of data completeness.**

| % Valid Data | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 75 | 80 | 90 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IN3B R5 | 459 | 455 | 451 | 444 | 435 | 419 | 399 | 379 | 373 | 343 | 339 | 265 |
| IN3B R6 | 427 | 415 | 412 | 404 | 386 | 372 | 359 | 342 | 336 | 301 | 297 | 236 |
| IN3B R7 | 422 | 416 | 413 | 406 | 387 | 374 | 360 | 342 | 331 | 307 | 298 | 213 |
| IN3B R8 | 390 | 380 | 376 | 372 | 366 | 351 | 335 | 315 | 307 | 286 | 285 | 228 |
| NC3B B1 | 637 | 635 | 630 | 627 | 624 | 618 | 600 | 586 | 571 | 558 | 545 | 386 |
| NC3B B2 | 632 | 629 | 624 | 622 | 619 | 608 | 590 | 573 | 561 | 543 | 527 | 374 |
| NC3B B3 | 628 | 624 | 621 | 620 | 618 | 604 | 592 | 569 | 556 | 534 | 521 | 376 |
| Total | 3595 | 3554 | 3527 | 3495 | 3435 | 3346 | 3235 | 3106 | 3035 | 2872 | 2812 | 2078 |

**Table C-7. The number of grow-finish ADM for grow-finish $H_2S$ at varying percentages of data completeness.**

| % Valid Data | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 75 | 80 | 90 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IN3B R5 | 602 | 602 | 600 | 592 | 577 | 560 | 535 | 508 | 497 | 466 | 457 | 339 |
| IN3B R6 | 564 | 553 | 549 | 544 | 529 | 507 | 487 | 457 | 446 | 408 | 398 | 302 |
| IN3B R7 | 565 | 558 | 555 | 546 | 530 | 509 | 479 | 455 | 437 | 399 | 389 | 274 |
| IN3B R8 | 503 | 491 | 484 | 477 | 464 | 448 | 421 | 395 | 385 | 354 | 349 | 279 |
| NC3B B1 | 619 | 616 | 612 | 608 | 605 | 600 | 585 | 568 | 555 | 542 | 536 | 399 |
| NC3B B2 | 614 | 610 | 606 | 603 | 602 | 589 | 574 | 555 | 543 | 524 | 518 | 382 |
| NC3B B3 | 610 | 606 | 603 | 601 | 600 | 586 | 577 | 555 | 541 | 527 | 522 | 389 |
| Total | 4077 | 4036 | 4009 | 3971 | 3907 | 3799 | 3658 | 3493 | 3404 | 3220 | 3169 | 2364 |

For the particulate matter species, the number of ADM for $PM_{10}$, $PM_{2.5}$, and TSP emissions at varying percentages of data completeness for the revised data set are shown in Table C-8, Table C-9, and Table C-10, respectively. Decreasing the daily completeness criteria from 75% to 50% would increase the number of valid $PM_{10}$ days by 238 (10%), valid $PM_{2.5}$ days by 27 (9.9%), and valid TSP days by 29 (13%). Again, based on the Grant et al. (2013) study, there would be an approximate 15% increase in error for these increases in the number of ADM values available. Since the small increase in the number of ADM values does not justify the 15% increase in error, a daily completeness criterion of 75% was chosen for the revised swine particulate matter data set. This value also matches the data completeness criteria used in the 2010 NAEMS data sets (Grant et al. 2009; Heber et al. 2008).

**Table C-8. The number of ADM for grow-finish $PM_{10}$ at varying percentages of data completeness.**

| % Valid Data | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 75 | 80 | 90 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IN3B R5 | 392 | 382 | 379 | 370 | 351 | 339 | 320 | 311 | 301 | 293 | 280 | 179 |
| IN3B R6 | 376 | 369 | 365 | 351 | 333 | 317 | 291 | 282 | 271 | 264 | 245 | 162 |
| IN3B R7 | 382 | 377 | 377 | 370 | 351 | 335 | 321 | 308 | 297 | 289 | 270 | 178 |
| IN3B R8 | 303 | 290 | 286 | 276 | 257 | 245 | 227 | 218 | 210 | 199 | 185 | 125 |
| NC3B B1 | 534 | 532 | 529 | 527 | 519 | 503 | 489 | 473 | 466 | 454 | 394 | 125 |
| NC3B B2 | 517 | 514 | 512 | 510 | 503 | 494 | 484 | 476 | 473 | 471 | 455 | 298 |
| NC3B B3 | 383 | 380 | 378 | 376 | 370 | 365 | 357 | 347 | 342 | 334 | 325 | 211 |
| Total | 2887 | 2844 | 2826 | 2780 | 2684 | 2598 | 2489 | 2415 | 2360 | 2304 | 2154 | 1278 |

**Table C-9. The number of ADM for grow-finish $PM_{2.5}$ at varying percentages of data completeness.**

| % Valid Data | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 75 | 80 | 90 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IN3B R5 | 44 | 43 | 43 | 42 | 40 | 36 | 34 | 33 | 32 | 32 | 26 | 16 |
| IN3B R6 | 42 | 41 | 41 | 40 | 37 | 35 | 34 | 32 | 31 | 31 | 29 | 22 |
| IN3B R7 | 41 | 40 | 40 | 39 | 37 | 35 | 34 | 32 | 31 | 30 | 29 | 21 |
| IN3B R8 | 39 | 39 | 38 | 37 | 35 | 32 | 31 | 30 | 28 | 28 | 27 | 18 |
| NC3B B1 | 69 | 69 | 69 | 69 | 68 | 63 | 59 | 59 | 59 | 59 | 58 | 35 |
| NC3B B2 | 69 | 69 | 69 | 68 | 67 | 63 | 59 | 59 | 59 | 59 | 59 | 37 |
| NC3B B3 | 39 | 39 | 39 | 39 | 38 | 36 | 33 | 33 | 33 | 33 | 33 | 24 |
| Total | 343 | 340 | 339 | 334 | 322 | 300 | 284 | 278 | 273 | 272 | 261 | 173 |

**Table C-10. The number of ADM for grow-finish TSP at varying percentages of data completeness.**

| % Valid Data | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 75 | 80 | 90 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IN3B R5 | 39 | 38 | 37 | 37 | 33 | 29 | 25 | 24 | 24 | 24 | 22 | 16 |
| IN3B R6 | 36 | 35 | 35 | 34 | 34 | 31 | 27 | 24 | 24 | 23 | 21 | 14 |
| IN3B R7 | 44 | 43 | 43 | 43 | 42 | 39 | 34 | 34 | 34 | 34 | 33 | 22 |
| IN3B R8 | 29 | 29 | 29 | 28 | 27 | 25 | 22 | 22 | 22 | 22 | 21 | 15 |
| NC3B B1 | 65 | 65 | 64 | 64 | 60 | 55 | 53 | 52 | 52 | 52 | 52 | 41 |
| NC3B B2 | 65 | 65 | 64 | 64 | 61 | 56 | 53 | 53 | 52 | 52 | 52 | 40 |
| NC3B B3 | 29 | 29 | 29 | 29 | 26 | 25 | 23 | 23 | 23 | 23 | 23 | 20 |
| Total | 307 | 304 | 301 | 299 | 283 | 260 | 237 | 232 | 231 | 230 | 224 | 168 |

### C.1.3 Data Completeness Review and Conclusions for Open Sources

As noted in Section 4.2.3 of Volume 1: Overview report, the data completeness criteria used was reviewed to see how much the data completeness criteria could be relaxed, but still have data that had acceptable error. Grant et al. (2013) suggested an error of ± 25% to be acceptable and by using an emission model determined that a daily data completeness of 52% (or 25 out of 48, 30-minute periods) gave less than ± 25% error. The review and conclusion for the swine open source data follows.

For $NH_3$ emissions, reducing the completeness criteria to 52% results in at least a 76% increase in the ADM values available. In most instances, the number of ADM values at least doubles with the relaxed completeness criteria. This substantial increase in the number of ADM values does justify the 15% increase in error, a daily completeness criterion of 52% was chosen for the revised NH3 emissions from swine open source data set.

Similarly, reducing the completion criteria for $H_2S$ to 52% results in at least a 914% increase in ADM values available at each site. Overall, for both pollutants, the number of ADM available more than doubles when the completeness criteria are relaxed to 52%. This substantial increase in the number of ADM values available is worth the estimated 15% increase in error.

**Table C-11. The number of grow – finish open source ADM for open source $NH_3$ at different percentages of data completeness.**

| Completeness criteria | NC3A | | | OK3A | | |
|---|---|---|---|---|---|---|
| | BLS | VRPM | Sum | BLS | VRPM | Sum |
| 52% | 10 | 8 | 16 | 41 | 26 | 59 |
| 75% | 5 | 3 | 7 | 17 | 9 | 25 |
| % change | 100% | 167% | 129% | 141% | 189% | 136% |

**Table C-12. The number of breeding and gestion open source ADM for open source $NH_3$ at different percentages of data completeness.**

| Completeness criteria | IN4A | | | NC4A | | | OK4A | | |
|---|---|---|---|---|---|---|---|---|---|
| | BLS | VRPM | Sum | BLS | VRPM | Sum | BLS | VRPM | Sum |
| 52% | 48 | 3 | 49 | 28 | 13 | 30 | 53 | 42 | 70 |
| 75% | 25 | 1 | 25 | 14 | 4 | 17 | 24 | 30 | 42 |
| % change | 92% | 200% | 96% | 100% | 225% | 76% | 121% | 40% | 67% |

**Table C-13. The number of open source ADM for open source $H_2S$ at different percentages of data completeness.**

| Completeness criteria | NC3A | OK3A | IN4A | NC4A | OK4A |
|---|---|---|---|---|---|
| | BLS | BLS | BLS | BLS | BLS |
| 52% | 15 | 53 | 34 | 30 | 36 |
| 75% | 7 | 19 | 15 | 14 | 18 |
| % change | 114% | 179% | 127% | 114% | 100% |

## C.2 Reference

Grant, R.H., Boehm, M.T., Lawrence, A.F., & Heber, A.J. (2013). Ammonia emissions from anaerobic treatment lagoons at sow and finishing farms in Oklahoma. Agricultural and Forest Meteorology 180, 203-210.

# Appendix D: Statistical Summaries

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## D.1 Gestation Barns

### D.1.1 Emissions

#### D.1.1.1 Ammonia ($NH_3$)

**Table D-1. $NH_3$ emission summary statistics for swine gestation barn (kg $d^{-1}$).**

| Statistic | IA4BB1 | IA4BB2 | NC4BB1 | NC4BB2 | OK4BB1 | OK4BB2 |
|---|---|---|---|---|---|---|
| Mean | 31.488 | 20.414 | 5.579 | 6.801 | 10.802 | 11.231 |
| Std. Dev. | 25.340 | 10.252 | 1.822 | 2.192 | 2.139 | 1.428 |
| Median | 21.990 | 20.505 | 5.372 | 6.790 | 10.352 | 11.145 |
| Minimum | 6.140 | 5.450 | -0.892 | 0.149 | 6.877 | 6.926 |
| Maximum | 110.240 | 60.010 | 11.139 | 12.950 | 21.385 | 17.026 |
| N | 378.000 | 432.000 | 554.000 | 578.000 | 610.000 | 579.000 |
| N<0 | 0.000 | 0.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| N>0 | 378.000 | 432.000 | 553.000 | 578.000 | 610.000 | 579.000 |
| Q25 | 11.910 | 11.770 | 4.177 | 5.216 | 9.192 | 10.395 |
| Q75 | 44.367 | 26.915 | 6.825 | 8.399 | 12.193 | 11.959 |
| CV | 80.473 | 50.219 | 32.661 | 32.227 | 19.800 | 12.714 |

**Table D-2. $NH_3$ emission summary statistics for swine gestation barn (g $d^{-1}$ $hd^{-1}$).**

| Statistic | IA4BB1 | IA4BB2 | NC4BB1 | NC4BB2 | OK4BB1 | OK4BB2 |
|---|---|---|---|---|---|---|
| Mean | 29.635 | 17.549 | 6.199 | 7.683 | 9.228 | 9.597 |
| Std. Dev. | 23.270 | 7.885 | 1.967 | 2.460 | 1.831 | 1.240 |
| Median | 20.911 | 18.148 | 6.018 | 7.693 | 8.845 | 9.463 |
| Minimum | 6.079 | 4.955 | -0.970 | 0.168 | 5.929 | 5.971 |
| Maximum | 107.157 | 37.468 | 12.160 | 14.485 | 18.596 | 14.552 |
| N | 368.000 | 418.000 | 554.000 | 578.000 | 610.000 | 579.000 |
| N<0 | 0.000 | 0.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| N>0 | 368.000 | 418.000 | 553.000 | 578.000 | 610.000 | 579.000 |
| Q25 | 11.973 | 10.459 | 4.750 | 5.937 | 7.872 | 8.868 |
| Q75 | 41.138 | 23.797 | 7.542 | 9.479 | 10.383 | 10.165 |
| CV | 78.520 | 44.930 | 31.730 | 32.014 | 19.837 | 12.923 |

### D.1.1.2 Hydrogen Sulfide ($H_2S$)

**Table D-3. $H_2S$ emission summary statistics for swine gestation barn (g $d^{-1}$).**

| Statistic | IA4BB1 | IA4BB2 | NC4BB1 | NC4BB2 | OK4BB1 | OK4BB2 |
|---|---|---|---|---|---|---|
| Mean | 8,591.202 | 5,735.745 | 278.850 | 219.791 | 862.413 | 884.092 |
| Std. Dev. | 5,658.223 | 3,572.425 | 213.070 | 189.896 | 225.623 | 203.456 |
| Median | 7,040.000 | 5,100.000 | 217.376 | 155.602 | 853.297 | 875.278 |
| Minimum | 1,900.000 | 1,320.000 | -27.244 | -4.562 | 297.787 | 451.481 |
| Maximum | 27,070.000 | 42,530.000 | 1,366.479 | 1,301.911 | 2,192.531 | 1,585.166 |
| N | 391.000 | 463.000 | 592.000 | 633.000 | 619.000 | 589.000 |
| N<0 | 0.000 | 0.000 | 2.000 | 1.000 | 0.000 | 0.000 |
| N>0 | 391.000 | 463.000 | 590.000 | 632.000 | 619.000 | 589.000 |
| Q25 | 3560.000 | 3,325.000 | 126.940 | 95.504 | 703.551 | 737.731 |
| Q75 | 12,225.000 | 7,285.000 | 356.300 | 269.658 | 1009.876 | 1,007.510 |
| CV | 65.861 | 62.284 | 76.410 | 86.398 | 26.162 | 23.013 |

**Table D-4. $H_2S$ emission summary statistics for swine gestation barn (mg $d^{-1}$ $hd^{-1}$).**

| Statistic | IA4BB1 | IA4BB2 | NC4BB1 | NC4BB2 | OK4BB1 | OK4BB2 |
|---|---|---|---|---|---|---|
| Mean | 8,555.263 | 5,173.822 | 308.464 | 248.083 | 736.761 | 755.110 |
| Std. Dev. | 5,635.014 | 3,233.696 | 234.970 | 213.980 | 192.158 | 172.859 |
| Median | 6,871.287 | 4,598.214 | 245.791 | 174.344 | 730.040 | 746.997 |
| Minimum | 1,932.859 | 1,178.571 | -30.577 | -5.161 | 252.362 | 392.592 |
| Maximum | 26,362.745 | 37,307.018 | 1,438.399 | 1,464.467 | 1,873.958 | 1,343.361 |
| N | 377.000 | 435.000 | 592.000 | 633.000 | 619.000 | 589.000 |
| N<0 | 0.000 | 0.000 | 2.000 | 1.000 | 0.000 | 0.000 |
| N>0 | 377.000 | 435.000 | 590.000 | 632.000 | 619.000 | 589.000 |
| Q25 | 3,663.968 | 2,898.230 | 140.246 | 107.856 | 605.672 | 627.190 |
| Q75 | 12,267.327 | 6,681.581 | 386.966 | 306.913 | 855.827 | 862.989 |
| CV | 65.866 | 62.501 | 76.174 | 86.254 | 26.081 | 22.892 |

### D.1.1.3 Particulate Matter ($PM_{10}$)

**Table D-5. $PM_{10}$ emission summary statistics for swine gestation barn (g $d^{-1}$).**

| Statistic | IA4BB1 | IA4BB2 | NC4BB1 | NC4BB2 | OK4BB1 | OK4BB2 |
|---|---|---|---|---|---|---|
| Mean | 465.542 | 526.882 | 251.912 | 385.232 | 345.485 | 493.392 |
| Std. Dev. | 225.015 | 224.148 | 101.769 | 183.924 | 122.991 | 152.480 |
| Median | 505.010 | 507.570 | 244.508 | 378.428 | 329.388 | 482.694 |
| Minimum | -41.330 | 8.290 | 32.075 | 29.574 | 62.895 | 93.769 |
| Maximum | 1,024.290 | 1,080.620 | 642.973 | 1,113.356 | 971.438 | 1,076.709 |
| N | 359.000 | 341.000 | 379.000 | 305.000 | 494.000 | 434.000 |
| N<0 | 3.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| N>0 | 356.000 | 341.000 | 379.000 | 305.000 | 494.000 | 434.000 |
| Q25 | 302.570 | 350.630 | 178.479 | 248.751 | 258.676 | 379.679 |
| Q75 | 620.355 | 671.630 | 320.681 | 488.898 | 410.439 | 585.847 |
| CV | 48.334 | 42.542 | 40.399 | 47.744 | 35.600 | 30.905 |

**Table D-6. $PM_{10}$ emission summary statistics for swine gestation barn (mg $d^{-1}$ $hd^{-1}$).**

| Statistic | IA4BB1 | IA4BB2 | NC4BB1 | NC4BB2 | OK4BB1 | OK4BB2 |
|---|---|---|---|---|---|---|
| Mean | 463.473 | 485.683 | 279.409 | 436.377 | 294.873 | 420.701 |
| Std. Dev. | 230.495 | 210.201 | 112.521 | 206.767 | 105.017 | 129.723 |
| Median | 497.123 | 472.087 | 269.605 | 427.159 | 281.585 | 412.697 |
| Minimum | -40.921 | 7.336 | 32.301 | 33.267 | 53.301 | 81.538 |
| Maximum | 1050.919 | 1000.574 | 716.005 | 1253.779 | 816.335 | 904.798 |
| N | 343.000 | 320.000 | 379.000 | 305.000 | 494.000 | 434.000 |
| N<0 | 3.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| N>0 | 340.000 | 320.000 | 379.000 | 305.000 | 494.000 | 434.000 |
| Q25 | 289.322 | 315.336 | 193.605 | 281.075 | 220.957 | 322.785 |
| Q75 | 620.873 | 626.216 | 357.498 | 552.357 | 350.539 | 501.576 |
| CV | 49.732 | 43.280 | 40.271 | 47.383 | 35.614 | 30.835 |

### D.1.1.4 Particulate Matter ($PM_{2.5}$)

**Table D-7. $PM_{2.5}$ emission summary statistics for swine gestation barn (g $d^{-1}$).**

| Statistic | IA4BB1 | IA4BB2 | NC4BB1 | NC4BB2 | OK4BB1 | OK4BB2 |
|---|---|---|---|---|---|---|
| Mean | 48.312 | 52.407 | 34.642 | 40.651 | 31.292 | 56.636 |
| Std. Dev. | 17.340 | 28.578 | 12.503 | 17.066 | 15.430 | 23.504 |
| Median | 46.580 | 50.550 | 38.248 | 37.060 | 28.126 | 56.780 |
| Minimum | 4.930 | -5.310 | 0.215 | 23.619 | 4.499 | 6.358 |
| Maximum | 107.070 | 117.150 | 52.060 | 116.413 | 94.183 | 145.724 |
| N | 36.000 | 39.000 | 28.000 | 25.000 | 40.000 | 39.000 |
| N<0 | 0.000 | 1.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| N>0 | 36.000 | 38.000 | 28.000 | 25.000 | 40.000 | 39.000 |
| Q25 | 39.385 | 26.155 | 28.528 | 33.764 | 26.349 | 47.579 |
| Q75 | 54.828 | 74.935 | 41.743 | 42.838 | 33.519 | 61.810 |
| CV | 35.892 | 54.530 | 36.093 | 41.981 | 49.309 | 41.499 |

**Table D-8. $PM_{2.5}$ emission summary statistics for swine gestation barn (mg $d^{-1}$ $hd^{-1}$).**

| Statistic | IA4BB1 | IA4BB2 | NC4BB1 | NC4BB2 | OK4BB1 | OK4BB2 |
|---|---|---|---|---|---|---|
| Mean | 47.109 | 49.868 | 37.750 | 45.904 | 26.959 | 48.771 |
| Std. Dev. | 16.892 | 28.627 | 13.582 | 19.269 | 13.462 | 20.384 |
| Median | 46.230 | 54.566 | 41.534 | 41.688 | 24.069 | 48.654 |
| Minimum | 4.786 | -4.699 | 0.232 | 26.568 | 3.845 | 5.529 |
| Maximum | 102.952 | 105.541 | 56.649 | 131.391 | 81.899 | 126.717 |
| N | 36.000 | 30.000 | 28.000 | 25.000 | 40.000 | 39.000 |
| N<0 | 0.000 | 1.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| N>0 | 36.000 | 29.000 | 28.000 | 25.000 | 40.000 | 39.000 |
| Q25 | 37.960 | 21.960 | 30.556 | 38.066 | 22.520 | 40.883 |
| Q75 | 53.857 | 72.457 | 45.626 | 48.569 | 28.777 | 53.374 |
| CV | 35.858 | 57.406 | 35.979 | 41.976 | 49.936 | 41.796 |

### D.1.1.5 Total Suspended Particulates (TSP)

**Table D-9. TSP emission summary statistics for swine gestation barn (g $d^{-1}$).**

| Statistic | IA4BB1 | IA4BB2 | NC4BB1 | NC4BB2 | OK4BB1 | OK4BB2 |
|---|---|---|---|---|---|---|
| Mean | 727.687 | 1068.210 | 445.438 | 549.738 | 629.639 | 787.299 |
| Std. Dev. | 445.151 | 462.091 | 283.213 | 266.590 | 277.233 | 301.803 |
| Median | 772.240 | 1130.090 | 412.914 | 557.654 | 575.405 | 795.424 |
| Minimum | 109.380 | 317.620 | 55.925 | 162.176 | 216.089 | 256.356 |
| Maximum | 1603.840 | 2108.260 | 1206.440 | 1005.726 | 1260.706 | 1545.412 |
| N | 39.000 | 45.000 | 39.000 | 35.000 | 88.000 | 81.000 |
| N>0 | 39.000 | 45.000 | 39.000 | 35.000 | 88.000 | 81.000 |
| Q25 | 278.565 | 704.710 | 221.316 | 295.150 | 363.393 | 599.448 |
| Q75 | 1100.575 | 1312.000 | 599.061 | 767.719 | 855.118 | 959.400 |
| CV | 61.173 | 43.258 | 63.581 | 48.494 | 44.030 | 38.334 |

**Table D-10. TSP emission summary statistics for swine gestation barn (mg $d^{-1}$ $hd^{-1}$).**

| Statistic | IA4BB1 | IA4BB2 | NC4BB1 | NC4BB2 | OK4BB1 | OK4BB2 |
|---|---|---|---|---|---|---|
| Mean | 716.550 | 975.781 | 506.152 | 622.386 | 538.709 | 673.227 |
| Std. Dev. | 439.188 | 442.551 | 322.167 | 302.799 | 235.609 | 255.823 |
| Median | 781.436 | 1017.386 | 464.471 | 632.261 | 494.019 | 679.999 |
| Minimum | 105.173 | 283.589 | 65.029 | 184.710 | 184.692 | 219.107 |
| Maximum | 1613.521 | 2007.867 | 1367.400 | 1145.473 | 1077.527 | 1309.671 |
| N | 39.000 | 45.000 | 39.000 | 35.000 | 88.000 | 81.000 |
| N>0 | 39.000 | 45.000 | 39.000 | 35.000 | 88.000 | 81.000 |
| Q25 | 267.851 | 634.874 | 252.426 | 334.606 | 315.276 | 515.039 |
| Q75 | 1083.716 | 1189.568 | 679.875 | 867.016 | 723.121 | 827.069 |
| CV | 61.292 | 45.353 | 63.650 | 48.651 | 43.736 | 38.000 |

### D.1.2 Environmental

**Table D-11. Environmental parameter summary statistics for swine gestation barn.**

| Parameter | Statistic | IA4BB1 | IA4BB2 | NC4BB1 | NC4BB2 | OK4BB1 | OK4BB2 |
|---|---|---|---|---|---|---|---|
| Inventory (hd) | Mean | 1,007.538 | 1,105.648 | 901.593 | 884.910 | 1,170.427 | 1,170.578 |
| Inventory (hd) | Std. Dev. | 33.310 | 33.565 | 48.724 | 8.404 | 13.068 | 13.225 |
| Inventory (hd) | Median | 1,020.000 | 1,120.000 | 907.000 | 887.000 | 1,170.000 | 1,170.000 |
| Inventory (hd) | Minimum | 909.000 | 997.000 | 768.000 | 856.000 | 1,140.000 | 1,140.000 |
| Inventory (hd) | Maximum | 1,080.000 | 1,190.000 | 1,010.000 | 896.000 | 1,200.000 | 1,200.000 |
| Inventory (hd) | N | 474.000 | 488.000 | 627.000 | 641.000 | 655.000 | 623.000 |
| Inventory (hd) | Q25 | 987.250 | 1,090.000 | 878.500 | 882.000 | 1,160.000 | 1,160.000 |
| Inventory (hd) | Q75 | 1,030.000 | 1,130.000 | 933.000 | 890.000 | 1,180.000 | 1,180.000 |
| Inventory (hd) | CV | 0.033 | 0.030 | 0.054 | 0.009 | 0.011 | 0.011 |
| Average Weight (kg) | Mean | 249.000 | 249.000 | 181.000 | 181.000 | 200.000 | 200.000 |
| Average Weight (kg) | Std. Dev. | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Average Weight (kg) | Median | 249.000 | 249.000 | 181.000 | 181.000 | 200.000 | 200.000 |
| Average Weight (kg) | Minimum | 249.000 | 249.000 | 181.000 | 181.000 | 200.000 | 200.000 |
| Average Weight (kg) | Maximum | 249.000 | 249.000 | 181.000 | 181.000 | 200.000 | 200.000 |
| Average Weight (kg) | N | 474.000 | 488.000 | 627.000 | 641.000 | 655.000 | 623.000 |
| Average Weight (kg) | Q25 | 249.000 | 249.000 | 181.000 | 181.000 | 200.000 | 200.000 |
| Average Weight (kg) | Q75 | 249.000 | 249.000 | 181.000 | 181.000 | 200.000 | 200.000 |
| Average Weight (kg) | CV | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Live animal weight (Mg) | Mean | 250,876.956 | 275,306.238 | 163,188.388 | 160,168.622 | 234,085.496 | 234,115.570 |
| Live animal weight (Mg) | Std. Dev. | 8,294.251 | 8,357.584 | 8,819.049 | 1,521.214 | 2,613.542 | 2,645.046 |
| Live animal weight (Mg) | Median | 253,980.000 | 278,880.000 | 164,167.000 | 160,547.000 | 234,000.000 | 234,000.000 |
| Live animal weight (Mg) | Minimum | 226,341.000 | 248,253.000 | 139,008.000 | 154,936.000 | 228,000.000 | 228,000.000 |
| Live animal weight (Mg) | Maximum | 268,920.000 | 296,310.000 | 182,810.000 | 162,176.000 | 240,000.000 | 240,000.000 |
| Live animal weight (Mg) | N | 474.000 | 488.000 | 627.000 | 641.000 | 655.000 | 623.000 |
| Live animal weight (Mg) | Q25 | 245,825.250 | 271,410.000 | 159,008.500 | 159,642.000 | 232000.000 | 232000.000 |
| Live animal weight (Mg) | Q75 | 256,470.000 | 281,370.000 | 168,873.000 | 161,090.000 | 236000.000 | 236000.000 |
| Live animal weight (Mg) | CV | 0.033 | 0.030 | 0.054 | 0.009 | 0.011 | 0.011 |
| Exhaust Temperature (C) | Mean | 17.168 | 17.387 | 22.915 | 24.638 | 21.780 | 21.590 |
| Exhaust Temperature (C) | Std. Dev. | 4.784 | 5.235 | 2.279 | 2.099 | 2.754 | 3.002 |
| Exhaust Temperature (C) | Median | 17.100 | 17.200 | 23.000 | 24.300 | 21.600 | 21.500 |
| Exhaust Temperature (C) | Minimum | 7.300 | 6.300 | 12.800 | 18.100 | 16.100 | 11.400 |
| Exhaust Temperature (C) | Maximum | 27.600 | 27.900 | 28.100 | 31.200 | 27.800 | 27.600 |
| Exhaust Temperature (C) | N | 490.000 | 519.000 | 624.000 | 640.000 | 655.000 | 623.000 |
| Exhaust Temperature (C) | Q25 | 13.100 | 12.850 | 21.400 | 23.100 | 19.600 | 19.550 |
| Exhaust Temperature (C) | Q75 | 21.400 | 22.150 | 24.600 | 26.100 | 24.050 | 24.100 |
| Exhaust Temperature (C) | CV | 0.279 | 0.301 | 0.099 | 0.085 | 0.126 | 0.139 |
| Exhaust Relative Humidity (%) | Mean | 62.994 | 59.729 | 63.172 | 59.950 | 52.170 | 55.380 |
| Exhaust Relative Humidity (%) | Std. Dev. | 7.802 | 8.362 | 9.427 | 8.116 | 9.840 | 10.430 |
| Exhaust Relative Humidity (%) | Median | 64.450 | 60.000 | 63.100 | 59.900 | 50.600 | 54.200 |
| Exhaust Relative Humidity (%) | Minimum | 38.800 | 33.300 | 40.700 | 39.100 | 26.700 | 28.800 |
| Exhaust Relative Humidity (%) | Maximum | 83.100 | 80.800 | 83.400 | 79.500 | 76.400 | 80.200 |
| Exhaust Relative Humidity (%) | N | 484.000 | 498.000 | 624.000 | 628.000 | 650.000 | 613.000 |
| Exhaust Relative Humidity (%) | Q25 | 58.500 | 54.300 | 55.475 | 53.700 | 44.600 | 47.500 |
| Exhaust Relative Humidity (%) | Q75 | 67.900 | 65.400 | 71.100 | 66.000 | 60.100 | 63.500 |
| Exhaust Relative Humidity (%) | CV | 0.124 | 0.140 | 0.149 | 0.135 | 0.189 | 0.188 |
| Airflow ($dsm^3s^{-1}$) | Mean | 28.664 | 35.669 | 35.002 | 25.265 | 32.623 | 34.504 |
| Airflow ($dsm^3s^{-1}$) | Std. Dev. | 18.414 | 21.475 | 23.730 | 15.678 | 17.027 | 16.893 |
| Airflow ($dsm^3s^{-1}$) | Median | 22.200 | 26.415 | 29.632 | 22.049 | 30.274 | 31.932 |
| Airflow ($dsm^3s^{-1}$) | Minimum | 6.250 | 8.400 | 3.708 | 3.549 | 6.996 | 7.094 |
| Airflow ($dsm^3s^{-1}$) | Maximum | 68.130 | 73.440 | 90.270 | 62.624 | 62.572 | 65.140 |

| Parameter | Statistic | IA4BB1 | IA4BB2 | NC4BB1 | NC4BB2 | OK4BB1 | OK4BB2 |
|---|---|---|---|---|---|---|---|
| Airflow ($dsm^3s^{-1}$) | N | 471.000 | 494.000 | 621.000 | 629.000 | 655.000 | 623.000 |
| Airflow ($dsm^3s^{-1}$) | Q25 | 12.080 | 16.960 | 12.870 | 11.067 | 17.404 | 19.293 |
| Airflow ($dsm^3s^{-1}$) | Q75 | 47.515 | 58.675 | 57.345 | 39.368 | 49.670 | 51.605 |
| Airflow ($dsm^3s^{-1}$) | CV | 0.642 | 0.602 | 0.678 | 0.621 | 0.522 | 0.490 |

### D.1.3 Ambient

**Table D-12. Summary of ambient meteorological parameters for swine gestation barn.**

| Parameter | Statistic | IA4B | NC4B | OK4B |
|---|---|---|---|---|
| Ambient Temperature (°C) | Mean | 8.949 | 19.523 | 14.987 |
| Ambient Temperature (°C) | Std. Dev. | 12.190 | 6.937 | 10.217 |
| Ambient Temperature (°C) | Median | 10.200 | 20.800 | 15.850 |
| Ambient Temperature (°C) | Minimum | -25.100 | 1.800 | -12.600 |
| Ambient Temperature (°C) | Maximum | 29.200 | 32.000 | 33.200 |
| Ambient Temperature (°C) | count | 579.000 | 540.000 | 658.000 |
| Ambient Temperature (°C) | Q25 | -0.800 | 14.375 | 7.100 |
| Ambient Temperature (°C) | Q75 | 20.200 | 25.400 | 24.000 |
| Ambient Temperature (°C) | CV | 1.362 | 0.355 | 0.682 |
| Relative humidity (%) | Mean | 71.577 | 69.206 | 52.437 |
| Relative humidity (%) | Std. Dev. | 11.066 | 12.640 | 14.773 |
| Relative humidity (%) | Median | 72.800 | 69.500 | 51.500 |
| Relative humidity (%) | Minimum | 36.400 | 32.800 | 12.000 |
| Relative humidity (%) | Maximum | 91.800 | 94.600 | 90.100 |
| Relative humidity (%) | count | 579.000 | 565.000 | 658.000 |
| Relative humidity (%) | Q25 | 65.000 | 60.700 | 42.025 |
| Relative humidity (%) | Q75 | 79.750 | 78.300 | 61.525 |
| Relative humidity (%) | CV | 0.155 | 0.183 | 0.282 |
| Barometric Pressure (kPa) | Mean | 98.400 | 100.531 | 91.047 |
| Barometric Pressure (kPa) | Std. Dev. | 1.321 | 0.660 | 0.663 |
| Barometric Pressure (kPa) | Median | 98.000 | 100.500 | 91.000 |
| Barometric Pressure (kPa) | Minimum | 94.700 | 98.470 | 88.700 |
| Barometric Pressure (kPa) | Maximum | 102.200 | 102.900 | 93.100 |
| Barometric Pressure (kPa) | count | 605.000 | 648.000 | 672.000 |
| Barometric Pressure (kPa) | Q25 | 97.400 | 100.100 | 90.600 |
| Barometric Pressure (kPa) | Q75 | 99.500 | 100.900 | 91.500 |
| Barometric Pressure (kPa) | CV | 0.013 | 0.007 | 0.007 |

## D.2 Farrowing Rooms

### D.2.1 Emissions

#### D.2.1.1 Ammonia ($NH_3$)

**Table D-13. $NH_3$ emission summary statistics for swine farrowing rooms (kg $d^{-1}$).**

| Statistic | IA4BF | NC4BF | OK4BF |
|---|---|---|---|
| Mean | 0.254 | 0.129 | 0.506 |
| Std. Dev. | 0.207 | 0.057 | 0.147 |
| Median | 0.210 | 0.122 | 0.499 |
| Minimum | 0.010 | -0.005 | 0.081 |
| Maximum | 1.770 | 0.363 | 1.039 |
| N | 511.000 | 514.000 | 487.000 |
| N<0 | 0.000 | 1.000 | 0.000 |
| N>0 | 511.000 | 513.000 | 487.000 |
| Q25 | 0.110 | 0.086 | 0.415 |
| Q75 | 0.340 | 0.163 | 0.592 |
| CV | 81.461 | 43.905 | 28.938 |

**Table D-14. $NH_3$ emission summary statistics for swine farrowing rooms (kg $d^{-1}$ $hd^{-1}$).**

| Statistic | IA4BF | NC4BF | OK4BF |
|---|---|---|---|
| Mean | 1.156 | 0.938 | 1.788 |
| Std. Dev. | 1.476 | 1.631 | 0.562 |
| Median | 0.772 | 0.590 | 1.735 |
| Minimum | 0.0353 | -0.0259 | 0.303 |
| Maximum | 15.000 | 19.375 | 3.790 |
| N | 471.000 | 509.000 | 487.000 |
| N<0 | 0.000 | 1.000 | 0.000 |
| N>0 | 471.000 | 508.000 | 487.000 |
| Q25 | 0.429 | 0.418 | 1.413 |
| Q75 | 1.325 | 0.799 | 2.112 |
| CV | 127.730 | 173.883 | 31.401 |

### D.2.1.2 Hydrogen Sulfide ($H_2S$)

**Table D-15. $H_2S$ emission summary statistics for swine farrowing rooms (g $d^{-1}$).**

| Statistic | IA4BF | NC4BF | OK4BF |
|---|---|---|---|
| Mean | 91.041 | 131.807 | 103.294 |
| Std. Dev. | 170.007 | 90.383 | 81.483 |
| Median | 18.165 | 117.999 | 91.698 |
| Minimum | 0.260 | 1.613 | -1.859 |
| Maximum | 1183.470 | 483.376 | 351.920 |
| N | 550.000 | 562.000 | 498.000 |
| N<0 | 0.000 | 0.000 | 2.000 |
| N>0 | 550.000 | 562.000 | 496.000 |
| Q25 | 8.793 | 55.824 | 26.280 |
| Q75 | 78.537 | 198.415 | 164.458 |
| CV | 186.736 | 68.572 | 78.885 |

**Table D-16. $H_2S$ emission summary statistics for swine farrowing rooms (mg $d^{-1}$ $hd^{-1}$).**

| Statistic | IA4BF | NC4BF | OK4BF |
|---|---|---|---|
| Mean | 430.331 | 931.515 | 373.054 |
| Std. Dev. | 1238.642 | 1749.535 | 302.895 |
| Median | 67.533 | 575.633 | 322.408 |
| Minimum | 1.024 | 7.364 | -7.070 |
| Maximum | 21823.704 | 18188.279 | 1308.252 |
| N | 494.000 | 557.000 | 498.000 |
| N<0 | 0.000 | 0.000 | 2.000 |
| N>0 | 494.000 | 557.000 | 496.000 |
| Q25 | 32.588 | 294.552 | 89.036 |
| Q75 | 268.959 | 963.577 | 589.842 |
| CV | 287.835 | 187.816 | 81.193 |

### D.2.1.3 Particulate Matter ($PM_{10}$)

**Table D-17. $PM_{10}$ emission summary statistics for swine farrowing rooms (g $d^{-1}$).**

| Statistic | IA4BF | NC4BF | OK4BF |
|---|---|---|---|
| Mean | 28.408 | 27.825 | 46.214 |
| Std. Dev. | 16.871 | 15.037 | 26.667 |
| Median | 27.250 | 25.840 | 44.434 |
| Minimum | -0.220 | 3.854 | -4.565 |
| Maximum | 91.460 | 75.414 | 122.131 |
| N | 395.000 | 230.000 | 369.000 |
| N<0 | 1.000 | 0.000 | 2.000 |
| N>0 | 394.000 | 230.000 | 367.000 |
| Q25 | 17.185 | 15.114 | 25.309 |
| Q75 | 38.920 | 38.091 | 64.703 |
| CV | 59.388 | 54.043 | 57.703 |

**Table D-18. $PM_{10}$ emission summary statistics for swine farrowing rooms (mg $d^{-1}$ $hd^{-1}$).**

| Statistic | IA4BF | NC4BF | OK4BF |
|---|---|---|---|
| Mean | 116.235 | 149.501 | 164.196 |
| Std. Dev. | 76.203 | 116.258 | 98.823 |
| Median | 102.805 | 125.902 | 154.407 |
| Minimum | 7.026 | 24.511 | -14.725 |
| Maximum | 429.811 | 934.917 | 452.339 |
| N | 353.000 | 230.000 | 369.000 |
| N<0 | 0.000 | 0.000 | 2.000 |
| N>0 | 353.000 | 230.000 | 367.000 |
| Q25 | 66.439 | 85.783 | 85.504 |
| Q75 | 150.811 | 184.519 | 229.432 |
| CV | 65.559 | 77.764 | 60.186 |

### D.2.1.4 Particulate Matter ($PM_{2.5}$)

**Table D-19. $PM_{2.5}$ emission summary statistics for swine farrowing rooms (g $d^{-1}$).**

| Statistic | IA4BF | NC4BF | OK4BF |
|---|---|---|---|
| Mean | 3.132 | 2.540 | 6.755 |
| Std. Dev. | 2.697 | 1.006 | 5.254 |
| Median | 2.320 | 2.242 | 7.355 |
| Minimum | 0.090 | 0.962 | 1.439 |
| Maximum | 11.620 | 4.695 | 14.778 |
| N | 51.000 | 24.000 | 9.000 |
| N>0 | 51.000 | 24.000 | 9.000 |
| Q25 | 1.610 | 1.753 | 1.916 |
| Q75 | 3.690 | 3.287 | 9.453 |
| CV | 86.105 | 39.603 | 77.779 |

**Table D-20. $PM_{2.5}$ emission summary statistics for swine farrowing rooms (mg $d^{-1}$ $hd^{-1}$).**

| Statistic | IA4BF | NC4BF | OK4BF |
|---|---|---|---|
| Mean | 14.925 | 46.091 | 24.582 |
| Std. Dev. | 10.322 | 75.121 | 19.843 |
| Median | 9.518 | 11.109 | 27.041 |
| Minimum | 4.163 | 5.201 | 4.671 |
| Maximum | 42.255 | 247.126 | 54.733 |
| N | 42.000 | 24.000 | 9.000 |
| N>0 | 42.000 | 24.000 | 9.000 |
| Q25 | 7.829 | 7.662 | 6.261 |
| Q75 | 25.552 | 17.404 | 34.625 |
| CV | 69.159 | 162.985 | 80.721 |

### D.2.1.5 Total Suspended Particulates (TSP)

**Table D-21. TSP emission summary statistics for swine farrowing rooms (g $d^{-1}$).**

| Statistic | IA4BF | NC4BF | OK4BF |
|---|---|---|---|
| Mean | 67.452 | 90.687 | 125.172 |
| Std. Dev. | 36.386 | 60.084 | 83.368 |
| Median | 60.610 | 89.908 | 100.166 |
| Minimum | 15.340 | 11.410 | 18.716 |
| Maximum | 148.660 | 192.895 | 317.088 |
| N | 45.000 | 33.000 | 58.000 |
| N>0 | 45.000 | 33.000 | 58.000 |
| Q25 | 38.830 | 27.908 | 63.562 |
| Q75 | 95.240 | 130.862 | 174.396 |
| CV | 53.943 | 66.254 | 66.602 |

**Table D-22. TSP emission summary statistics for swine farrowing rooms (mg $d^{-1}$ $hd^{-1}$).**

| Statistic | IA4BF | NC4BF | OK4BF |
|---|---|---|---|
| Mean | 275.436 | 775.268 | 443.877 |
| Std. Dev. | 156.256 | 789.727 | 312.448 |
| Median | 233.434 | 587.512 | 346.767 |
| Minimum | 91.856 | 52.579 | 61.306 |
| Maximum | 835.971 | 3154.389 | 1178.768 |
| N | 45.000 | 33.000 | 58.000 |
| N>0 | 45.000 | 33.000 | 58.000 |
| Q25 | 143.065 | 232.784 | 210.278 |
| Q75 | 366.308 | 817.737 | 621.079 |
| CV | 56.730 | 101.865 | 70.391 |

### D.2.2 Environmental

**Table D-23. Environmental parameter summary statistics for swine farrowing rooms.**

| Parameter | Statistic | IA4BF | NC4BF | OK4BF |
|---|---|---|---|---|
| Inventory (hd) | Mean | 244.904 | 200.101 | 285.635 |
| Inventory (hd) | Std. Dev. | 67.707 | 55.804 | 18.298 |
| Inventory (hd) | Median | 270.000 | 219.000 | 286.000 |
| Inventory (hd) | Minimum | 0.000 | 8.000 | 118.000 |
| Inventory (hd) | Maximum | 319.000 | 347.000 | 310.000 |
| Inventory (hd) | N | 572.000 | 565.000 | 526.000 |
| Inventory (hd) | Q25 | 251.000 | 203.000 | 275.000 |
| Inventory (hd) | Q75 | 282.250 | 225.000 | 298.000 |
| Inventory (hd) | CV | 0.276 | 0.279 | 0.064 |
| Average Weight (kg) | Mean | 26.497 | 29.950 | 21.816 |
| Average Weight (kg) | Std. Dev. | 10.867 | 36.180 | 2.207 |
| Average Weight (kg) | Median | 24.916 | 21.336 | 21.811 |
| Average Weight (kg) | Minimum | 0.000 | 5.350 | 17.984 |
| Average Weight (kg) | Maximum | 204.696 | 181.000 | 30.424 |
| Average Weight (kg) | N | 568.000 | 565.000 | 526.000 |
| Average Weight (kg) | Q25 | 22.985 | 19.798 | 20.153 |
| Average Weight (kg) | Q75 | 26.880 | 22.737 | 23.717 |
| Average Weight (kg) | CV | 0.410 | 1.208 | 0.101 |
| Live animal weight | Mean | 6325.609 | 4338.961 | 6198.850 |
| Live animal weight | Std. Dev. | 1350.473 | 735.939 | 425.941 |
| Live animal weight | Median | 6582.700 | 4445.080 | 6254.100 |
| Live animal weight | Minimum | 0.000 | 660.300 | 3590.000 |
| Live animal weight | Maximum | 7480.800 | 6263.080 | 6719.700 |
| Live animal weight | N | 568.000 | 565.000 | 526.000 |
| Live animal weight | Q25 | 6322.950 | 4076.980 | 5915.180 |
| Live animal weight | Q75 | 6866.100 | 4784.040 | 6572.030 |
| Live animal weight | CV | 0.213 | 0.170 | 0.069 |
| Exhaust Temperatures (C) | Mean | 24.977 | 25.511 | 24.009 |
| Exhaust Temperatures (C) | Std. Dev. | 2.207 | 1.473 | 1.422 |
| Exhaust Temperatures (C) | Median | 24.700 | 25.300 | 23.900 |
| Exhaust Temperatures (C) | Minimum | 16.000 | 22.200 | 20.000 |
| Exhaust Temperatures (C) | Maximum | 31.800 | 29.200 | 27.600 |
| Exhaust Temperatures (C) | N | 603.000 | 568.000 | 526.000 |
| Exhaust Temperatures (C) | Q25 | 23.250 | 24.400 | 23.000 |
| Exhaust Temperatures (C) | Q75 | 26.500 | 26.700 | 25.000 |
| Exhaust Temperatures (C) | CV | 0.088 | 0.058 | 0.059 |
| Exhaust Relative Humidity (%) | Mean | 55.619 | 59.892 | 53.117 |
| Exhaust Relative Humidity (%) | Std. Dev. | 8.511 | 9.696 | 10.990 |
| Exhaust Relative Humidity (%) | Median | 54.300 | 59.700 | 50.000 |
| Exhaust Relative Humidity (%) | Minimum | 33.900 | 34.400 | 27.400 |
| Exhaust Relative Humidity (%) | Maximum | 78.300 | 80.500 | 82.800 |

| Parameter | Statistic | IA4BF | NC4BF | OK4BF |
|---|---|---|---|---|
| Exhaust Relative Humidity (%) | N | 603.000 | 569.000 | 490.000 |
| Exhaust Relative Humidity (%) | Q25 | 49.800 | 51.900 | 44.800 |
| Exhaust Relative Humidity (%) | Q75 | 60.700 | 67.900 | 61.950 |
| Exhaust Relative Humidity (%) | CV | 0.153 | 0.162 | 0.207 |
| Airflow ($dsm^3s^{-1}$) | Mean | 1.135 | 1.711 | 2.699 |
| Airflow ($dsm^3s^{-1}$) | Std. Dev. | 0.861 | 1.246 | 1.491 |
| Airflow ($dsm^3s^{-1}$) | Median | 0.840 | 1.266 | 2.200 |
| Airflow ($dsm^3s^{-1}$) | Minimum | 0.180 | 0.218 | 0.631 |
| Airflow ($dsm^3s^{-1}$) | Maximum | 3.390 | 4.762 | 6.045 |
| Airflow ($dsm^3s^{-1}$) | N | 603.000 | 569.000 | 500.000 |
| Airflow ($dsm^3s^{-1}$) | Q25 | 0.460 | 0.599 | 1.455 |
| Airflow ($dsm^3s^{-1}$) | Q75 | 1.530 | 2.745 | 3.922 |
| Airflow ($dsm^3s^{-1}$) | CV | 0.758 | 0.728 | 0.553 |

### D.2.3 Ambient

**Table D-24. Summary of ambient meteorological parameters for swine farrowing rooms.**

| Parameter | Statistic | IA4B | NC4B | OK4B |
|---|---|---|---|---|
| Ambient Temperature (°C) | Mean | 8.391 | 19.469 | 16.384 |
| Ambient Temperature (°C) | Std. Dev. | 12.169 | 6.969 | 9.226 |
| Ambient Temperature (°C) | Median | 9.300 | 21.000 | 16.800 |
| Ambient Temperature (°C) | Minimum | -25.100 | 1.800 | -6.900 |
| Ambient Temperature (°C) | Maximum | 29.200 | 32.000 | 33.200 |
| Ambient Temperature (°C) | count | 589.000 | 468.000 | 518.000 |
| Ambient Temperature (°C) | Q25 | -1.800 | 14.100 | 9.000 |
| Ambient Temperature (°C) | Q75 | 19.800 | 25.400 | 24.300 |
| Ambient Temperature (°C) | CV | 1.450 | 0.358 | 0.563 |
| Relative humidity (%) | Mean | 71.662 | 69.237 | 50.852 |
| Relative humidity (%) | Std. Dev. | 10.872 | 12.695 | 14.138 |
| Relative humidity (%) | Median | 72.900 | 69.700 | 50.000 |
| Relative humidity (%) | Minimum | 36.400 | 32.800 | 12.000 |
| Relative humidity (%) | Maximum | 91.800 | 94.600 | 92.100 |
| Relative humidity (%) | count | 589.000 | 489.000 | 518.000 |
| Relative humidity (%) | Q25 | 65.500 | 60.800 | 40.950 |
| Relative humidity (%) | Q75 | 79.400 | 78.300 | 59.750 |
| Relative humidity (%) | CV | 0.152 | 0.183 | 0.278 |
| Barometric Pressure (kPa) | Mean | 98.503 | 100.514 | 90.991 |
| Barometric Pressure (kPa) | Std. Dev. | 1.312 | 0.662 | 0.656 |
| Barometric Pressure (kPa) | Median | 98.300 | 100.500 | 91.000 |
| Barometric Pressure (kPa) | Minimum | 95.300 | 98.470 | 88.700 |
| Barometric Pressure (kPa) | Maximum | 102.200 | 102.900 | 92.600 |
| Barometric Pressure (kPa) | count | 618.000 | 549.000 | 526.000 |
| Barometric Pressure (kPa) | Q25 | 97.500 | 100.100 | 90.600 |
| Barometric Pressure (kPa) | Q75 | 99.600 | 100.900 | 91.400 |
| Barometric Pressure (kPa) | CV | 0.013 | 0.007 | 0.007 |

## D.3 Grow-Finish

### D.3.1 Emissions

#### D.3.1.1 Ammonia ($NH_3$)

**Table D-25. $NH_3$ emission summary statistics for swine grow-finish barns (kg $d^{-1}$).**

| Statistic | IN3BR5 | IN3BR6 | IN3BR7 | IN3BR8 | NC3BB1 | NC3BB2 | NC3BB3 |
|---|---|---|---|---|---|---|---|
| Mean | 7.503 | 7.873 | 6.743 | 6.931 | 5.197 | 4.966 | 4.998 |
| Std. Dev. | 2.680 | 2.777 | 3.314 | 3.156 | 2.532 | 1.937 | 2.158 |
| Median | 7.300 | 7.645 | 7.209 | 7.231 | 4.786 | 4.950 | 4.932 |
| Minimum | 1.948 | 0.011 | 0.004 | 0.560 | 0.747 | 0.830 | 0.635 |
| Maximum | 18.698 | 16.002 | 23.322 | 25.291 | 14.895 | 10.657 | 11.934 |
| N | 373.000 | 336.000 | 331.000 | 307.000 | 571.000 | 561.000 | 556.000 |
| N>0 | 373.000 | 336.000 | 331.000 | 307.000 | 571.000 | 561.000 | 556.000 |
| Q25 | 5.621 | 5.796 | 3.954 | 4.588 | 3.122 | 3.469 | 3.382 |
| Q75 | 9.005 | 9.466 | 8.988 | 8.590 | 6.954 | 6.258 | 6.249 |
| CV | 35.725 | 35.274 | 49.146 | 45.535 | 48.713 | 39.011 | 43.181 |

**Table D-26. $NH_3$ emission summary statistics for swine grow-finish barns (kg $d^{-1}$ $hd^{-1}$).**

| Statistic | IN3BR5 | IN3BR6 | IN3BR7 | IN3BR8 | NC3BB1 | NC3BB2 | NC3BB3 |
|---|---|---|---|---|---|---|---|
| Mean | 8.766 | 8.366 | 7.747 | 8.728 | 7.585 | 7.505 | 7.310 |
| Std. Dev. | 7.651 | 4.757 | 5.787 | 6.374 | 5.761 | 3.702 | 3.519 |
| Median | 6.928 | 7.765 | 6.925 | 7.797 | 6.932 | 7.137 | 6.914 |
| Minimum | 0.844 | 0.338 | 1.159 | 0.504 | 1.451 | 1.781 | 1.719 |
| Maximum | 82.187 | 40.713 | 62.257 | 71.562 | 109.553 | 26.693 | 22.085 |
| N | 371.000 | 335.000 | 299.000 | 290.000 | 557.000 | 557.000 | 544.000 |
| N>0 | 371.000 | 335.000 | 299.000 | 290.000 | 557.000 | 557.000 | 544.000 |
| Q25 | 4.928 | 5.207 | 4.472 | 5.484 | 4.486 | 4.752 | 4.468 |
| Q75 | 9.620 | 10.457 | 8.869 | 9.852 | 9.772 | 9.238 | 9.298 |
| CV | 87.286 | 56.865 | 74.701 | 73.027 | 75.945 | 49.320 | 48.146 |

### D.3.1.2 Hydrogen Sulfide ($H_2S$)

**Table D-27. $H_2S$ emission summary statistics for swine grow-finish barns (g $d^{-1}$).**

| Statistic | IN3BR5 | IN3BR6 | IN3BR7 | IN3BR8 | NC3BB1 | NC3BB2 | NC3BB3 |
|---|---|---|---|---|---|---|---|
| Mean | 418.482 | 624.559 | 406.153 | 690.214 | 144.635 | 160.679 | 164.990 |
| Std. Dev. | 479.292 | 590.550 | 504.800 | 614.222 | 131.483 | 138.253 | 134.580 |
| Median | 189.560 | 488.156 | 174.224 | 439.481 | 118.206 | 131.484 | 143.122 |
| Minimum | 0.928 | 0.804 | -10.522 | 21.570 | -2.219 | -11.161 | -2.888 |
| Maximum | 2129.877 | 5366.170 | 2376.042 | 2975.546 | 712.545 | 722.545 | 698.534 |
| N | 498.000 | 447.000 | 438.000 | 386.000 | 555.000 | 543.000 | 541.000 |
| N<0 | 0.000 | 0.000 | 3.000 | 0.000 | 5.000 | 2.000 | 2.000 |
| N>0 | 498.000 | 447.000 | 435.000 | 386.000 | 550.000 | 541.000 | 539.000 |
| Q25 | 80.766 | 136.089 | 65.189 | 183.494 | 38.664 | 61.112 | 56.915 |
| Q75 | 630.747 | 865.584 | 597.262 | 1131.307 | 200.065 | 203.188 | 225.011 |
| CV | 114.531 | 94.555 | 124.288 | 88.990 | 90.907 | 86.043 | 81.569 |

**Table D-28. $H_2S$ emission summary statistics for swine grow-finish barns (mg $d^{-1}$ $hd^{-1}$).**

| Statistic | IN3BR5 | IN3BR6 | IN3BR7 | IN3BR8 | NC3BB1 | NC3BB2 | NC3BB3 |
|---|---|---|---|---|---|---|---|
| Mean | 535.402 | 706.632 | 495.116 | 1039.967 | 213.283 | 258.852 | 251.865 |
| Std. Dev. | 1040.842 | 1085.400 | 613.257 | 1332.322 | 206.429 | 257.642 | 219.896 |
| Median | 167.267 | 375.766 | 224.145 | 576.769 | 164.003 | 177.207 | 196.104 |
| Minimum | 4.311 | 0.759 | -8.917 | 19.433 | -2.324 | -7.796 | 3.439 |
| Maximum | 10605.155 | 15923.354 | 4314.757 | 11706.343 | 2011.228 | 1661.022 | 1145.360 |
| N | 496.000 | 446.000 | 382.000 | 356.000 | 540.000 | 539.000 | 529.000 |
| N<0 | 0.000 | 0.000 | 1.000 | 0.000 | 1.000 | 1.000 | 0.000 |
| N>0 | 496.000 | 446.000 | 381.000 | 356.000 | 539.000 | 538.000 | 529.000 |
| Q25 | 73.787 | 110.223 | 93.560 | 183.576 | 61.394 | 88.673 | 79.311 |
| Q75 | 668.079 | 1016.181 | 693.745 | 1332.482 | 279.318 | 329.362 | 355.840 |
| CV | 194.404 | 153.602 | 123.861 | 128.112 | 96.786 | 99.533 | 87.307 |

### D.3.1.3 Particulate Matter ($PM_{10}$)

**Table D-29. $PM_{10}$ emission summary statistics for swine grow-finish barns (g $d^{-1}$).**

| Statistic | IN3BR5 | IN3BR6 | IN3BR7 | IN3BR8 | NC3BB1 | NC3BB2 | NC3BB3 |
|---|---|---|---|---|---|---|---|
| Mean | 211.015 | 223.347 | 183.885 | 185.187 | 189.570 | 174.250 | 145.238 |
| Std. Dev. | 114.542 | 132.450 | 129.510 | 171.146 | 112.225 | 108.741 | 83.465 |
| Median | 197.870 | 199.983 | 159.235 | 137.654 | 174.837 | 149.234 | 129.314 |
| Minimum | 14.557 | -29.740 | -22.303 | -10.147 | -7.666 | -7.015 | 2.300 |
| Maximum | 614.931 | 810.052 | 1179.593 | 1093.199 | 645.475 | 555.408 | 492.211 |
| N | 301.000 | 271.000 | 296.000 | 210.000 | 466.000 | 473.000 | 342.000 |
| N<0 | 0.000 | 2.000 | 15.000 | 12.000 | 2.000 | 3.000 | 0.000 |
| N>0 | 301.000 | 269.000 | 281.000 | 198.000 | 464.000 | 470.000 | 342.000 |
| Q25 | 127.319 | 132.887 | 108.663 | 43.646 | 106.460 | 92.144 | 81.997 |
| Q75 | 263.507 | 277.110 | 240.081 | 274.649 | 249.274 | 228.800 | 196.654 |
| CV | 54.281 | 59.302 | 70.430 | 92.418 | 59.200 | 62.405 | 57.468 |

**Table D-30. $PM_{10}$ emission summary statistics for swine grow-finish barns (mg $d^{-1}$ $hd^{-1}$).**

| Statistic | IN3BR5 | IN3BR6 | IN3BR7 | IN3BR8 | NC3BB1 | NC3BB2 | NC3BB3 |
|---|---|---|---|---|---|---|---|
| Mean | 233.862 | 231.304 | 193.025 | 279.436 | 282.885 | 268.543 | 217.200 |
| Std. Dev. | 188.760 | 147.862 | 116.350 | 491.949 | 162.700 | 185.425 | 128.359 |
| Median | 191.442 | 209.117 | 163.655 | 192.830 | 258.344 | 231.657 | 193.513 |
| Minimum | 20.337 | -28.056 | -21.241 | -10.047 | 31.704 | 22.207 | 34.319 |
| Maximum | 1399.388 | 1090.565 | 999.655 | 4554.997 | 995.815 | 1704.416 | 735.742 |
| N | 301.000 | 270.000 | 280.000 | 203.000 | 449.000 | 469.000 | 336.000 |
| N<0 | 0.000 | 2.000 | 1.000 | 6.000 | 0.000 | 0.000 | 0.000 |
| N>0 | 301.000 | 268.000 | 279.000 | 197.000 | 449.000 | 469.000 | 336.000 |
| Q25 | 112.414 | 131.322 | 118.354 | 51.973 | 152.351 | 125.585 | 112.679 |
| Q75 | 283.854 | 310.619 | 233.080 | 309.428 | 363.817 | 351.422 | 295.939 |
| CV | 80.715 | 63.925 | 60.277 | 176.051 | 57.514 | 69.048 | 59.097 |

### D.3.1.4 Particulate Matter ($PM_{2.5}$)

**Table D-31. $PM_{2.5}$ emission summary statistics for swine grow-finish barns (g $d^{-1}$).**

| Statistic | IN3BR5 | IN3BR6 | IN3BR7 | IN3BR8 | NC3BB1 | NC3BB2 | NC3BB3 |
|---|---|---|---|---|---|---|---|
| Mean | 8.710 | 10.955 | 7.286 | 3.391 | 21.460 | 12.982 | 8.579 |
| Std. Dev. | 9.702 | 9.678 | 6.492 | 5.164 | 9.490 | 5.287 | 3.698 |
| Median | 4.372 | 9.754 | 6.950 | 0.742 | 21.816 | 12.515 | 7.972 |
| Minimum | -2.668 | -1.558 | -2.069 | -3.094 | 6.548 | 4.200 | 3.763 |
| Maximum | 29.432 | 30.681 | 21.748 | 16.845 | 45.561 | 25.402 | 17.062 |
| N | 29.000 | 25.000 | 22.000 | 27.000 | 59.000 | 59.000 | 33.000 |
| N<0 | 3.000 | 2.000 | 3.000 | 11.000 | 0.000 | 0.000 | 0.000 |
| N>0 | 26.000 | 23.000 | 19.000 | 16.000 | 59.000 | 59.000 | 33.000 |
| Q25 | 1.677 | 2.041 | 2.633 | -0.485 | 14.413 | 9.236 | 5.494 |
| Q75 | 17.166 | 20.392 | 10.440 | 7.601 | 28.880 | 16.139 | 9.471 |
| CV | 111.387 | 88.339 | 89.100 | 152.267 | 44.221 | 40.728 | 43.101 |

**Table D-32. $PM_{2.5}$ emission summary statistics for swine grow-finish barns (mg $d^{-1}$ $hd^{-1}$).**

| Statistic | IN3BR5 | IN3BR6 | IN3BR7 | IN3BR8 | NC3BB1 | NC3BB2 | NC3BB3 |
|---|---|---|---|---|---|---|---|
| Mean | 9.585 | 13.773 | 12.682 | 7.114 | 28.356 | 18.742 | 11.620 |
| Std. Dev. | 10.199 | 11.790 | 11.510 | 11.657 | 12.133 | 8.304 | 4.787 |
| Median | 4.548 | 12.036 | 10.932 | 0.742 | 31.100 | 16.729 | 10.802 |
| Minimum | -2.616 | -1.417 | -1.933 | -3.094 | 9.588 | 6.204 | 5.106 |
| Maximum | 29.850 | 35.926 | 37.050 | 36.889 | 56.248 | 42.336 | 22.421 |
| N | 29.000 | 25.000 | 22.000 | 27.000 | 59.000 | 59.000 | 33.000 |
| N<0 | 3.000 | 2.000 | 3.000 | 11.000 | 0.000 | 0.000 | 0.000 |
| N>0 | 26.000 | 23.000 | 19.000 | 16.000 | 59.000 | 59.000 | 33.000 |
| Q25 | 1.696 | 2.001 | 2.461 | -0.485 | 18.372 | 12.855 | 7.444 |
| Q75 | 18.318 | 23.850 | 20.730 | 9.293 | 37.154 | 22.428 | 13.190 |
| CV | 106.409 | 85.602 | 90.752 | 163.859 | 42.789 | 44.309 | 41.192 |

### D.3.1.5 Total Suspended Particulates (TSP)

**Table D-33. TSP emission summary statistics for swine grow-finish barns (g $d^{-1}$).**

| Statistic | IN3BR5 | IN3BR6 | IN3BR7 | IN3BR8 | NC3BB1 | NC3BB2 | NC3BB3 |
|---|---|---|---|---|---|---|---|
| Mean | 891.935 | 1078.952 | 968.731 | 1026.632 | 444.411 | 473.774 | 432.119 |
| Std. Dev. | 380.599 | 269.339 | 278.381 | 238.340 | 195.830 | 235.610 | 167.795 |
| Median | 907.272 | 1024.902 | 974.830 | 1061.081 | 355.952 | 383.197 | 391.617 |
| Minimum | 224.570 | 756.341 | 436.072 | 479.419 | 188.447 | 202.732 | 197.424 |
| Maximum | 1646.603 | 1661.434 | 1450.085 | 1284.229 | 978.460 | 1158.182 | 906.482 |
| N | 24.000 | 24.000 | 34.000 | 22.000 | 52.000 | 52.000 | 23.000 |
| N>0 | 24.000 | 24.000 | 34.000 | 22.000 | 52.000 | 52.000 | 23.000 |
| NA | 569.000 | 512.000 | 512.000 | 462.000 | 592.000 | 579.000 | 599.000 |
| Q25 | 562.741 | 835.250 | 770.109 | 965.068 | 306.873 | 292.894 | 328.099 |
| Q75 | 1147.947 | 1273.397 | 1181.036 | 1195.047 | 613.689 | 670.002 | 480.946 |
| CV | 42.671 | 24.963 | 28.737 | 23.216 | 44.065 | 49.731 | 38.831 |

**Table D-34. TSP emission summary statistics for swine grow-finish barns (mg $d^{-1}$ $hd^{-1}$).**

| Statistic | IN3BR5 | IN3BR6 | IN3BR7 | IN3BR8 | NC3BB1 | NC3BB2 | NC3BB3 |
|---|---|---|---|---|---|---|---|
| Mean | 845.664 | 1020.753 | 842.537 | 954.910 | 653.903 | 702.441 | 572.905 |
| Std. Dev. | 369.175 | 249.264 | 222.322 | 217.590 | 295.561 | 400.186 | 211.810 |
| Median | 847.918 | 957.853 | 819.185 | 982.483 | 525.024 | 532.471 | 534.265 |
| Minimum | 159.642 | 706.860 | 407.544 | 482.313 | 280.427 | 273.962 | 268.971 |
| Maximum | 1583.272 | 1567.391 | 1289.522 | 1200.214 | 1349.141 | 1568.653 | 1183.397 |
| N | 24.000 | 24.000 | 34.000 | 22.000 | 52.000 | 52.000 | 23.000 |
| N>0 | 24.000 | 24.000 | 34.000 | 22.000 | 52.000 | 52.000 | 23.000 |
| NA | 569.000 | 512.000 | 512.000 | 462.000 | 592.000 | 579.000 | 599.000 |
| Q25 | 553.060 | 810.542 | 685.534 | 899.587 | 454.961 | 407.761 | 447.308 |
| Q75 | 1096.686 | 1201.318 | 996.435 | 1106.525 | 821.810 | 885.694 | 629.511 |
| CV | 43.655 | 24.420 | 26.387 | 22.786 | 45.200 | 56.971 | 36.971 |

### D.3.2 Environmental

**Table D-35. Environmental parameter summary statistics for swine grow-finish barns.**

| Parameter | Statistic | IN3BR5 | IN3BR6 | IN3BR7 | IN3BR8 | NC3BB1 | NC3BB2 | NC3BB3 |
|---|---|---|---|---|---|---|---|---|
| Inventory (hd) | Mean | 1117.602 | 1110.522 | 894.042 | 871.581 | 702.317 | 687.578 | 701.068 |
| Inventory (hd) | Std. Dev. | 497.556 | 459.722 | 396.325 | 343.934 | 170.243 | 136.784 | 146.256 |
| Inventory (hd) | Median | 1050.000 | 1060.000 | 1090.000 | 1060.000 | 709.500 | 732.000 | 745.000 |
| Inventory (hd) | Minimum | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Inventory (hd) | Maximum | 2550.000 | 2460.000 | 1190.000 | 1110.000 | 860.000 | 822.000 | 810.000 |
| Inventory (hd) | N | 593.000 | 536.000 | 546.000 | 484.000 | 644.000 | 631.000 | 622.000 |
| Inventory (hd) | Q25 | 1010.000 | 1030.000 | 875.250 | 840.750 | 670.000 | 675.000 | 716.000 |
| Inventory (hd) | Q75 | 1100.000 | 1080.000 | 1120.000 | 1082.500 | 824.000 | 781.000 | 777.750 |
| Inventory (hd) | CV | 0.445 | 0.414 | 0.443 | 0.395 | 0.242 | 0.199 | 0.209 |
| Average Weight (kg) | Mean | 67.066 | 66.168 | 63.002 | 72.874 | 71.814 | 75.151 | 70.000 |
| Average Weight (kg) | Std. Dev. | 37.570 | 38.251 | 39.504 | 37.823 | 32.883 | 33.582 | 32.895 |
| Average Weight (kg) | Median | 72.000 | 70.500 | 64.500 | 86.000 | 77.000 | 81.000 | 74.000 |
| Average Weight (kg) | Minimum | 6.000 | 5.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Average Weight (kg) | Maximum | 116.000 | 122.000 | 119.000 | 117.000 | 127.000 | 130.000 | 122.000 |
| Average Weight (kg) | N | 593.000 | 536.000 | 546.000 | 484.000 | 644.000 | 631.000 | 622.000 |
| Average Weight (kg) | Q25 | 30.000 | 26.750 | 27.000 | 37.750 | 40.750 | 41.000 | 39.000 |
| Average Weight (kg) | Q75 | 105.000 | 104.000 | 104.000 | 108.000 | 102.000 | 105.000 | 100.000 |
| Average Weight (kg) | CV | 0.560 | 0.578 | 0.627 | 0.519 | 0.458 | 0.447 | 0.470 |
| Live animal weight | Mean | 62409.076 | 61995.974 | 59491.621 | 63788.300 | 50295.652 | 49992.266 | 48302.952 |
| Live animal weight | Std. Dev. | 33753.358 | 33499.263 | 38164.506 | 36371.169 | 21949.354 | 20456.817 | 20892.973 |
| Live animal weight | Median | 59920.000 | 58850.500 | 57460.500 | 67590.500 | 54546.500 | 53072.000 | 49445.500 |
| Live animal weight | Minimum | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Live animal weight | Maximum | 118800.000 | 115440.000 | 129800.000 | 121000.000 | 92340.000 | 86016.000 | 88320.000 |
| Live animal weight | N | 593.000 | 536.000 | 546.000 | 484.000 | 644.000 | 631.000 | 622.000 |
| Live animal weight | Q25 | 29160.000 | 30520.000 | 28947.500 | 29767.500 | 30780.000 | 30856.000 | 29672.250 |
| Live animal weight | Q75 | 96000.000 | 94959.000 | 94554.000 | 97200.000 | 66145.500 | 66698.000 | 67031.250 |
| Live animal weight | CV | 0.541 | 0.540 | 0.642 | 0.570 | 0.436 | 0.409 | 0.433 |

| Parameter | Statistic | IN3BR5 | IN3BR6 | IN3BR7 | IN3BR8 | NC3BB1 | NC3BB2 | NC3BB3 |
|---|---|---|---|---|---|---|---|---|
| Exhaust Temperature (C) | Mean | 22.434 | 22.209 | 21.505 | 21.994 | 23.583 | 23.218 | 24.273 |
| Exhaust Temperature (C) | Std. Dev. | 3.717 | 3.674 | 5.391 | 4.674 | 3.407 | 3.146 | 3.125 |
| Exhaust Temperature (C) | Median | 22.500 | 22.000 | 22.400 | 22.350 | 23.800 | 23.300 | 24.400 |
| Exhaust Temperatures(C) | Minimum | 4.900 | 0.900 | 3.600 | 4.100 | 9.000 | 11.900 | 9.900 |
| Exhaust Temperature (C) | Maximum | 30.300 | 30.400 | 30.300 | 30.500 | 31.000 | 31.800 | 31.800 |
| Exhaust Temperature (C) | N | 593.000 | 536.000 | 546.000 | 484.000 | 639.000 | 626.000 | 616.000 |
| Exhaust Temperature (C) | Q25 | 19.400 | 19.300 | 19.500 | 19.700 | 21.600 | 21.300 | 22.475 |
| Exhaust Temperature (C) | Q75 | 25.700 | 25.400 | 25.600 | 25.600 | 26.200 | 25.400 | 26.525 |
| Exhaust Temperature (C) | CV | 0.166 | 0.165 | 0.251 | 0.213 | 0.144 | 0.135 | 0.129 |
| Exhaust Relative Humidity (%) | Mean | 57.567 | 56.837 | 58.838 | 56.070 | 60.333 | 61.990 | 63.275 |
| Exhaust Relative Humidity (%) | Std. Dev. | 6.979 | 7.149 | 8.066 | 7.497 | 7.505 | 7.035 | 6.946 |
| Exhaust Relative Humidity (%) | Median | 58.000 | 56.900 | 59.500 | 56.250 | 60.400 | 61.700 | 62.850 |
| Exhaust Relative Humidity (%) | Minimum | 38.900 | 39.500 | 36.500 | 38.100 | 43.000 | 41.800 | 43.800 |
| Exhaust Relative Humidity (%) | Maximum | 78.300 | 78.200 | 83.400 | 78.900 | 81.000 | 78.400 | 79.600 |
| Exhaust Relative Humidity (%) | N | 563.000 | 512.000 | 533.000 | 474.000 | 635.000 | 623.000 | 600.000 |
| Exhaust Relative Humidity (%) | Q25 | 52.100 | 51.225 | 53.300 | 51.000 | 54.500 | 57.700 | 58.975 |
| Exhaust Relative Humidity (%) | Q75 | 62.450 | 62.225 | 64.200 | 60.800 | 65.750 | 67.350 | 68.700 |
| Exhaust Relative Humidity (%) | CV | 0.121 | 0.126 | 0.137 | 0.134 | 0.124 | 0.113 | 0.110 |
| Airflow ($dsm^3s^{-1}$) | Mean | 13.952 | 14.131 | 15.282 | 14.886 | 10.590 | 12.737 | 10.076 |
| Airflow ($dsm^3s^{-1}$) | Std. Dev. | 11.514 | 11.731 | 13.113 | 12.944 | 6.498 | 8.375 | 6.789 |
| Airflow ($dsm^3s^{-1}$) | Median | 8.049 | 8.465 | 9.403 | 7.323 | 9.493 | 11.055 | 8.514 |
| Airflow ($dsm^3s^{-1}$) | Minimum | 1.265 | 1.795 | 0.017 | 0.378 | 1.072 | 0.828 | 1.050 |
| Airflow ($dsm^3s^{-1}$) | Maximum | 45.473 | 46.200 | 45.804 | 43.710 | 29.220 | 35.340 | 28.366 |
| Airflow ($dsm^3s^{-1}$) | N | 553.000 | 502.000 | 521.000 | 467.000 | 640.000 | 628.000 | 605.000 |
| Airflow ($dsm^3s^{-1}$) | Q25 | 5.616 | 5.600 | 4.987 | 4.331 | 4.920 | 5.150 | 4.146 |
| Airflow ($dsm^3s^{-1}$) | Q75 | 21.226 | 19.673 | 26.800 | 28.424 | 15.807 | 19.656 | 15.635 |
| Airflow ($dsm^3s^{-1}$) | CV | 0.825 | 0.830 | 0.858 | 0.870 | 0.614 | 0.658 | 0.674 |

### D.3.3 Ambient

**Table D-36. Summary of ambient meteorological parameters for swine grow-finish barns.**

| Parameter | Statistic | IN3B | NC3B |
|---|---|---|---|
| Ambient Temperature (°C) | Mean | 12.416 | 18.488 |
| Ambient Temperature (°C) | Std. Dev. | 10.779 | 7.356 |
| Ambient Temperature (°C) | Median | 14.100 | 19.500 |
| Ambient Temperature (°C) | Minimum | -19.600 | -2.200 |
| Ambient Temperature (°C) | Maximum | 30.800 | 31.800 |
| Ambient Temperature (°C) | count | 626.000 | 608.000 |
| Ambient Temperature (°C) | Q25 | 3.300 | 12.675 |
| Ambient Temperature (°C) | Q75 | 22.000 | 25.000 |
| Ambient Temperature (°C) | CV | 0.868 | 0.398 |
| Relative humidity (%) | Mean | 67.741 | 70.053 |
| Relative humidity (%) | Std. Dev. | 11.096 | 11.791 |
| Relative humidity (%) | Median | 67.400 | 70.700 |
| Relative humidity (%) | Minimum | 27.200 | 35.900 |
| Relative humidity (%) | Maximum | 94.200 | 96.000 |
| Relative humidity (%) | count | 634.000 | 643.000 |
| Relative humidity (%) | Q25 | 59.825 | 62.500 |
| Relative humidity (%) | Q75 | 75.375 | 78.800 |
| Relative humidity (%) | CV | 0.164 | 0.168 |
| Barometric Pressure (kPa) | Mean | 98.360 | 100.723 |
| Barometric Pressure (kPa) | Std. Dev. | 0.660 | 0.658 |
| Barometric Pressure (kPa) | Median | 98.300 | 100.700 |
| Barometric Pressure (kPa) | Minimum | 95.900 | 98.680 |
| Barometric Pressure (kPa) | Maximum | 100.400 | 103.000 |
| Barometric Pressure (kPa) | count | 599.000 | 629.000 |
| Barometric Pressure (kPa) | Q25 | 98.000 | 100.300 |
| Barometric Pressure (kPa) | Q75 | 98.800 | 101.100 |
| Barometric Pressure (kPa) | CV | 0.007 | 0.007 |

## D.4 Lagoons

### D.4.1 Emissions

#### D.4.1.1 Ammonia ($NH_3$)

**Table D-37. $NH_3$ emission summary statistics for swine lagoons (kg $d^{-1}$).**

| Statistic | IN4A | NC3A | NC4A | OK3A | OK4A |
|---|---|---|---|---|---|
| Mean | 30.354 | 30.000 | 81.239 | 54.365 | 152.948 |
| Std. Dev. | 31.084 | 21.752 | 54.861 | 45.534 | 101.100 |
| Median | 25.533 | 25.211 | 88.765 | 51.034 | 145.769 |
| Minimum | -2.942 | 5.874 | 15.830 | 0.590 | 6.165 |
| Maximum | 160.034 | 109.691 | 228.228 | 175.224 | 368.351 |
| N | 77.000 | 23.000 | 33.000 | 79.000 | 72.000 |
| N<0 | 2.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| N>0 | 75.000 | 23.000 | 33.000 | 79.000 | 72.000 |
| Q25 | 6.586 | 16.795 | 27.827 | 13.109 | 61.215 |
| Q75 | 41.382 | 37.395 | 120.588 | 79.488 | 233.147 |
| CV | 102.406 | 72.507 | 67.530 | 83.756 | 66.101 |

**Table D-38. $NH_3$ emission summary statistics for swine lagoons (kg $d^{-1}$ $m^{-2}$).**

| Statistic | IN4A | NC3A | NC4A | OK3A | OK4A |
|---|---|---|---|---|---|
| Mean | 0.0026 | 0.0017 | 0.0036 | 0.0047 | 0.0072 |
| Std. Dev. | 0.0030 | 0.0012 | 0.0024 | 0.0041 | 0.0047 |
| Median | 0.0017 | 0.0014 | 0.0039 | 0.0037 | 0.0068 |
| Minimum | -0.0002 | 0.0003 | 0.0007 | 0.0001 | 0.0003 |
| Maximum | 0.0133 | 0.0058 | 0.0101 | 0.0157 | 0.0172 |
| N | 49.0000 | 21.0000 | 33.0000 | 72.0000 | 72.0000 |
| N<0 | 2.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| N>0 | 47.0000 | 21.0000 | 33.0000 | 72.0000 | 72.0000 |
| Q25 | 0.0004 | 0.0010 | 0.0012 | 0.0010 | 0.0029 |
| Q75 | 0.0037 | 0.0022 | 0.0053 | 0.0071 | 0.0109 |
| CV | 112.3808 | 69.7809 | 67.5304 | 87.7658 | 66.1010 |

### D.4.1.2 Hydrogen Sulfide ($H_2S$)

**Table D-39. $H_2S$ emission summary statistics for swine lagoons (g $d^{-1}$).**

| Statistic | IN4A | NC3A | NC4A | OK3A | OK4A |
|---|---|---|---|---|---|
| Mean | 559.223 | 2299.319 | 5365.830 | 5131.242 | 9153.052 |
| Std. Dev. | 2225.240 | 4537.550 | 23979.827 | 5502.796 | 9827.591 |
| Median | 49.566 | 456.542 | 84.497 | 4402.175 | 6694.971 |
| Minimum | -97.445 | -58.895 | -107.636 | -23.567 | 170.127 |
| Maximum | 15232.794 | 13248.775 | 112714.606 | 25189.103 | 43498.893 |
| N | 51.000 | 8.000 | 22.000 | 51.000 | 53.000 |
| N<0 | 13.000 | 1.000 | 2.000 | 2.000 | 0.000 |
| N>0 | 38.000 | 7.000 | 20.000 | 49.000 | 53.000 |
| Q25 | -1.597 | 82.134 | 56.914 | 317.693 | 1733.400 |
| Q75 | 201.482 | 1637.013 | 276.247 | 7661.862 | 10838.433 |
| CV | 397.917 | 197.343 | 446.899 | 107.241 | 107.370 |

**Table D-40. $H_2S$ emission summary statistics for swine lagoons (g $d^{-1}$ $m^{-2}$).**

| Statistic | IN4A | NC3A | NC4A | OK3A | OK4A |
|---|---|---|---|---|---|
| Mean | 0.0481 | 0.1218 | 0.2370 | 0.4696 | 0.4407 |
| Std. Dev. | 0.2144 | 0.2404 | 1.0591 | 0.4948 | 0.4747 |
| Median | 0.0045 | 0.0242 | 0.0037 | 0.4003 | 0.3131 |
| Minimum | -0.0081 | -0.0031 | -0.0048 | -0.0021 | 0.0080 |
| Maximum | 1.2684 | 0.7018 | 4.9783 | 2.2613 | 2.0345 |
| N | 35.0000 | 8.0000 | 22.0000 | 50.0000 | 49.0000 |
| N<0 | 8.0000 | 1.0000 | 2.0000 | 2.0000 | 0.0000 |
| N>0 | 27.0000 | 7.0000 | 20.0000 | 48.0000 | 49.0000 |
| Q25 | 0.0005 | 0.0044 | 0.0025 | 0.0383 | 0.0811 |
| Q75 | 0.0133 | 0.0867 | 0.0122 | 0.6902 | 0.5915 |
| CV | 445.4726 | 197.3432 | 446.8988 | 105.3625 | 107.7032 |

### D.4.2 Environmental

**Table D-41. Environmental parameter summary statistics for swine lagoons.**

| Parameter | Statistic | IN4A | NC3A | NC4A | OK3A | OK4A |
|---|---|---|---|---|---|---|
| Lagoon Temperature (°C) | Mean | 20.573 | 15.461 | 20.883 | 16.755 | 18.270 |
| Lagoon Temperature (°C) | Std. Dev. | 6.854 | 4.753 | 6.711 | 7.340 | 8.129 |
| Lagoon Temperature (°C) | Median | 23.560 | 14.360 | 23.890 | 18.000 | 18.950 |
| Lagoon Temperature (°C) | Minimum | 2.920 | 8.950 | 4.540 | 3.170 | 3.380 |
| Lagoon Temperature (°C) | Maximum | 27.810 | 30.170 | 27.410 | 27.190 | 28.810 |
| Lagoon Temperature (°C) | N | 69.000 | 20.000 | 41.000 | 77.000 | 67.000 |
| Lagoon Temperature (°C) | Q25 | 18.590 | 13.080 | 16.220 | 10.100 | 9.675 |
| Lagoon Temperature (°C) | Q75 | 24.500 | 17.477 | 25.850 | 21.840 | 26.040 |
| Lagoon Temperature (°C) | CV | 0.333 | 0.307 | 0.321 | 0.438 | 0.445 |
| Oxidation reduction potential (mV) | Mean | -204.808 | -468.808 | -484.664 | -486.244 | -490.490 |
| Oxidation reduction potential (mV) | Std. Dev. | 176.965 | 84.825 | 65.965 | 66.041 | 42.208 |
| Oxidation reduction potential (mV) | Median | -66.115 | -497.225 | -507.960 | -503.810 | -501.540 |
| Oxidation reduction potential (mV) | Minimum | -483.350 | -546.830 | -553.140 | -560.160 | -545.300 |
| Oxidation reduction potential (mV) | Maximum | -36.700 | -228.560 | -281.330 | -246.090 | -329.950 |
| Oxidation reduction potential (mV) | N | 68.000 | 20.000 | 41.000 | 77.000 | 67.000 |
| Oxidation reduction potential (mV) | Q25 | -398.498 | -515.365 | -534.610 | -532.720 | -520.265 |
| Oxidation reduction potential (mV) | Q75 | -49.018 | -479.857 | -449.720 | -457.780 | -465.155 |
| Oxidation reduction potential (mV) | CV | -0.864 | -0.181 | -0.136 | -0.136 | -0.086 |
| pH | Mean | 7.898 | 7.769 | 7.737 | 7.845 | 7.892 |
| pH | Std. Dev. | 0.121 | 0.326 | 0.076 | 0.237 | 0.220 |
| pH | Median | 7.875 | 7.630 | 7.735 | 7.900 | 7.840 |
| pH | Minimum | 7.690 | 7.430 | 7.620 | 7.420 | 7.550 |
| pH | Maximum | 8.190 | 8.360 | 7.910 | 8.120 | 8.330 |
| pH | N | 38.000 | 21.000 | 36.000 | 67.000 | 41.000 |
| pH | Q25 | 7.822 | 7.540 | 7.670 | 7.710 | 7.770 |
| pH | Q75 | 7.948 | 7.840 | 7.790 | 8.060 | 7.920 |
| pH | CV | 0.015 | 0.042 | 0.010 | 0.030 | 0.028 |

### D.4.3 Ambient

**Table D-42. Summary of ambient meteorological parameters for swine lagoons.**

| Parameter | Statistic | IN4A | NC3A | NC4A | OK3A | OK4A |
|---|---|---|---|---|---|---|
| Ambient Temperature (°C) | Mean | 17.039 | 11.118 | 17.776 | 14.211 | 14.988 |
| Ambient Temperature (°C) | Std. Dev. | 8.352 | 5.693 | 7.609 | 9.117 | 10.379 |
| Ambient Temperature (°C) | Median | 20.540 | 10.590 | 19.860 | 14.115 | 14.415 |
| Ambient Temperature (°C) | Minimum | -6.410 | 1.020 | -4.160 | -4.310 | -9.900 |
| Ambient Temperature (°C) | Maximum | 27.950 | 28.490 | 26.570 | 28.960 | 32.850 |
| Ambient Temperature (°C) | count | 79.000 | 23.000 | 42.000 | 90.000 | 92.000 |
| Ambient Temperature (°C) | Q25 | 12.800 | 8.500 | 12.890 | 5.885 | 7.487 |
| Ambient Temperature (°C) | Q75 | 22.955 | 14.010 | 23.855 | 22.935 | 25.523 |
| Ambient Temperature (°C) | CV | 0.490 | 0.512 | 0.428 | 0.642 | 0.692 |
| Relative humidity (%) | Mean | 75.539 | 68.014 | 72.411 | 56.809 | 57.334 |
| Relative humidity (%) | Std. Dev. | 10.324 | 19.768 | 14.423 | 14.516 | 17.221 |
| Relative humidity (%) | Median | 77.150 | 69.420 | 72.735 | 56.020 | 58.270 |
| Relative humidity (%) | Minimum | 49.180 | 38.200 | 35.780 | 28.000 | 21.070 |
| Relative humidity (%) | Maximum | 93.330 | 99.290 | 96.040 | 93.910 | 97.910 |
| Relative humidity (%) | count | 79.000 | 23.000 | 42.000 | 90.000 | 92.000 |
| Relative humidity (%) | Q25 | 69.475 | 49.980 | 62.400 | 47.365 | 45.568 |
| Relative humidity (%) | Q75 | 83.510 | 81.635 | 82.922 | 64.350 | 68.018 |
| Relative humidity (%) | CV | 0.137 | 0.291 | 0.199 | 0.256 | 0.300 |
| Barometric Pressure (kPa) | Mean | 98.321 | 101.046 | 101.245 | 90.775 | 91.094 |
| Barometric Pressure (kPa) | Std. Dev. | 0.388 | 0.721 | 0.627 | 0.677 | 0.591 |
| Barometric Pressure (kPa) | Median | 98.315 | 101.220 | 101.415 | 90.795 | 91.005 |
| Barometric Pressure (kPa) | Minimum | 97.270 | 99.900 | 99.740 | 88.780 | 89.380 |
| Barometric Pressure (kPa) | Maximum | 99.280 | 102.370 | 102.840 | 92.270 | 92.430 |
| Barometric Pressure (kPa) | count | 72.000 | 20.000 | 42.000 | 90.000 | 76.000 |
| Barometric Pressure (kPa) | Q25 | 98.120 | 100.523 | 100.850 | 90.307 | 90.770 |
| Barometric Pressure (kPa) | Q75 | 98.552 | 101.530 | 101.650 | 91.258 | 91.495 |
| Barometric Pressure (kPa) | CV | 0.004 | 0.007 | 0.006 | 0.007 | 0.006 |
| Wind speed ($ms^{-1}$) | Mean | 3.957 | 2.106 | 2.605 | 4.787 | 5.499 |
| Wind speed ($ms^{-1}$) | Std. Dev. | 1.522 | 0.782 | 0.992 | 1.663 | 2.073 |
| Wind speed ($ms^{-1}$) | Median | 3.700 | 2.115 | 2.345 | 4.390 | 5.270 |
| Wind speed ($ms^{-1}$) | Minimum | 1.470 | 0.910 | 1.220 | 2.140 | 2.580 |
| Wind speed ($ms^{-1}$) | Maximum | 8.180 | 3.550 | 5.760 | 10.040 | 13.800 |
| Wind speed ($ms^{-1}$) | count | 79.000 | 20.000 | 42.000 | 92.000 | 91.000 |
| Wind speed ($ms^{-1}$) | Q25 | 2.660 | 1.365 | 1.890 | 3.492 | 3.720 |
| Wind speed ($ms^{-1}$) | Q75 | 5.085 | 2.775 | 3.337 | 5.910 | 6.675 |
| Wind speed ($ms^{-1}$) | CV | 0.385 | 0.371 | 0.381 | 0.347 | 0.377 |

## D.5 Basins

### D.5.1 Emissions

#### D.5.1.1 Ammonia ($NH_3$)

**Table D-43. $NH_3$ emission summary statistics for swine basin (IA3A).**

| Statistic | kg $d^{-1}$ | kg $d^{-1}$ $m^{-2}$ |
|---|---|---|
| Mean | 28.847277 | 0.012 |
| Std. Dev. | 28.959093 | 0.012 |
| Median | 19.971355 | 0.008 |
| Minimum | -8.320605 | -0.004 |
| Maximum | 91.529494 | 0.039 |
| N | 44.000000 | 44.000 |
| N<0 | 3.000000 | 3.000 |
| N>0 | 41.000000 | 41.000 |
| Q25 | 3.970706 | 0.002 |
| Q75 | 49.861537 | 0.021 |
| CV | 100.387613 | 100.388 |

#### D.5.1.2 Hydrogen Sulfide ($H_2S$)

**Table D-44. $H_2S$ emission summary statistics for swine basin (IA3A).**

| Statistic | g $d^{-1}$ | g $d^{-1}$ $m^{-2}$ |
|---|---|---|
| Mean | 5323.41139 | 2.240 |
| Std. Dev. | 8330.50517 | 3.506 |
| Median | 2358.74469 | 0.993 |
| Minimum | -5.58792 | -0.002 |
| Maximum | 29657.37600 | 12.482 |
| N | 23.00000 | 23.000 |
| N<0 | 1.00000 | 1.000 |
| N>0 | 22.00000 | 22.000 |
| Q25 | 73.54237 | 0.031 |
| Q75 | 6991.50579 | 2.943 |
| CV | 156.48810 | 156.488 |

### D.5.2 Ambient

**Table D-45. Summary of ambient meteorological parameters for swine basin.**

| Parameter | Statistic | IA3A |
|---|---|---|
| Ambient Temperature (°C) | Mean | 11.544 |
| Ambient Temperature (°C) | Std. Dev. | 11.374 |
| Ambient Temperature (°C) | Median | 17.035 |
| Ambient Temperature (°C) | Minimum | -9.500 |
| Ambient Temperature (°C) | Maximum | 27.840 |
| Ambient Temperature (°C) | count | 44.000 |
| Ambient Temperature (°C) | Q25 | 0.135 |
| Ambient Temperature (°C) | Q75 | 20.747 |
| Ambient Temperature (°C) | CV | 0.985 |
| Relative humidity (%) | Mean | 71.009 |
| Relative humidity (%) | Std. Dev. | 13.492 |
| Relative humidity (%) | Median | 73.900 |
| Relative humidity (%) | Minimum | 32.260 |
| Relative humidity (%) | Maximum | 87.530 |
| Relative humidity (%) | count | 44.000 |
| Relative humidity (%) | Q25 | 66.030 |
| Relative humidity (%) | Q75 | 80.007 |
| Relative humidity (%) | CV | 0.190 |
| Barometric Pressure (kPa) | Mean | 97.528 |
| Barometric Pressure (kPa) | Std. Dev. | 0.653 |
| Barometric Pressure (kPa) | Median | 97.375 |
| Barometric Pressure (kPa) | Minimum | 95.960 |
| Barometric Pressure (kPa) | Maximum | 99.400 |
| Barometric Pressure (kPa) | count | 44.000 |
| Barometric Pressure (kPa) | Q25 | 97.188 |
| Barometric Pressure (kPa) | Q75 | 97.782 |
| Barometric Pressure (kPa) | CV | 0.007 |
| Wind speed ($ms^{-1}$) | Mean | 4.288 |
| Wind speed ($ms^{-1}$) | Std. Dev. | 1.778 |
| Wind speed ($ms^{-1}$) | Median | 4.075 |
| Wind speed ($ms^{-1}$) | Minimum | 1.160 |
| Wind speed ($ms^{-1}$) | Maximum | 7.970 |
| Wind speed ($ms^{-1}$) | count | 44.000 |
| Wind speed ($ms^{-1}$) | Q25 | 2.993 |
| Wind speed ($ms^{-1}$) | Q75 | 5.725 |
| Wind speed ($ms^{-1}$) | CV | 0.415 |

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## E.1 Gestation Barns

### E.1.1 Emissions

#### E.1.1.1 Ammonia ($NH_3$)

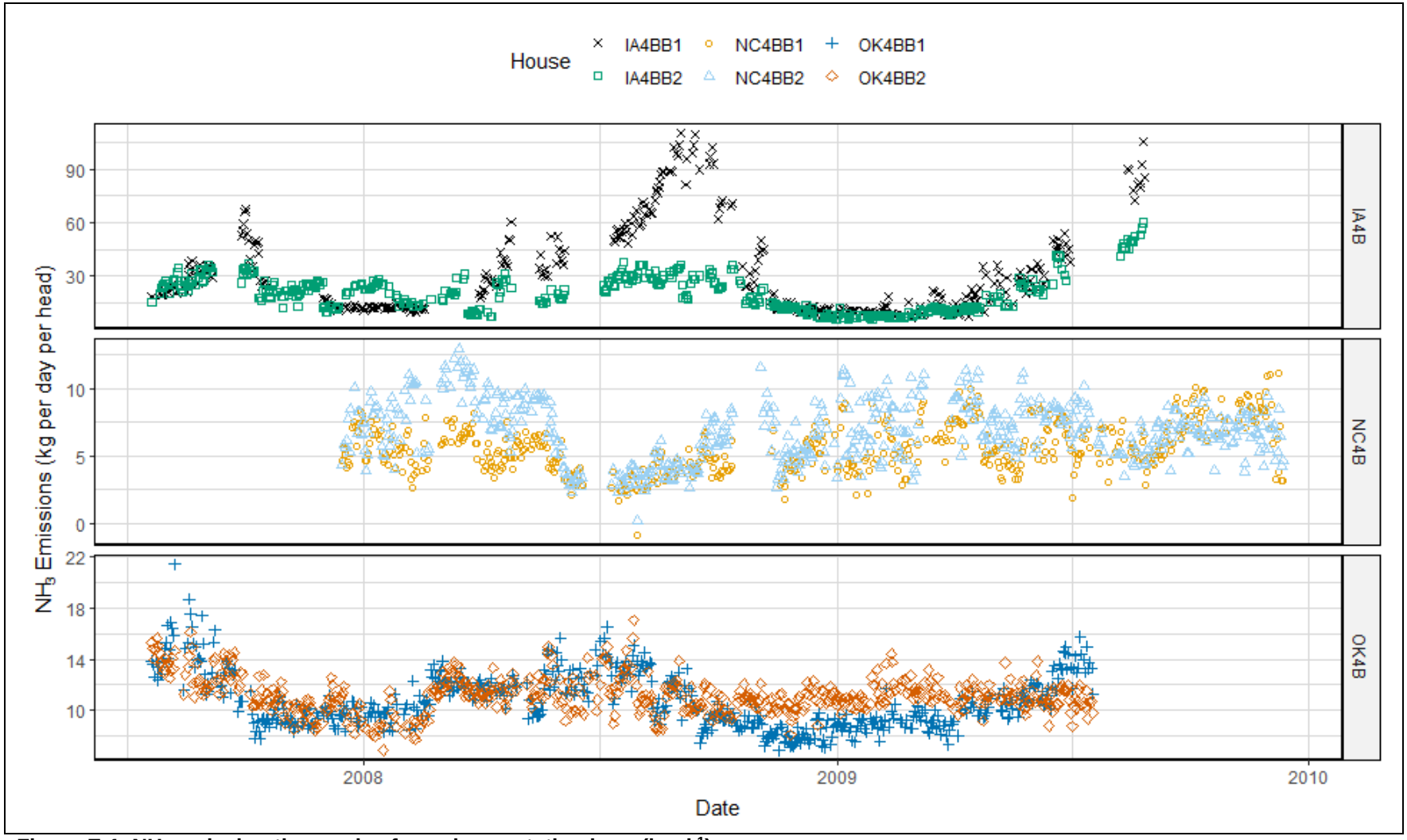


**Figure E-1. $NH_3$ emission time series for swine gestation barn (kg $d^{-1}$).**

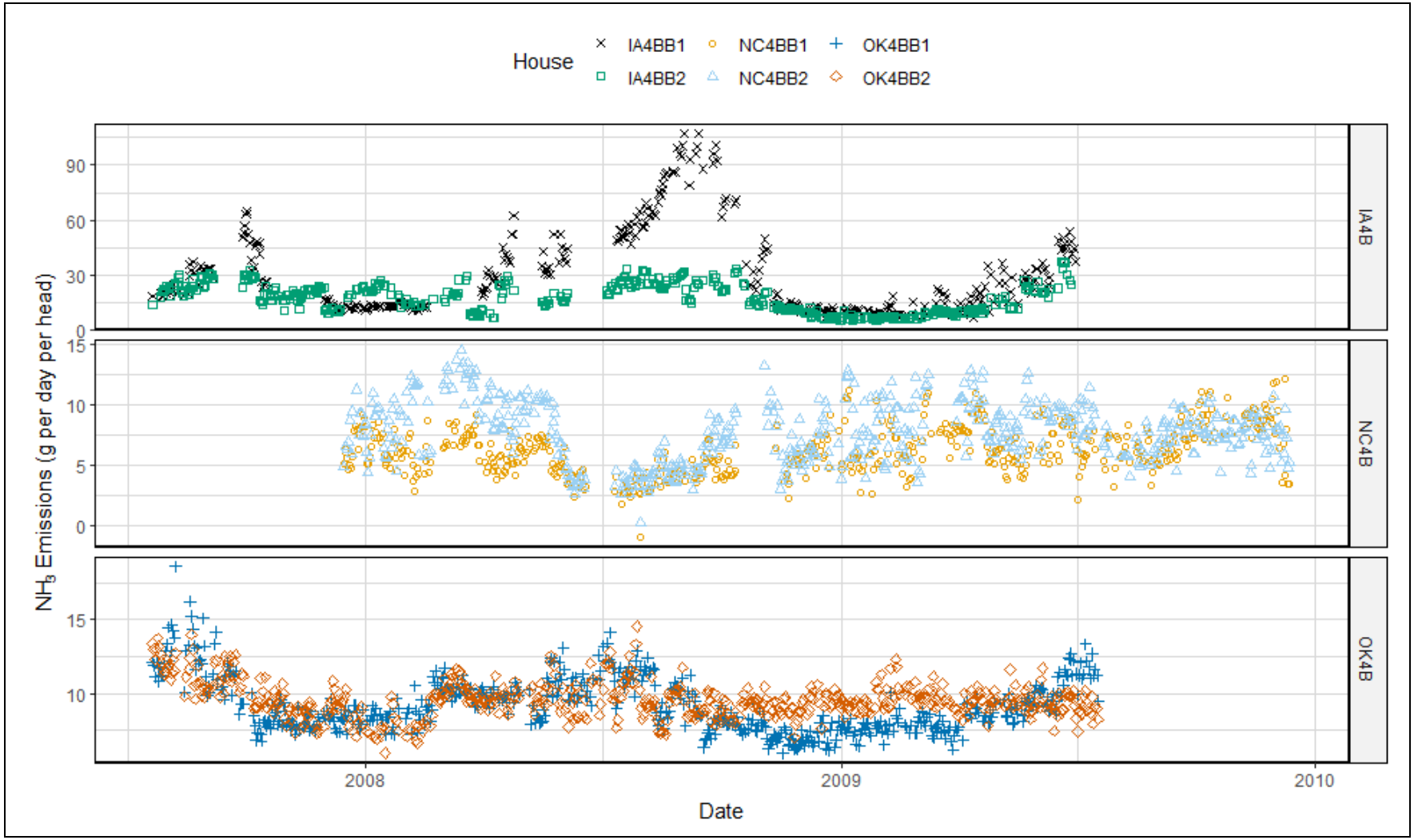


**Figure E-2. $NH_3$ emission time series for swine gestation barn (g $d^{-1}hd^{-1}$).**

### E.1.1.2 Hydrogen Sulfide ($H_2S$)

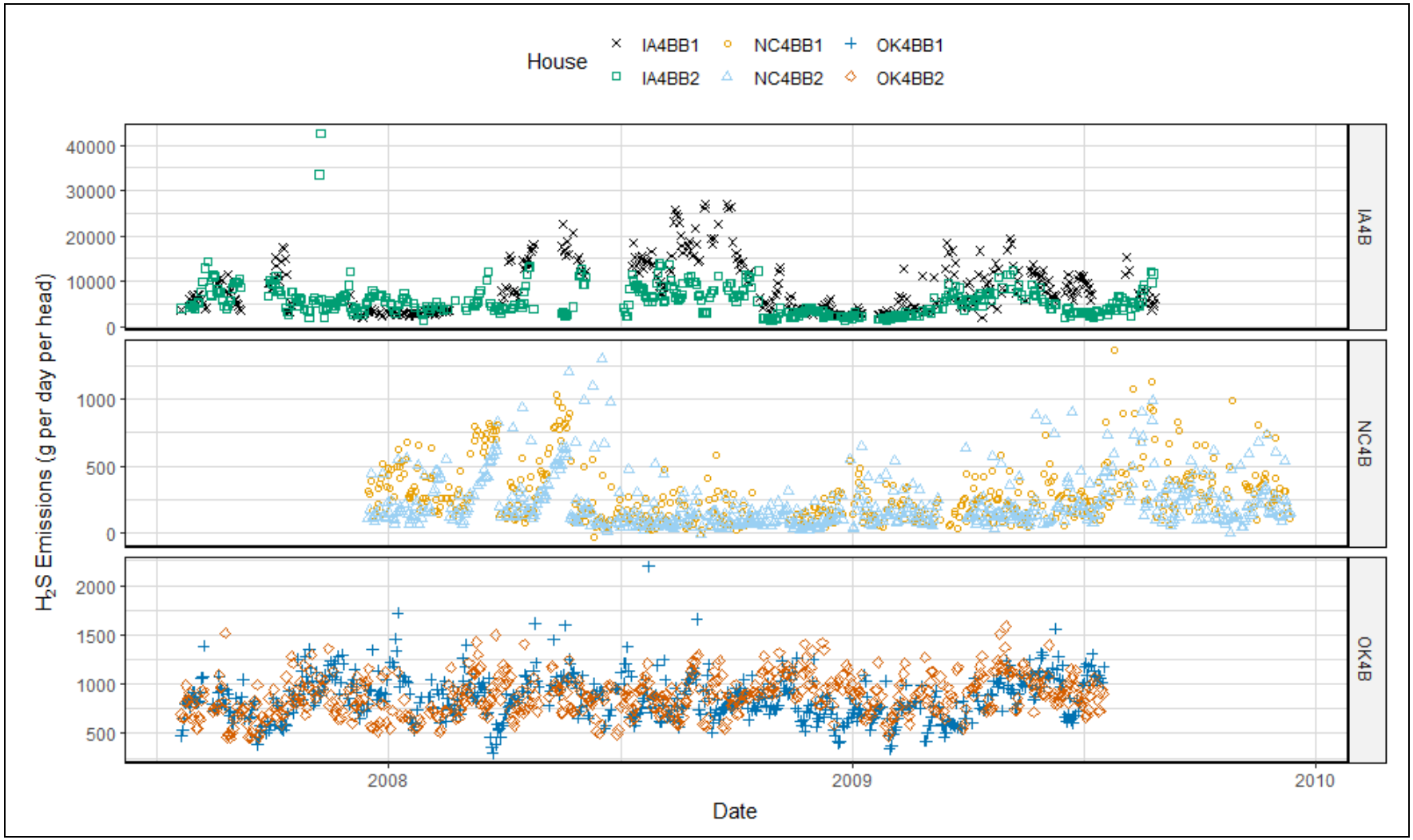


**Figure E-3. $H_2S$ emission time series for swine gestation barn (g $d^{-1}$).**

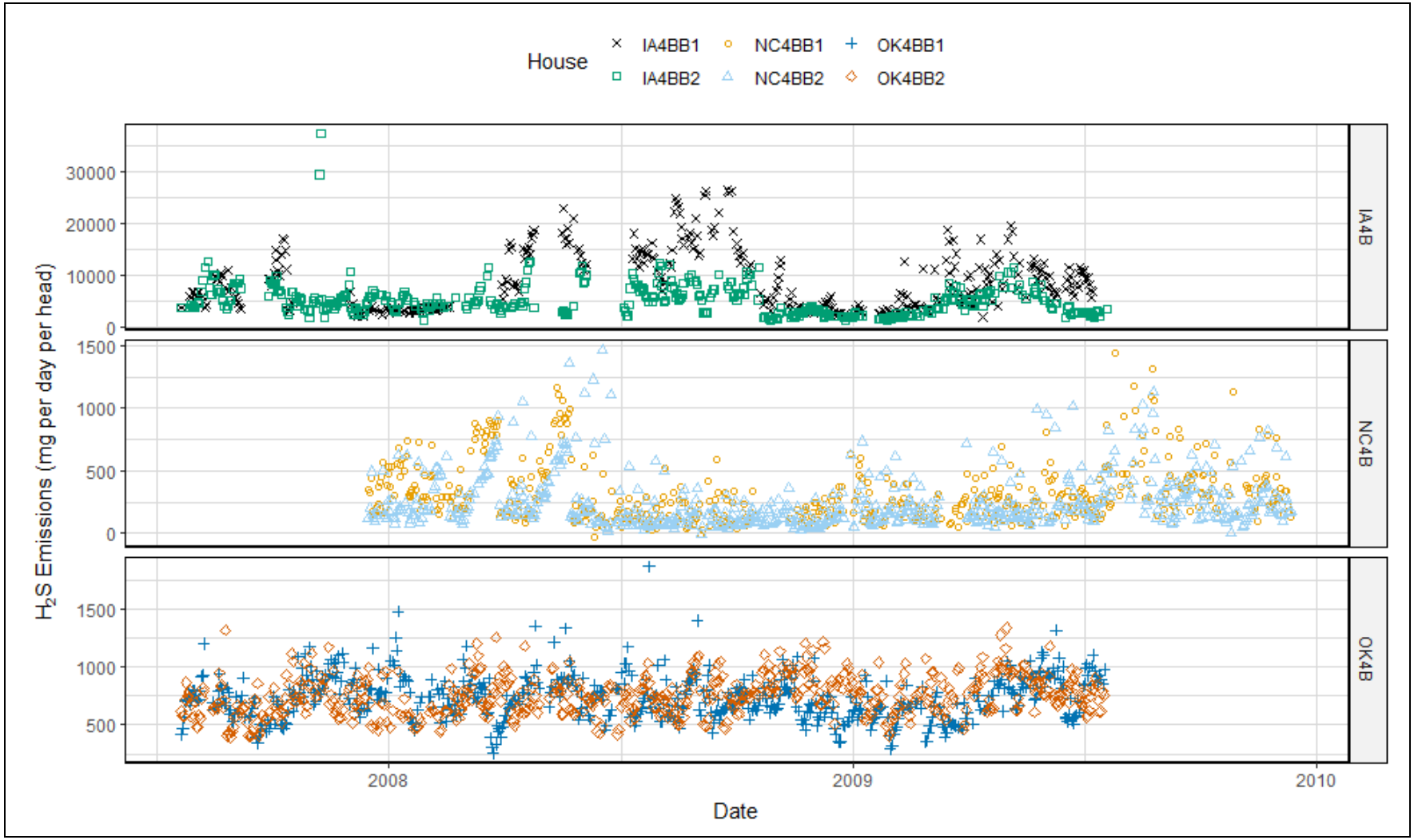


**Figure E-4. $H_2S$ emission time series for swine gestation barn (mg $d^{-1}hd^{-1}$).**

### E.1.1.3 Particulate Matter ($PM_{10}$)

**Figure E-5. $PM_{10}$ emission time series for swine gestation barn (g $d^{-1}$).**

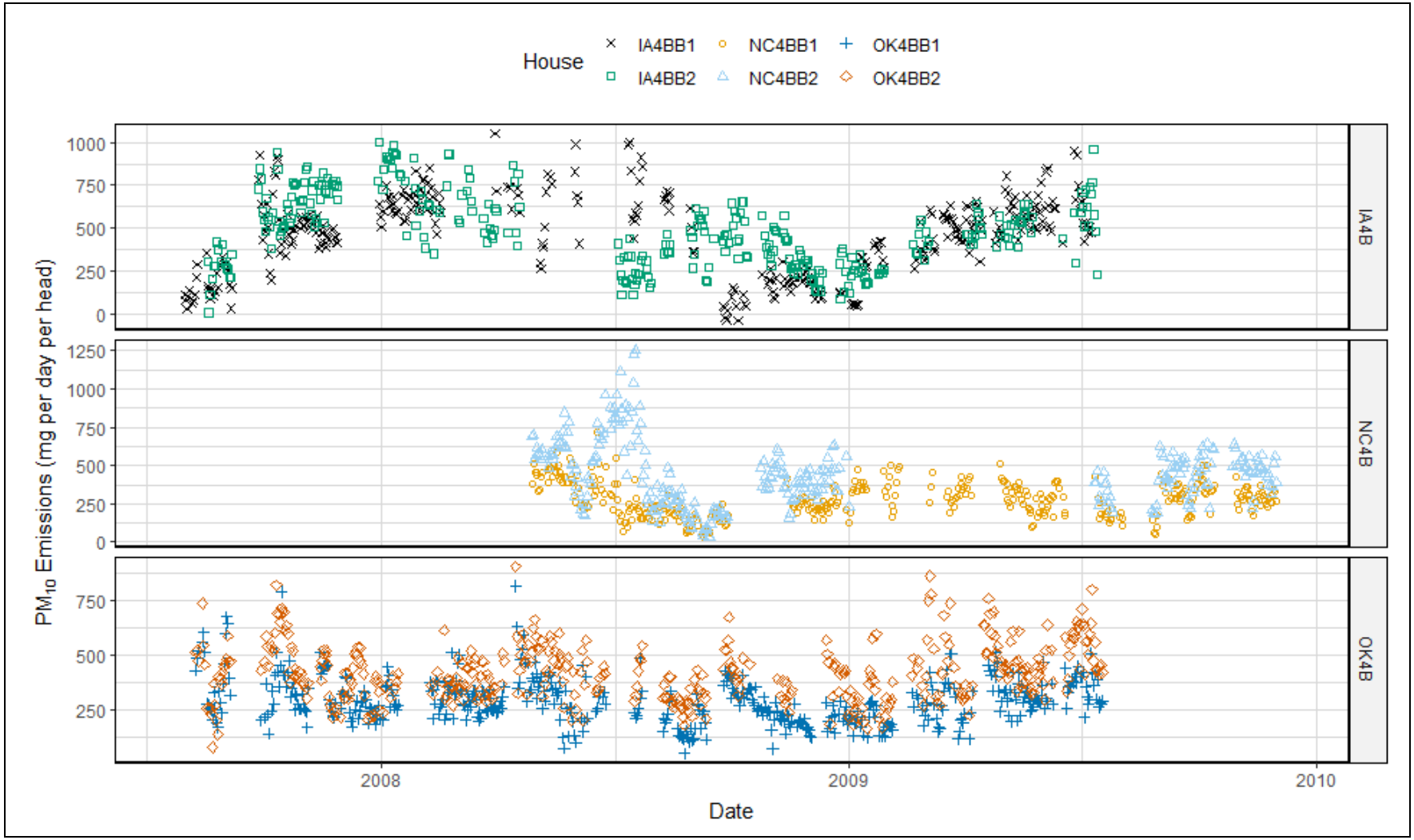


**Figure E-6. $PM_{10}$ emission time series for swine gestation barn (mg $d^{-1}hd^{-1}$).**

### E.1.1.4 Particulate Matter ($PM_{2.5}$)

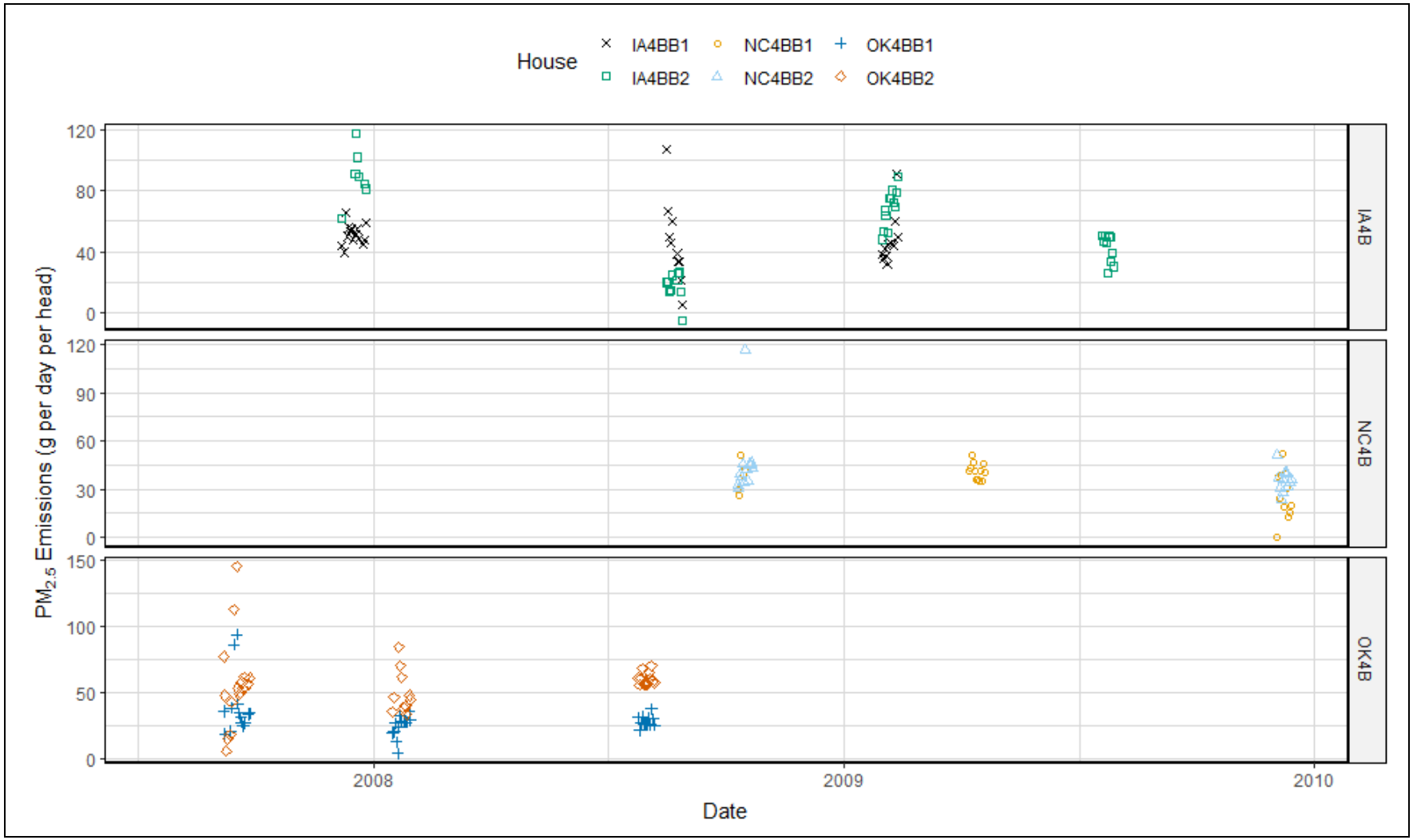


**Figure E-7. $PM_{2.5}$ emission time series for swine gestation barn (g $d^{-1}$).**

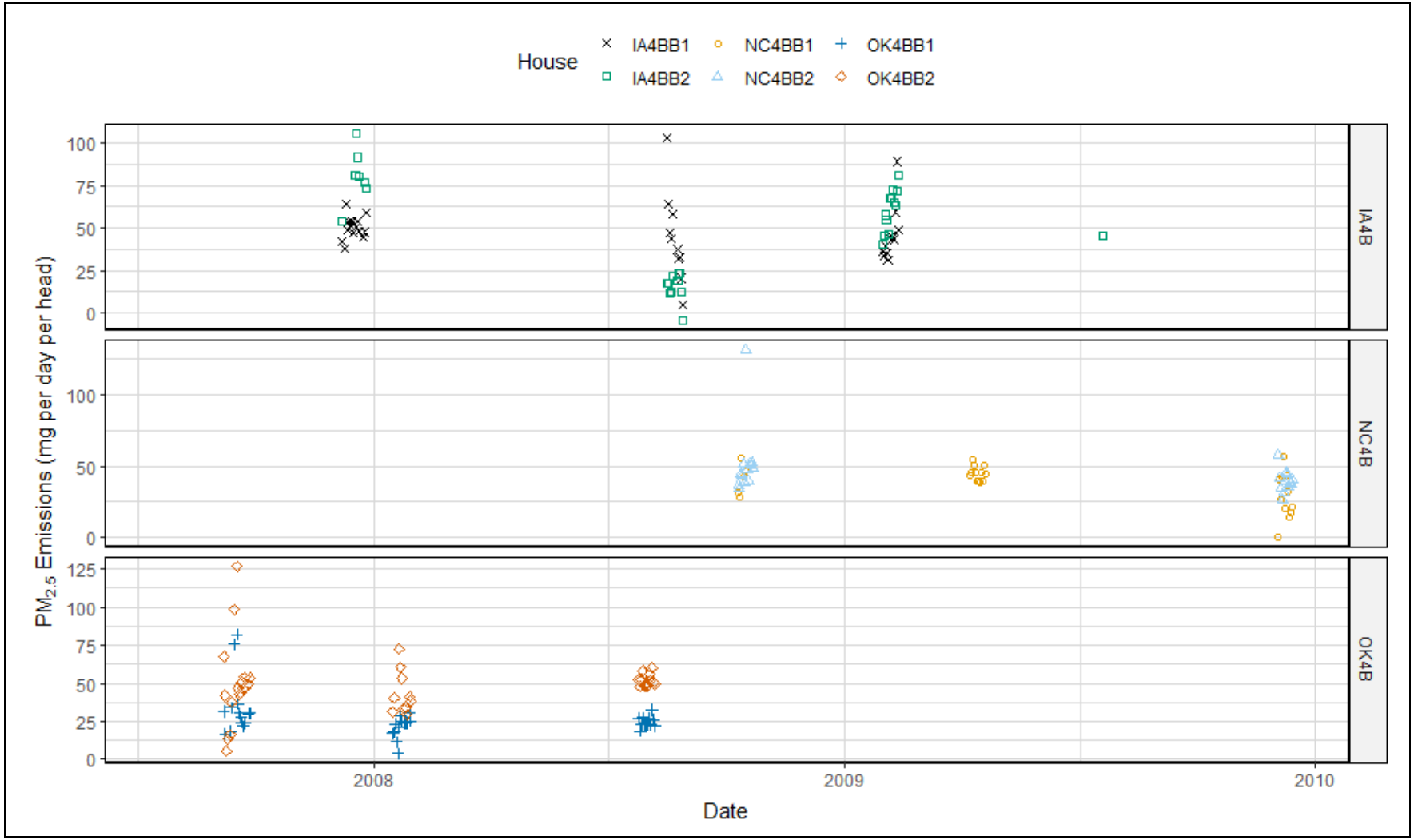


**Figure E-8. $PM_{2.5}$ emission time series for swine gestation barn (mg $d^{-1}hd^{-1}$).**

### E.1.1.5 Total Suspended Particulates (TSP)

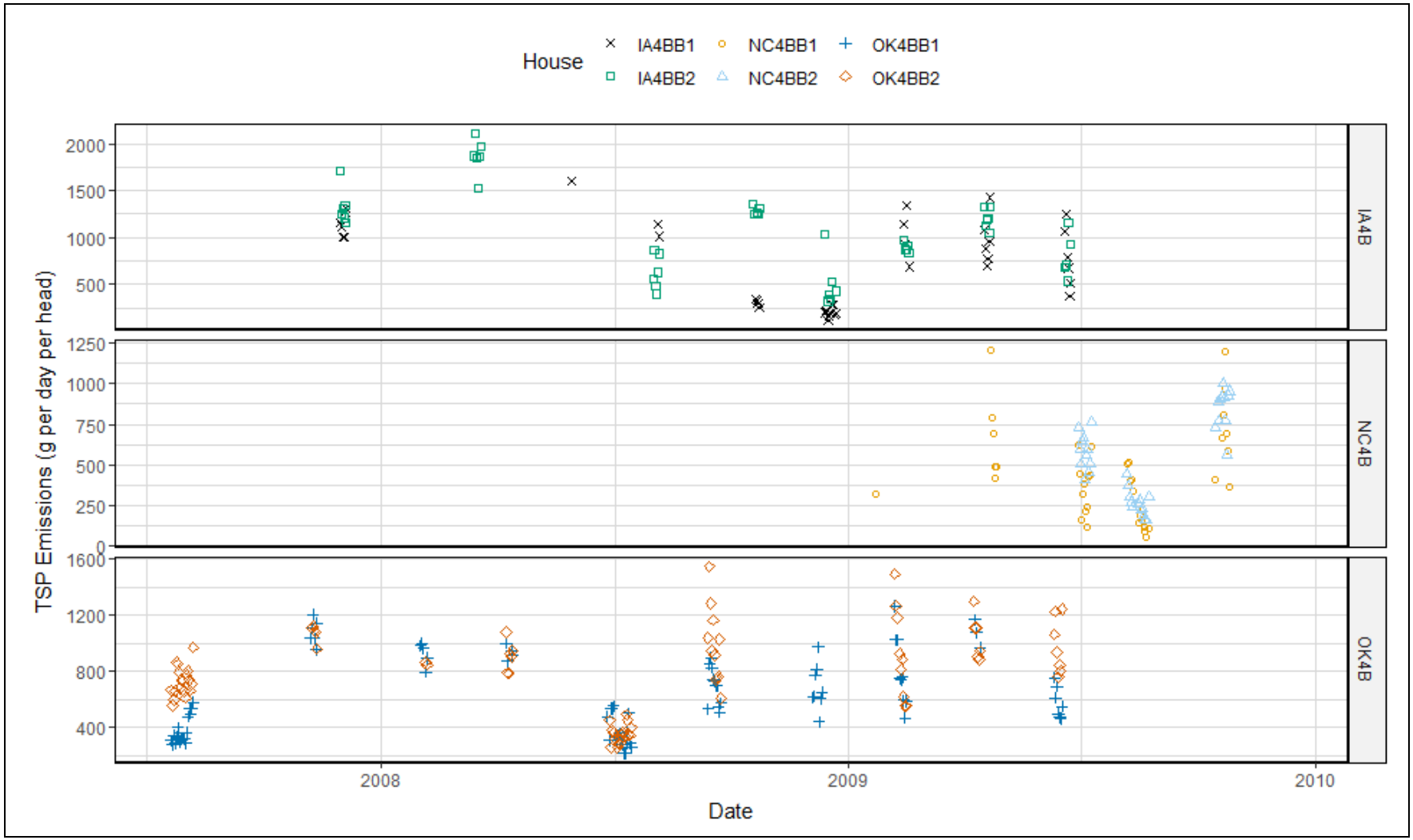


**Figure E-9. TSP emission time series for swine gestation barn (g $d^{-1}$).**

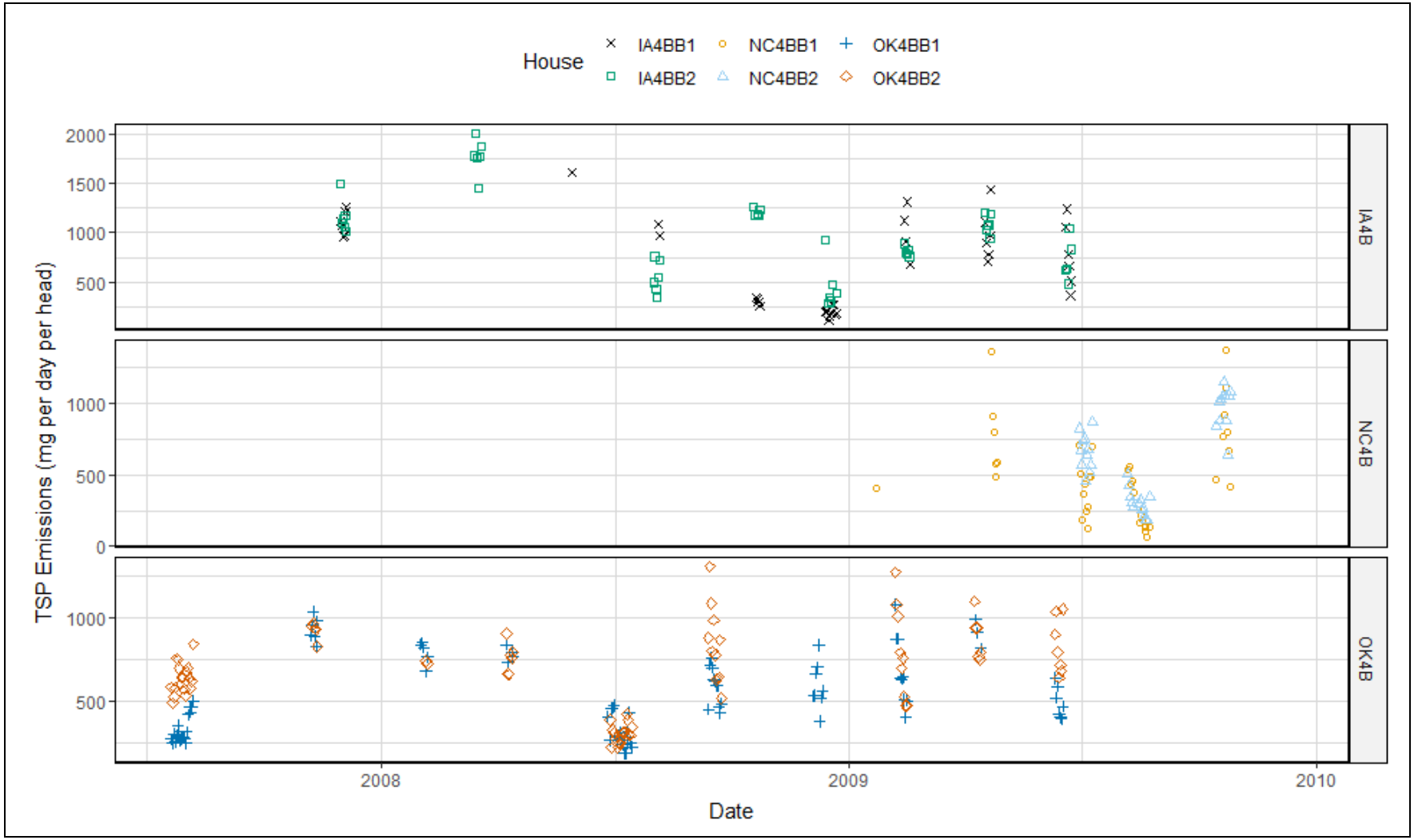


**Figure E-10. TSP emission time series for swine gestation barn (mg $d^{-1}hd^{-1}$).**

### E.1.2 Environmental

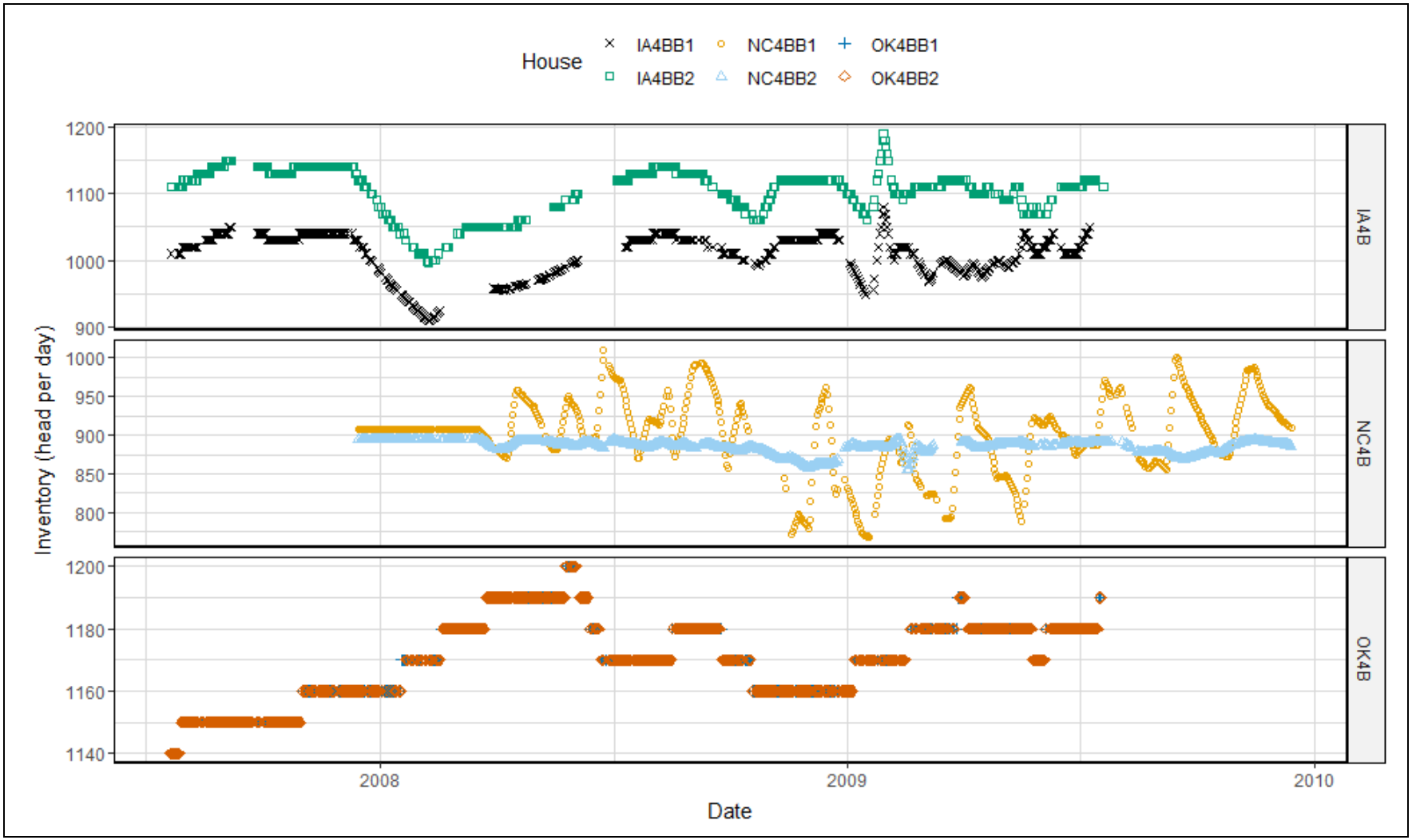


**Figure E-11. Inventory time series for swine gestation barn (hd).**

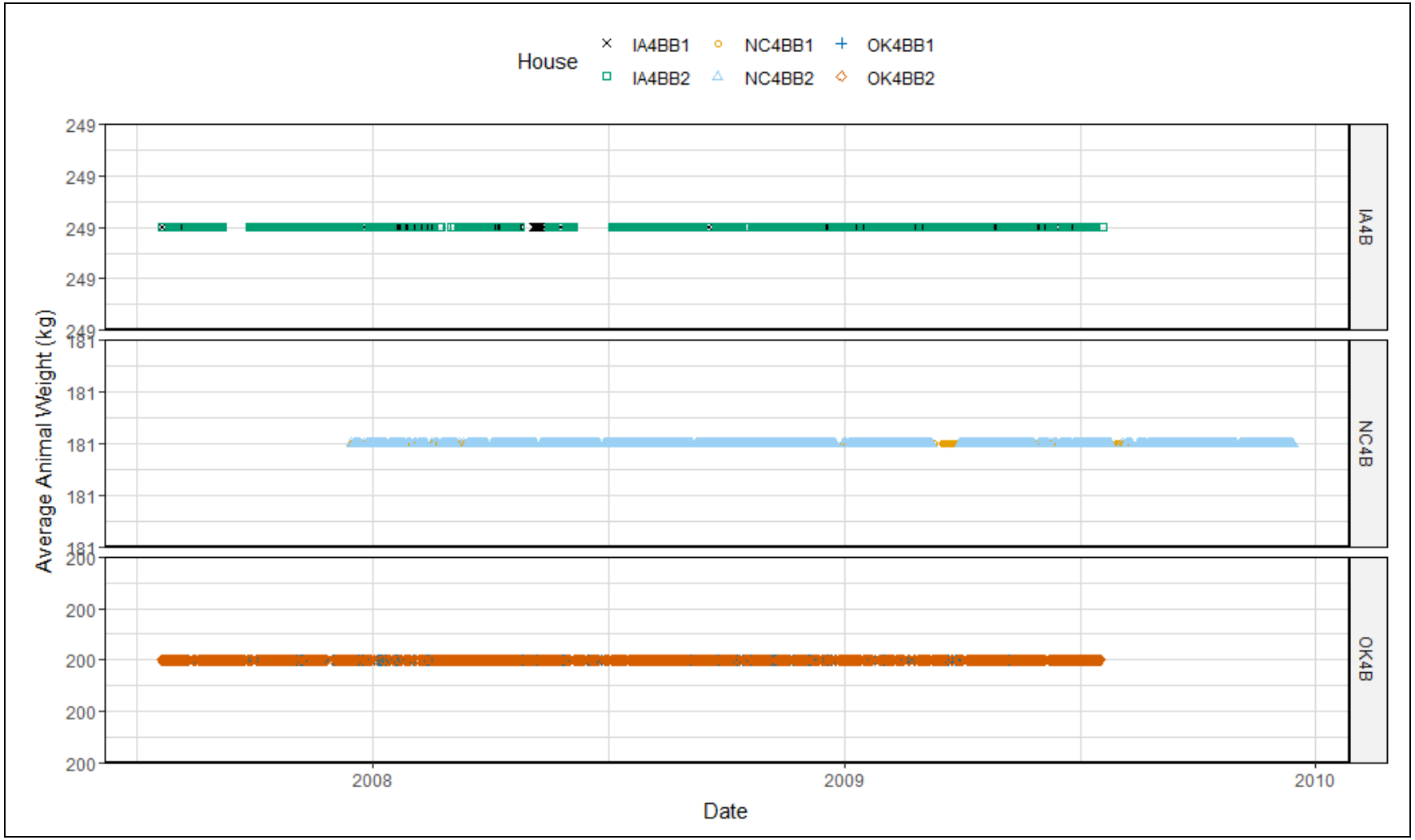


**Figure E-12. Average animal weight emission time series for swine gestation barn (kg).**

**Figure E-13. Live animal weight time series for swine gestation barn (kg).**

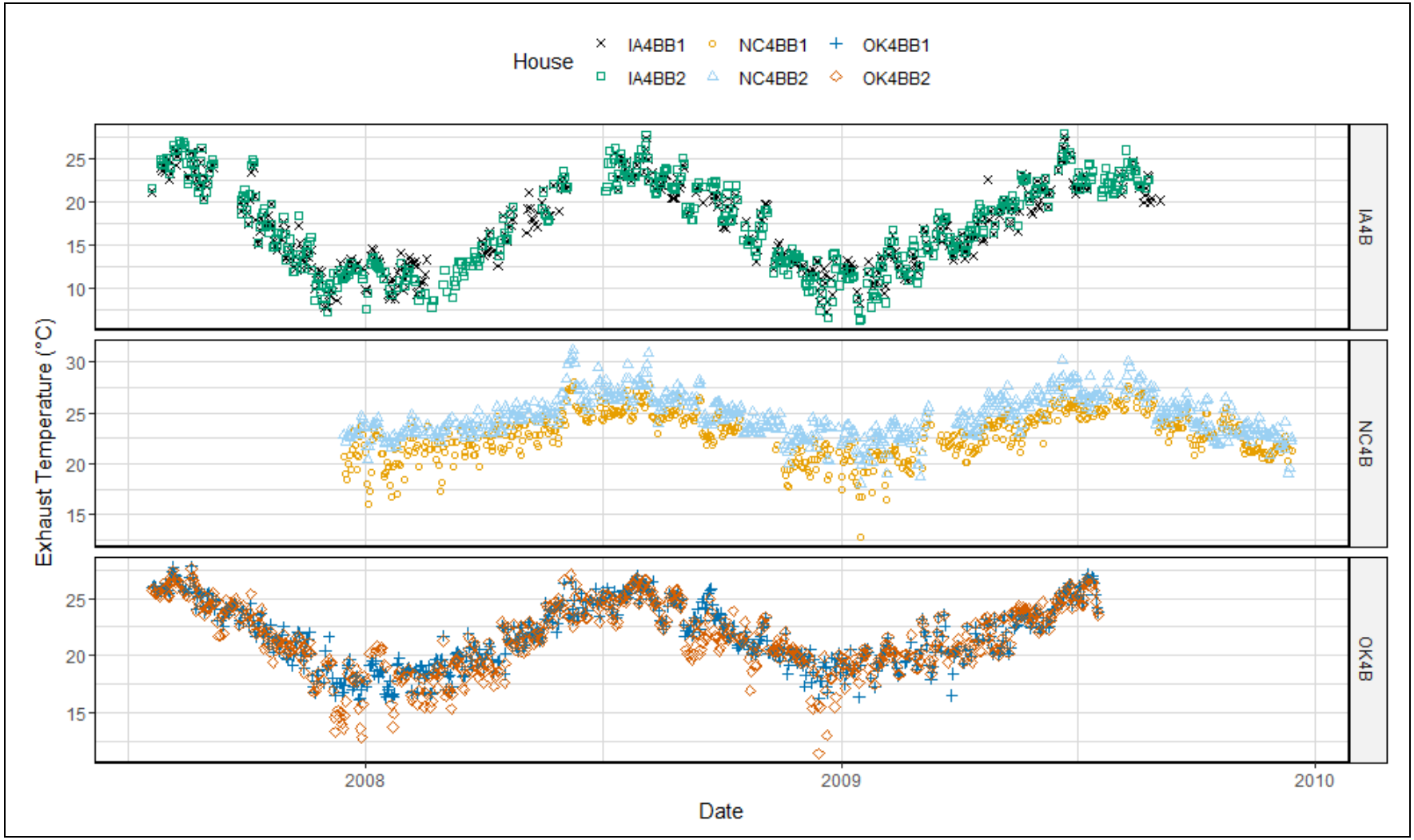


**Figure E-14. Exhaust temperature time series for swine gestation barn (°C).**

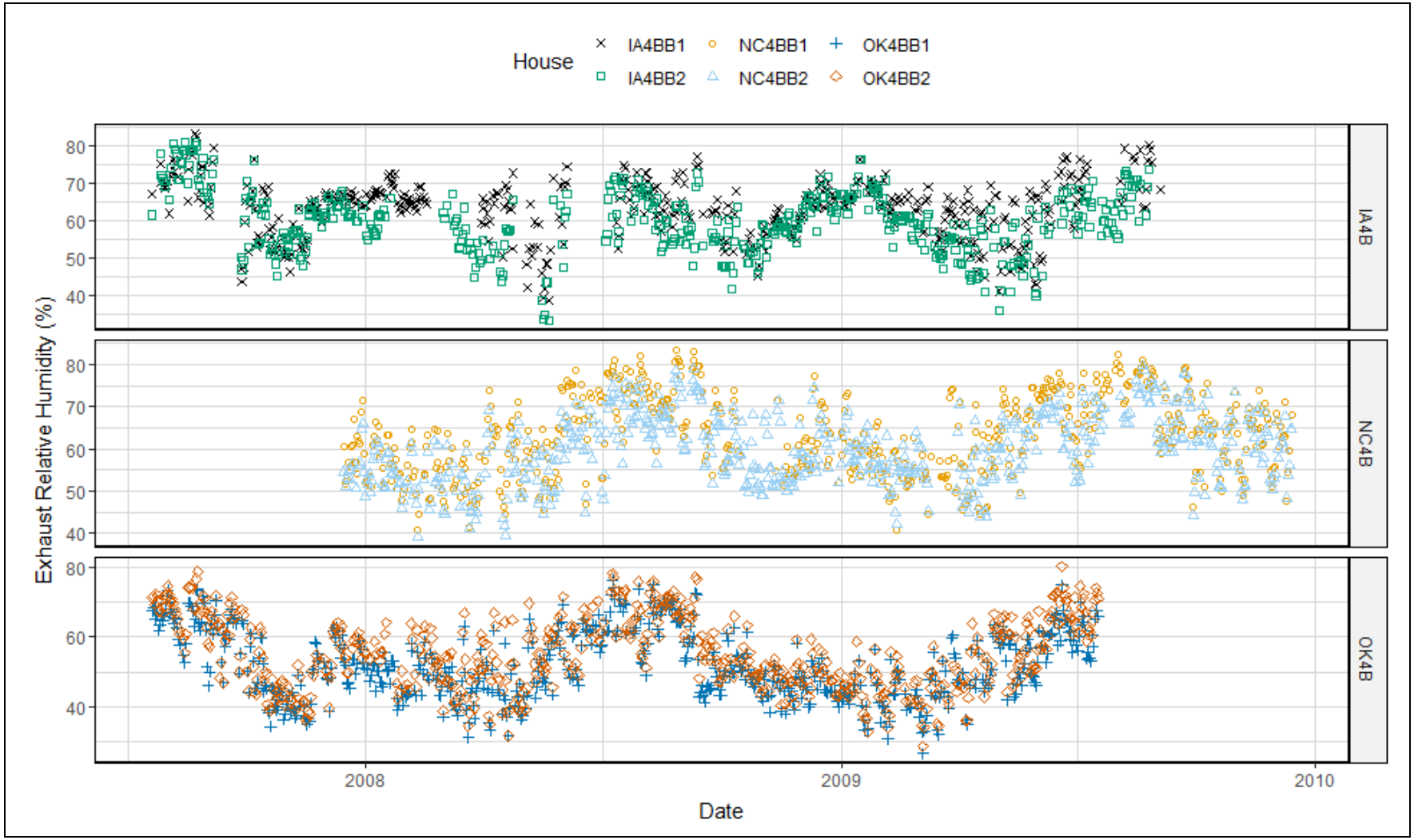


**Figure E-15. Exhaust relative humidity time series for swine gestation barn (%).**

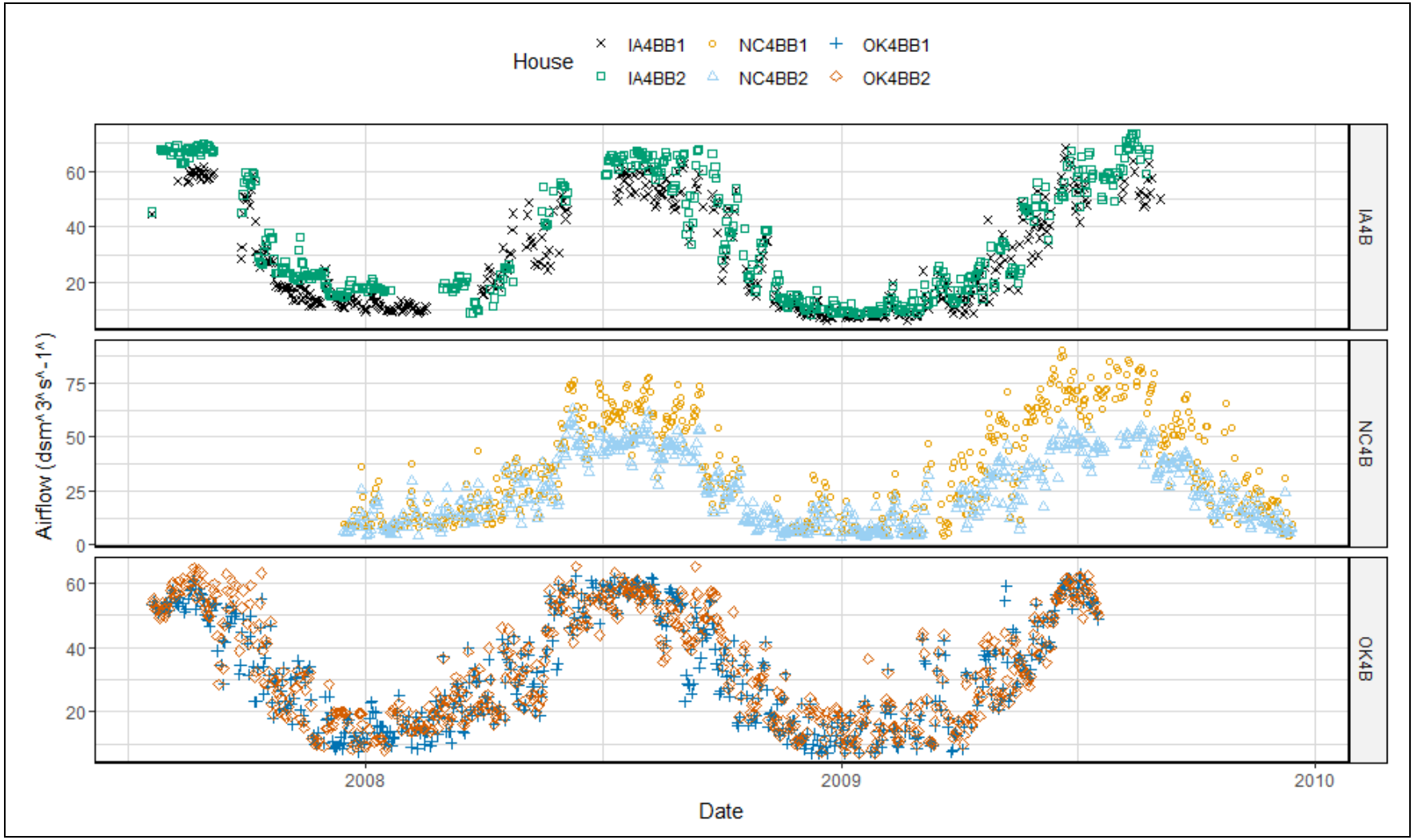


**Figure E-16. Airflow time series for swine gestation barn (dscm$^3$s$^{-1}$).**

### E.1.3 Ambient

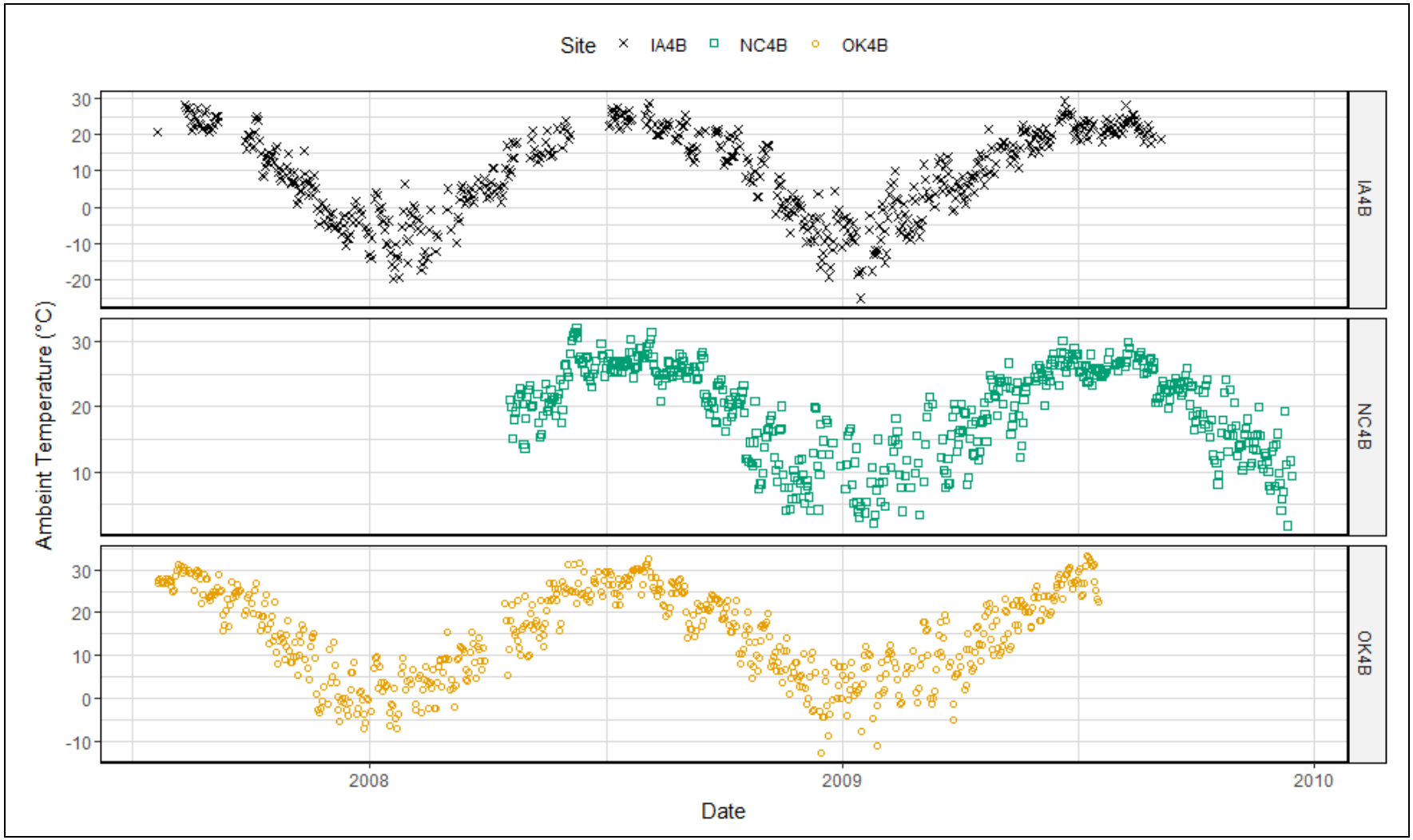


**Figure E-17. Ambient temperature time series for swine gestation barn (°C).**

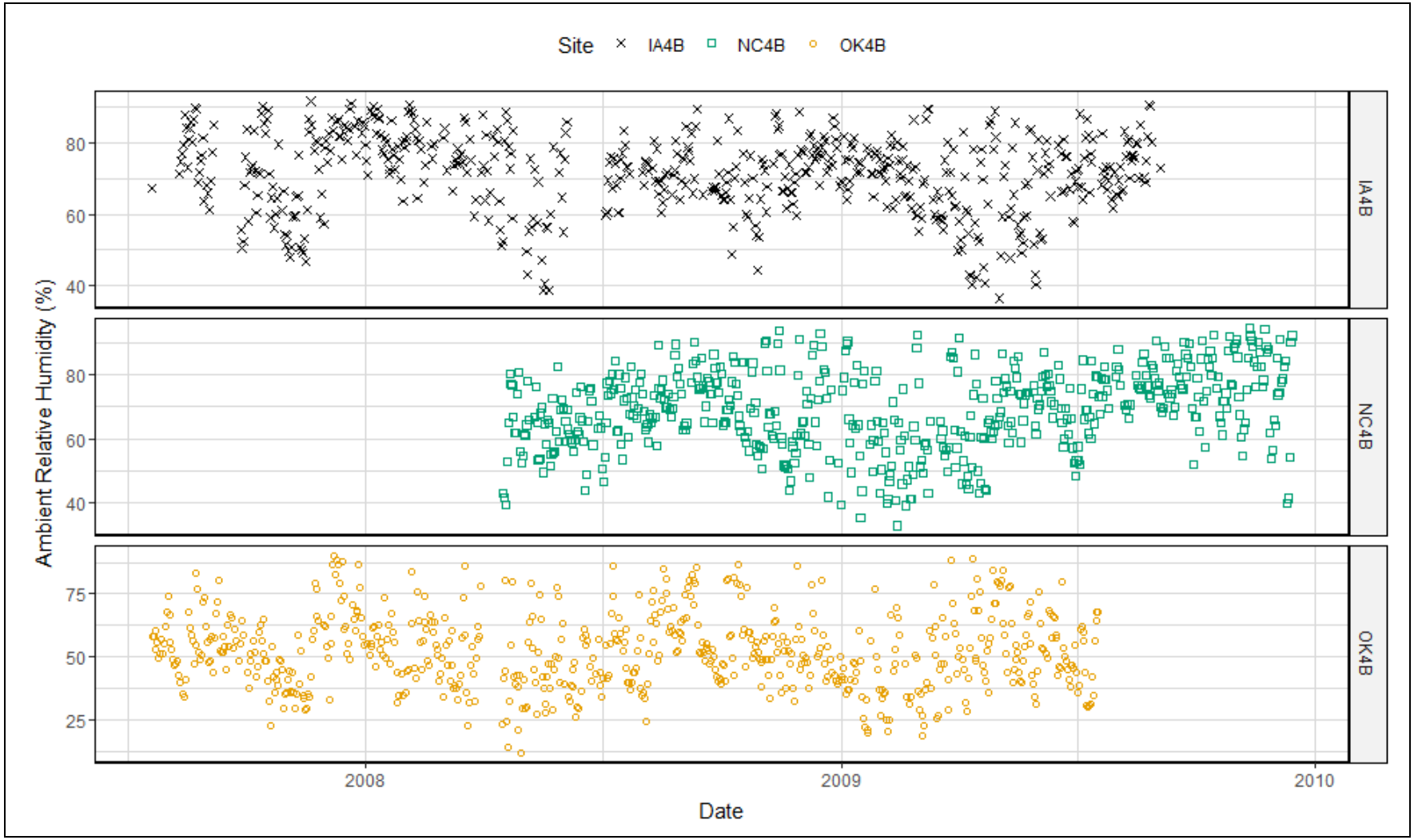


**Figure E-18. Ambient relative humidity time series for swine gestation barn (%).**

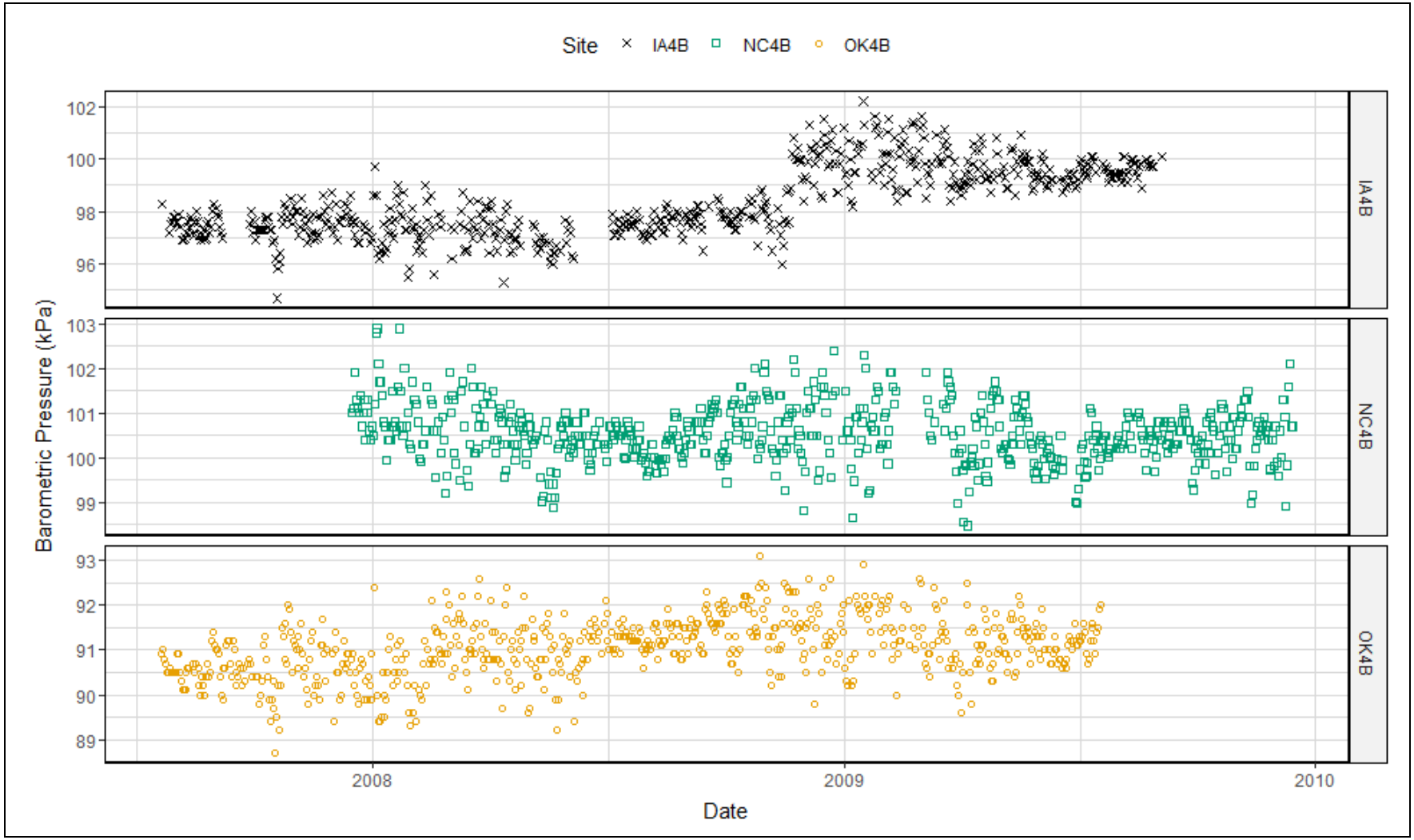


**Figure E-19. Barometric pressure time series for swine gestation barn (kPa).**

## E.2 Farrowing Rooms

### E.2.1 Emissions

#### E.2.1.1 Ammonia ($NH_3$)

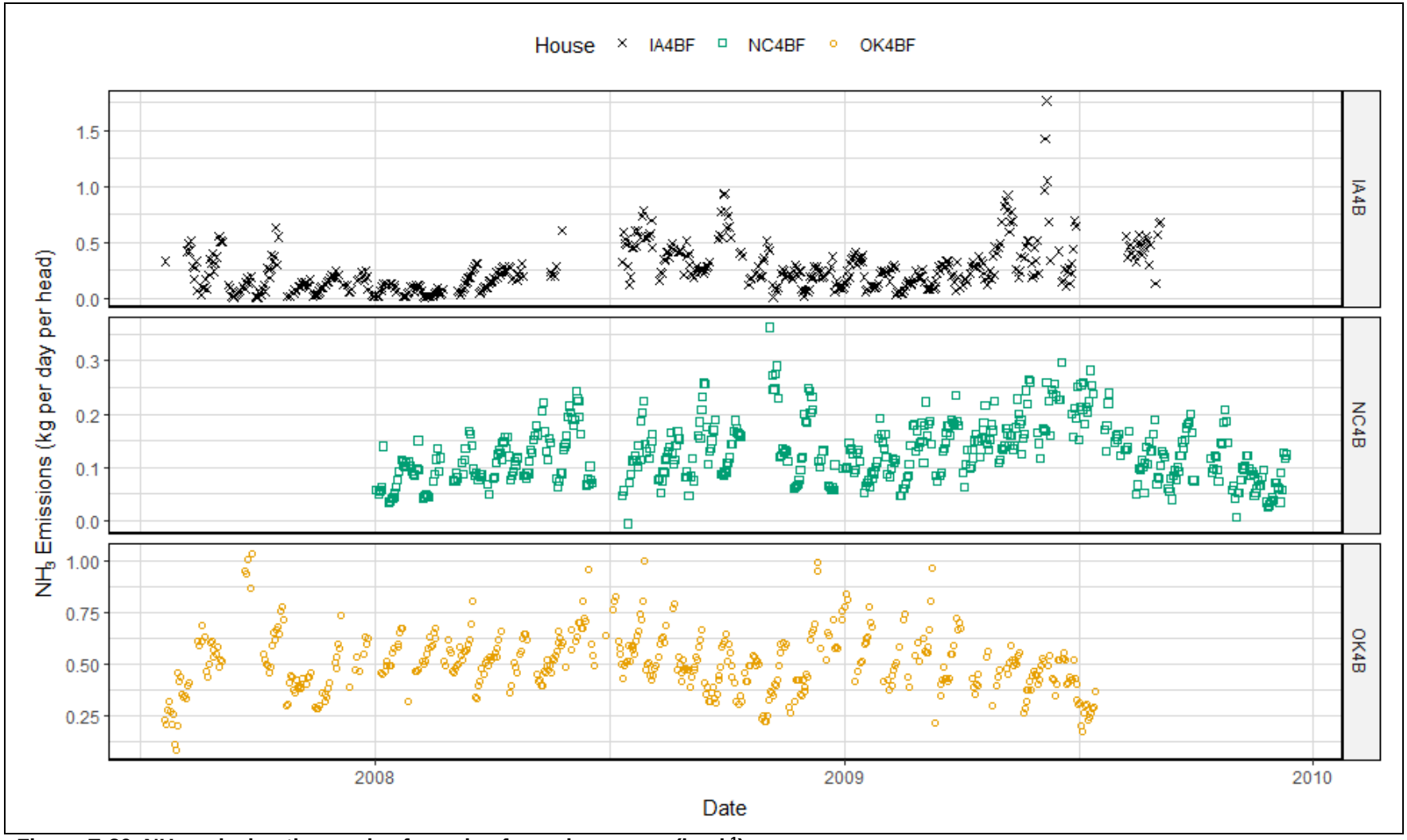


**Figure E-20. $NH_3$ emission time series for swine farrowing rooms (kg $d^{-1}$).**

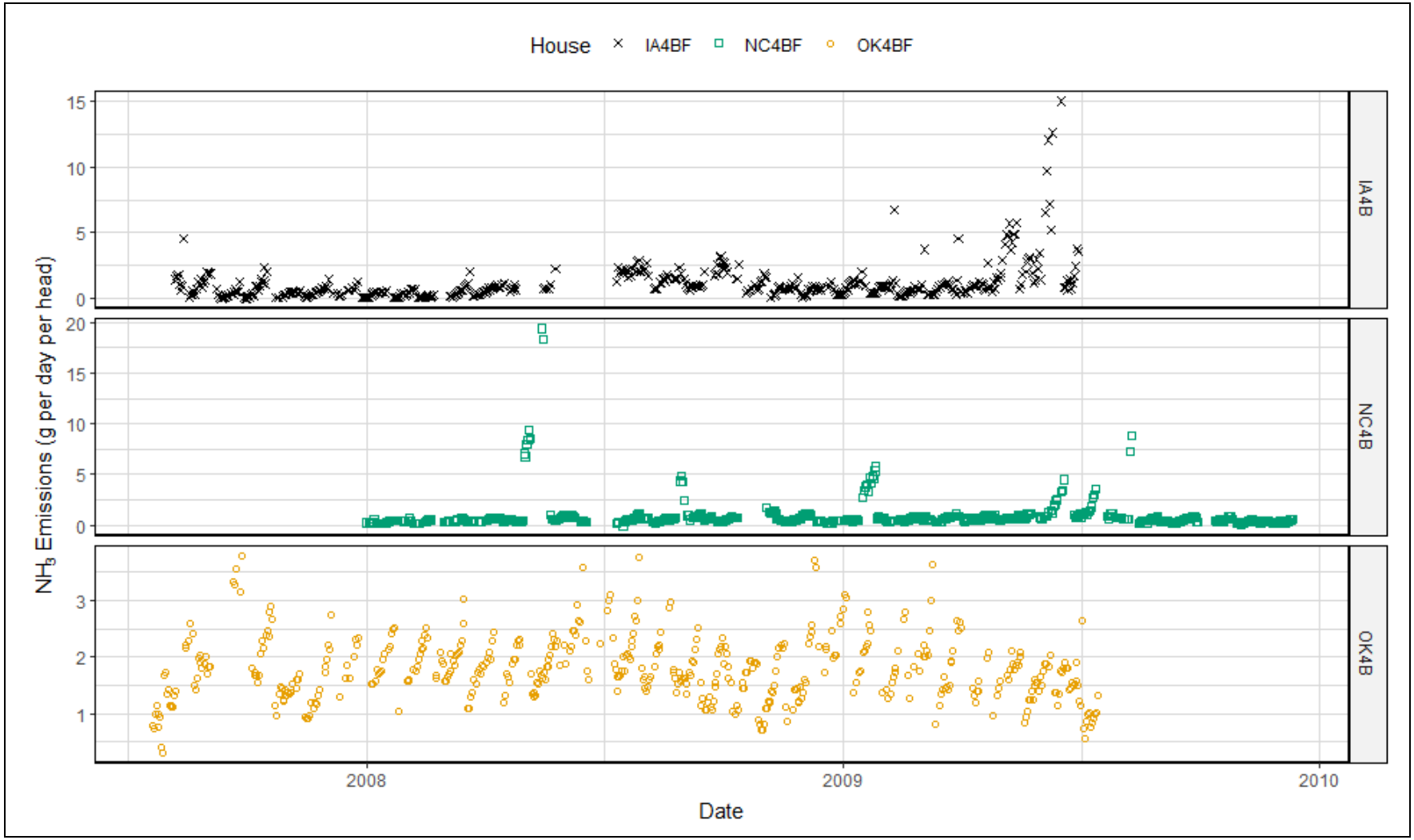


**Figure E-21. $NH_3$ emission time series for swine farrowing rooms (g $d^{-1}hd^{-1}$).**

### E.2.1.2 Hydrogen Sulfide ($H_2S$)

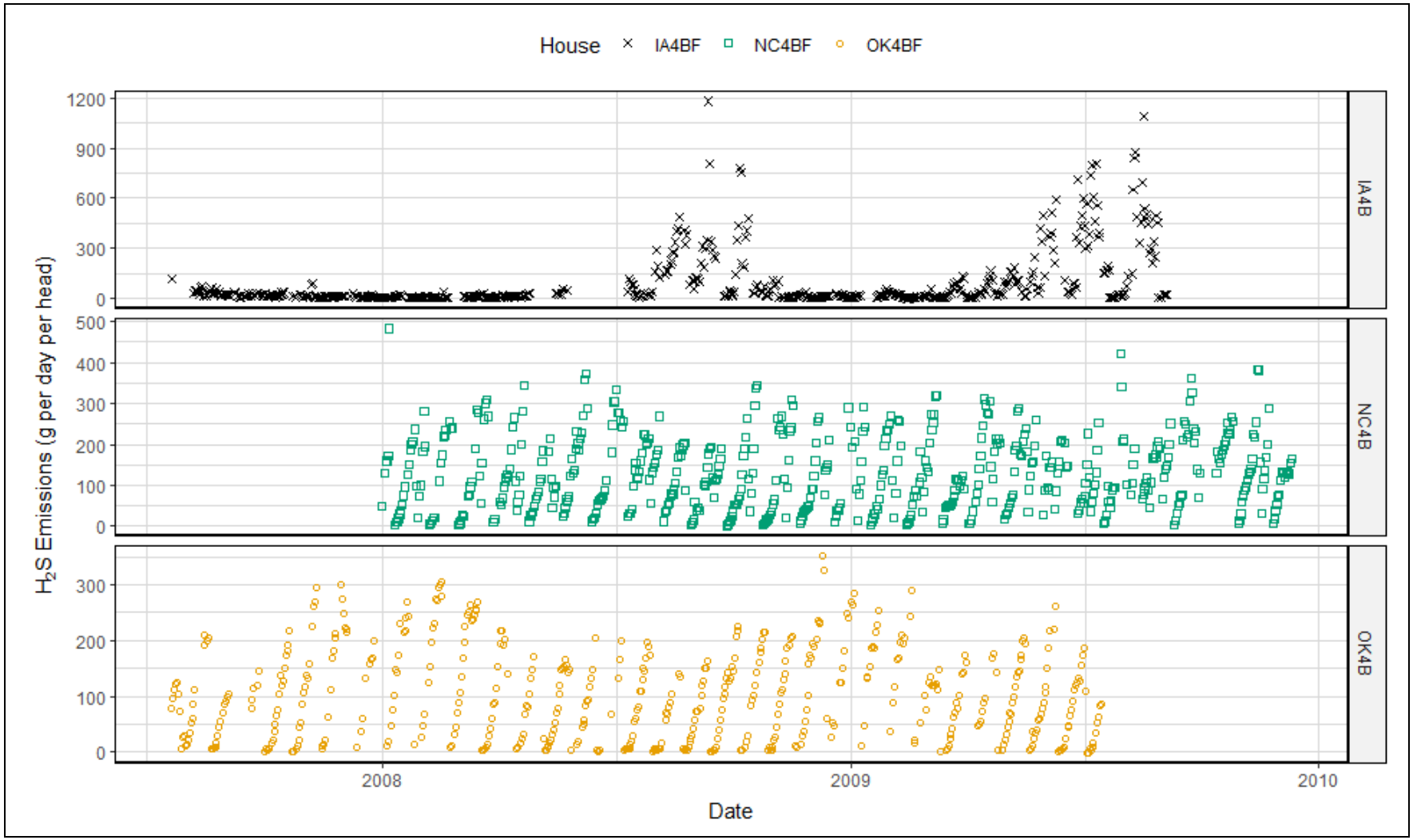


**Figure E-22. $H_2S$ emission time series for swine farrowing rooms (g $d^{-1}$).**

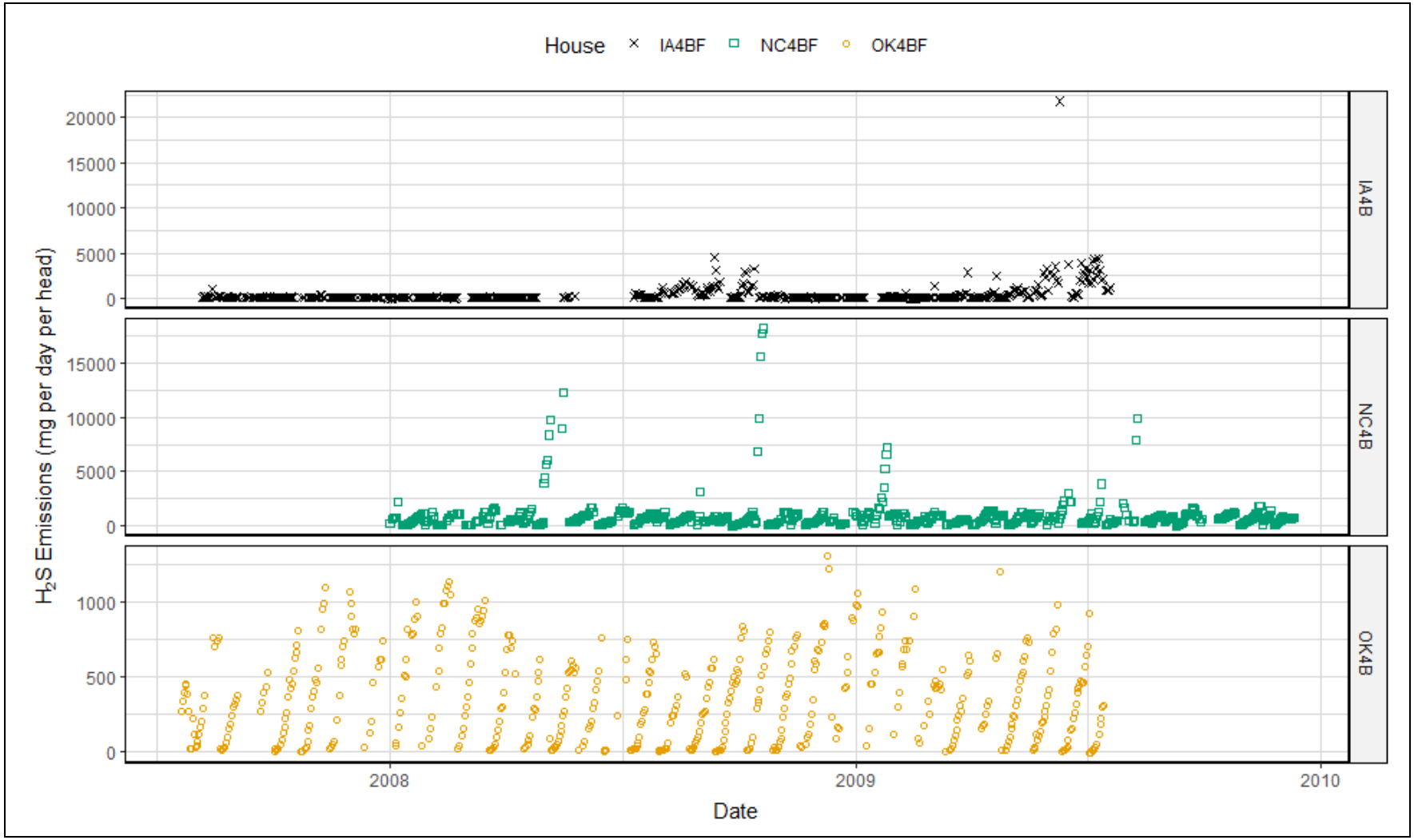


**Figure E-23. $H_2S$ emission time series for swine farrowing rooms (mg $d^{-1}hd^{-1}$).**

### E.2.1.3 Particulate Matter ($PM_{10}$)

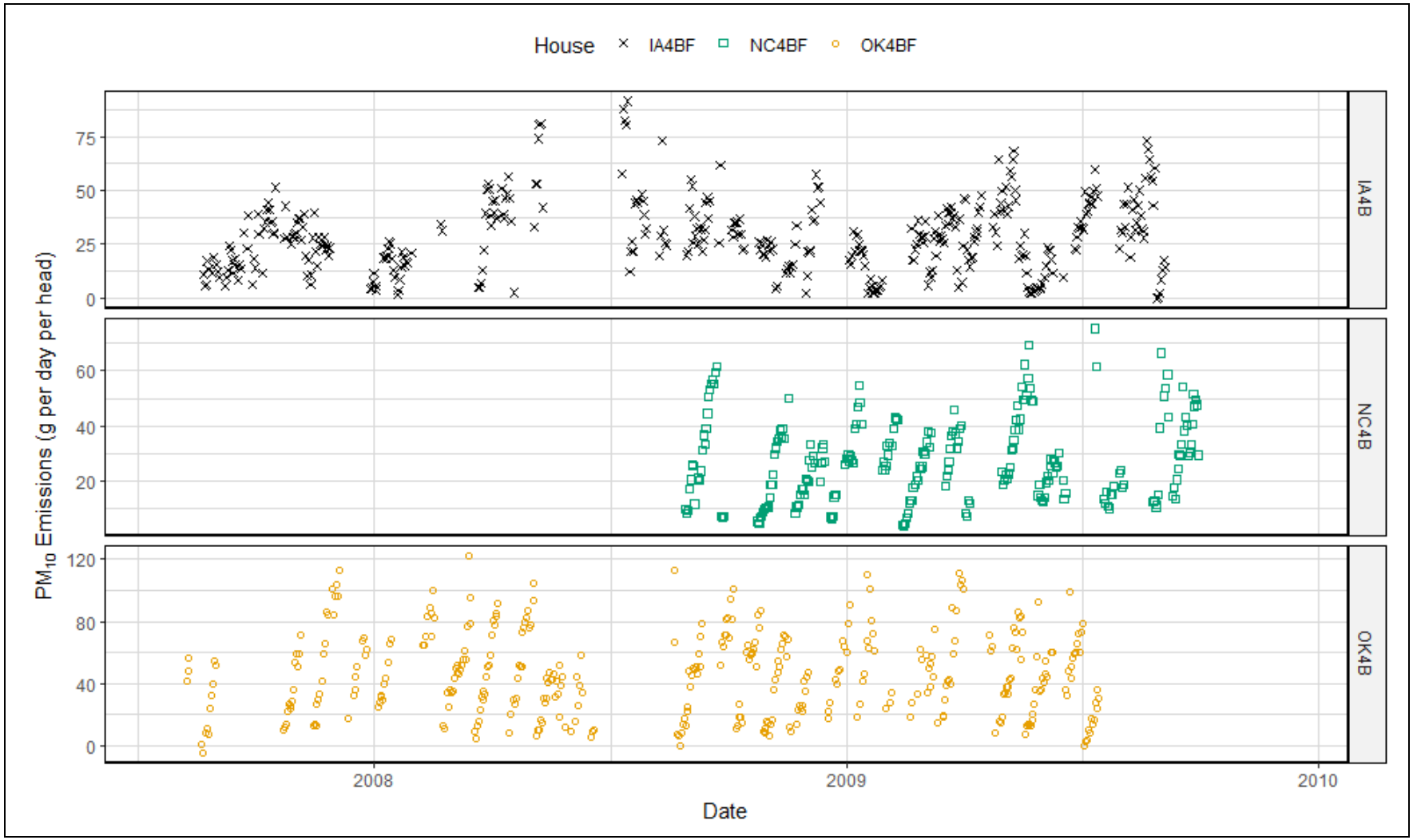


**Figure E-24. $PM_{10}$ emission time series for swine farrowing rooms (g $d^{-1}$).**

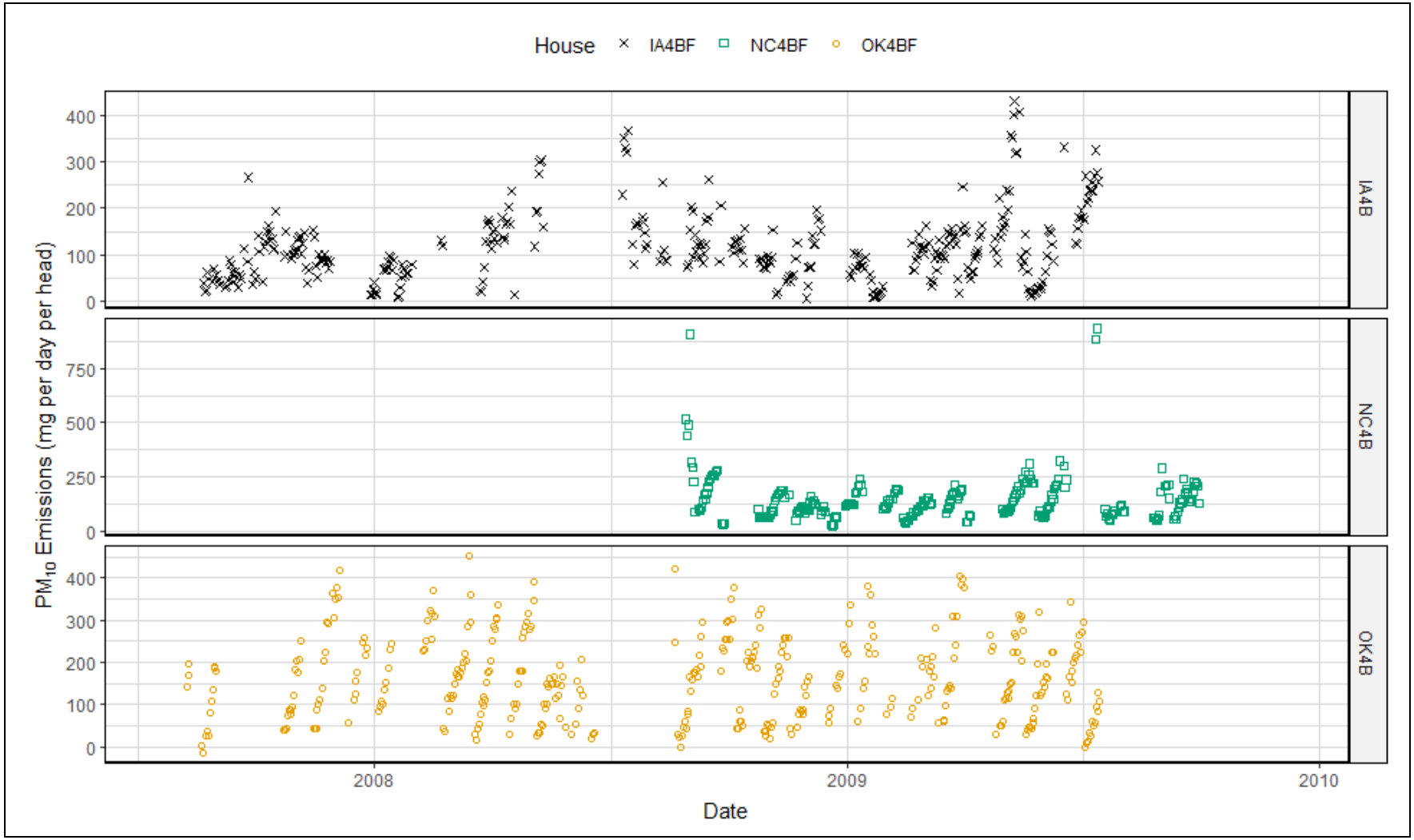


**Figure E-25. $PM_{10}$ emission time series for swine farrowing rooms (mg $d^{-1}hd^{-1}$).**

### E.2.1.4 Particulate Matter ($PM_{2.5}$)

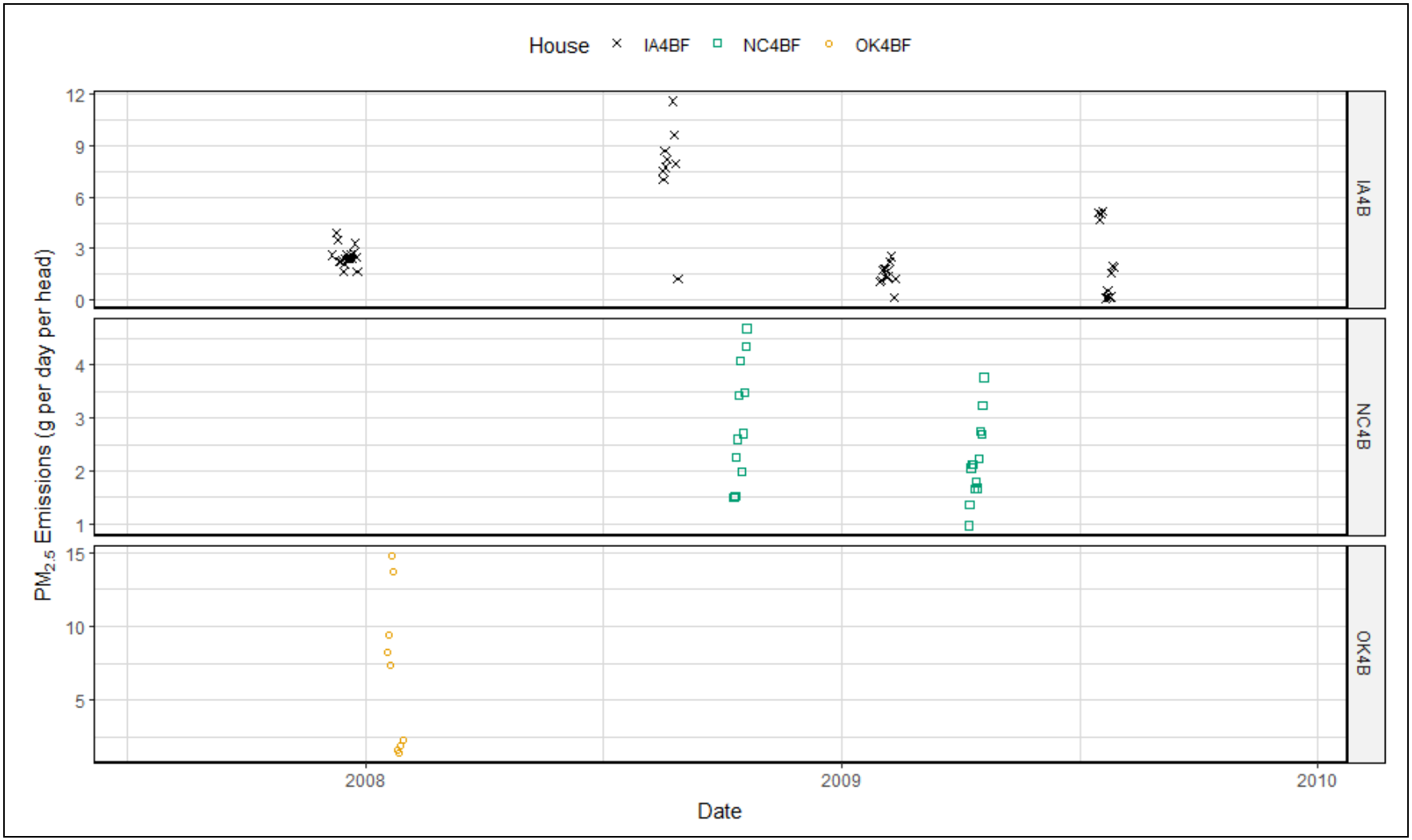


**Figure E-26. $PM_{2.5}$ emission time series for swine farrowing rooms (g $d^{-1}$).**

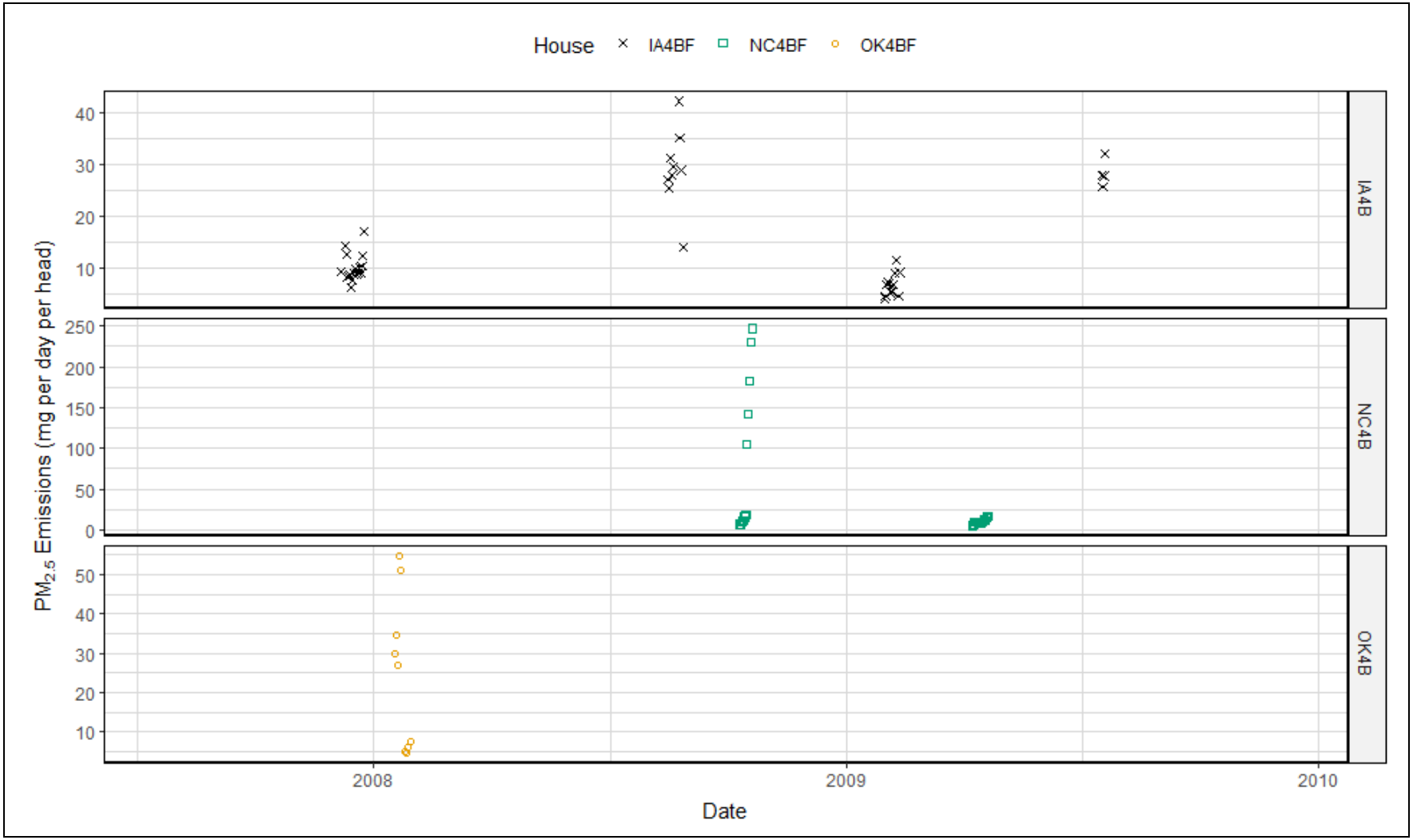


**Figure E-27. $PM_{2.5}$ emission time series for swine farrowing rooms (mg $d^{-1}hd^{-1}$).**

### E.2.1.5 Total Suspended Particulates (TSP)

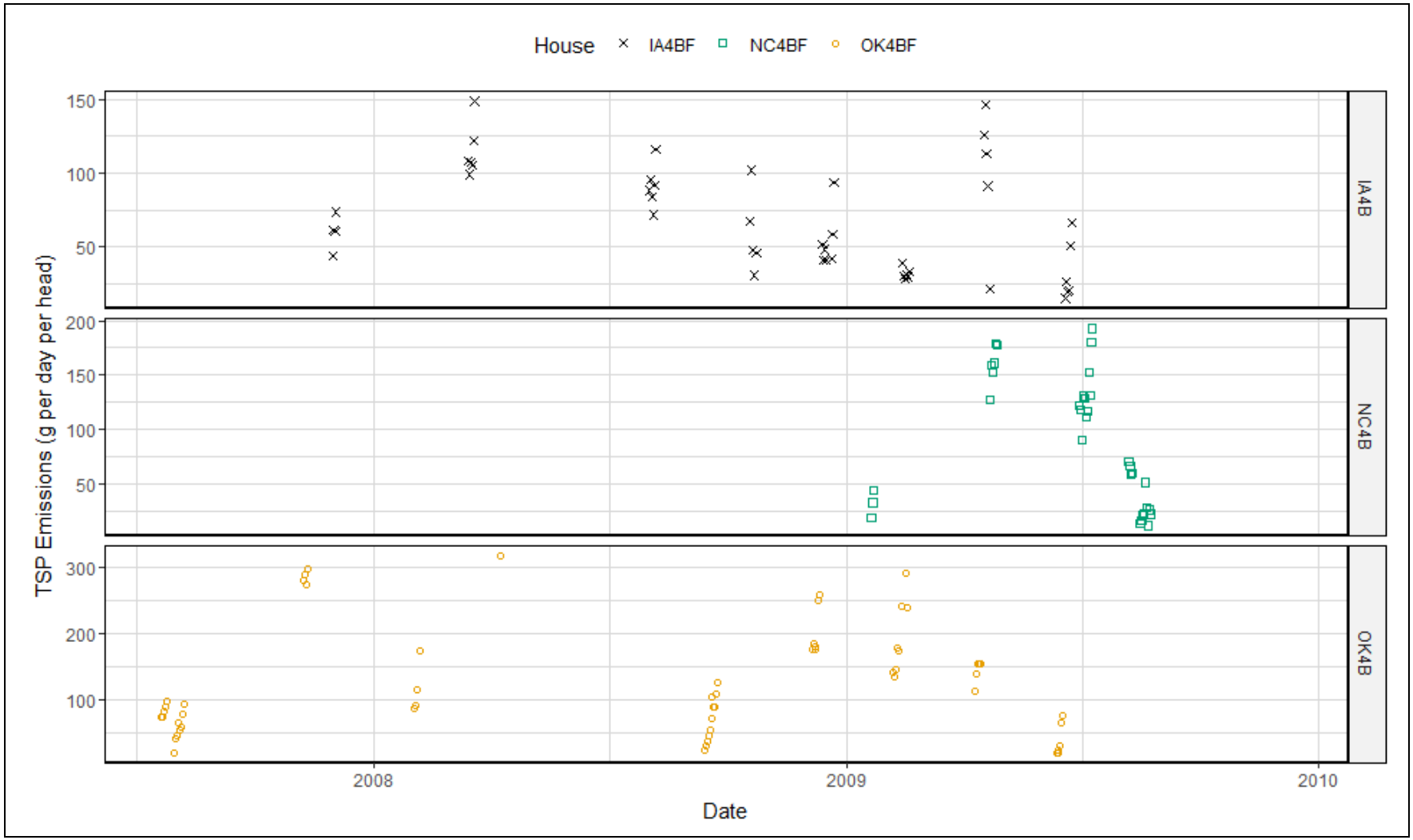


**Figure E-28. TSP emission time series for swine farrowing rooms (g $d^{-1}$).**

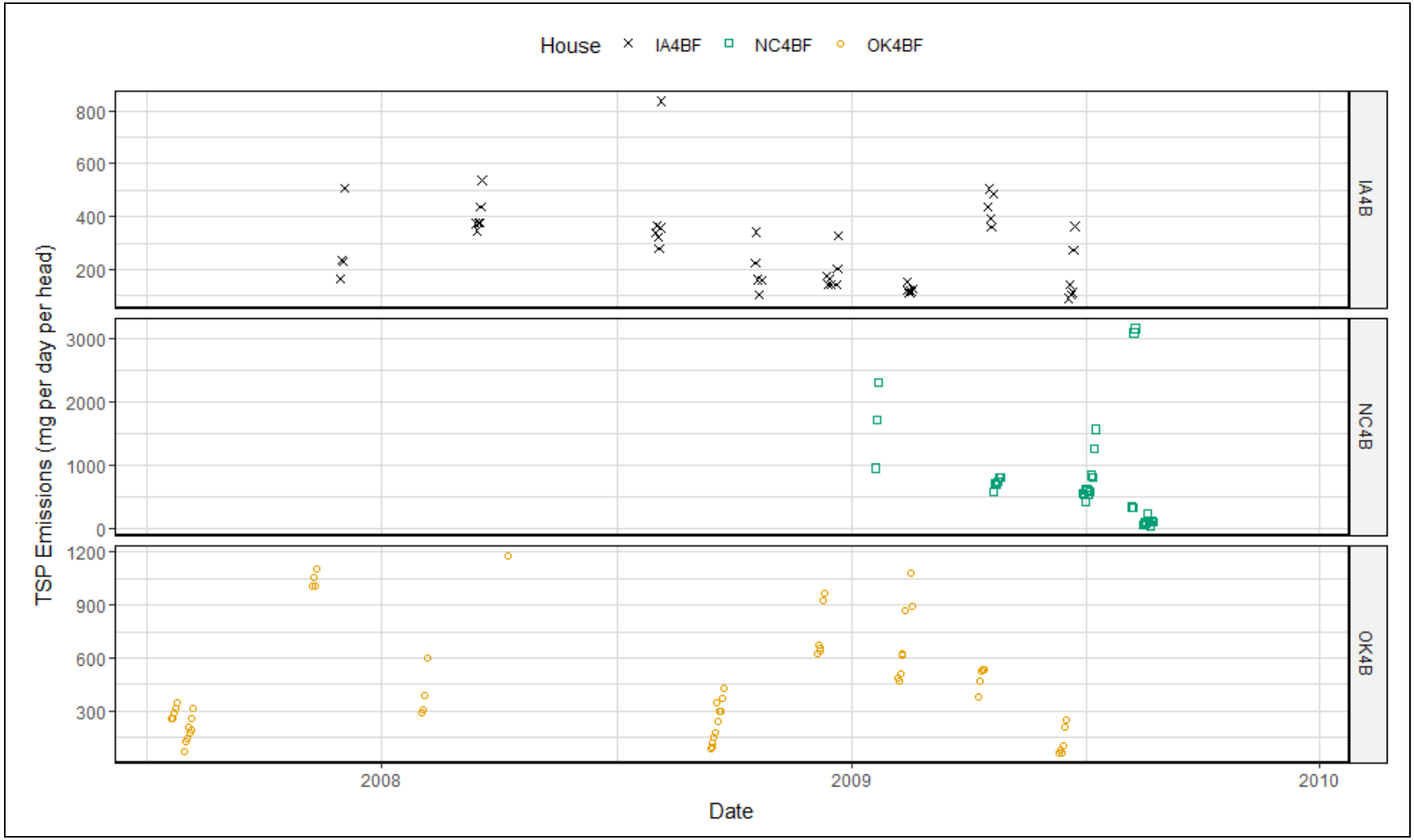


**Figure E-29. TSP emission time series for swine farrowing rooms (mg $d^{-1}hd^{-1}$).**

### E.2.2 Environmental

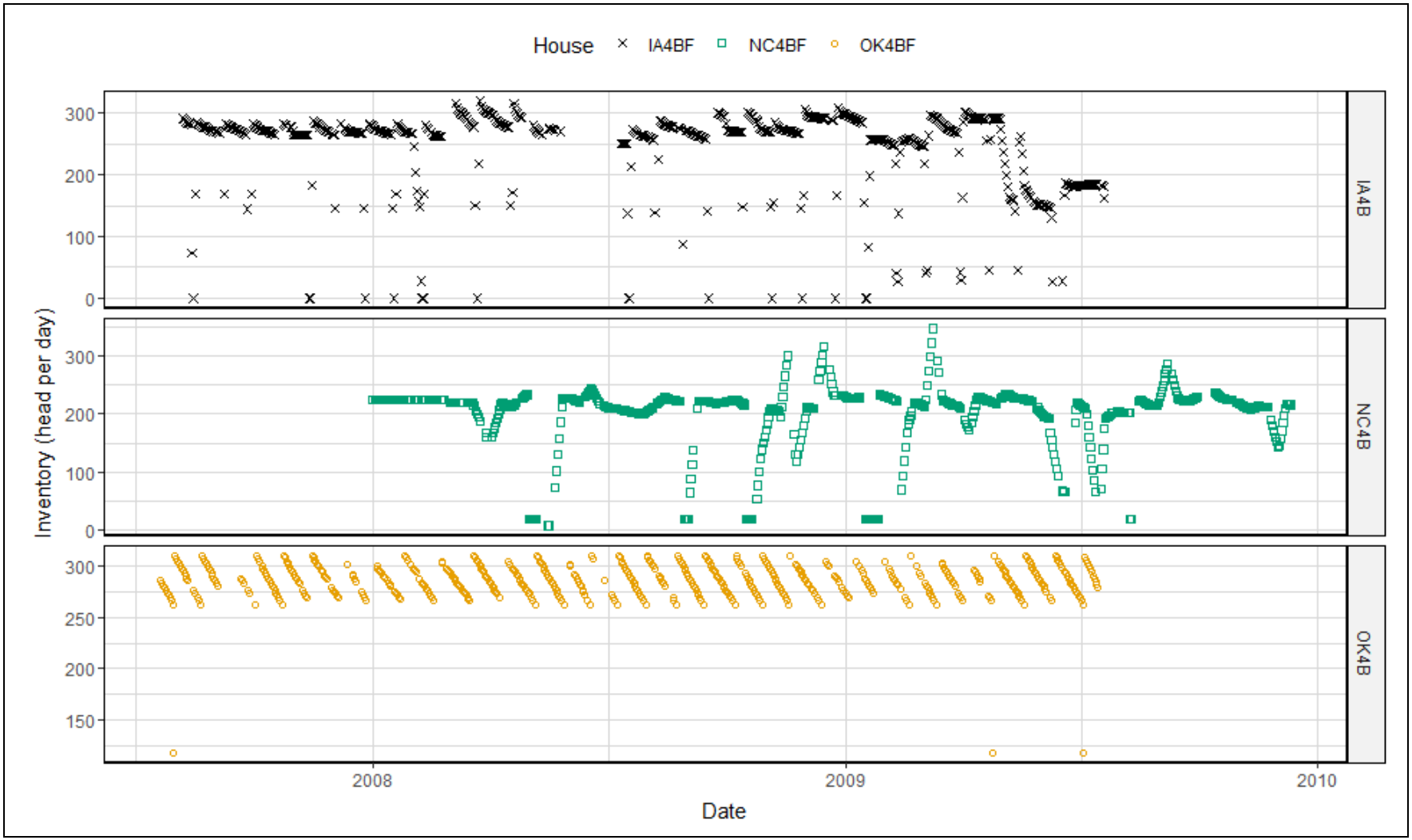


**Figure E-30. Inventory time series for swine farrowing rooms (hd).**

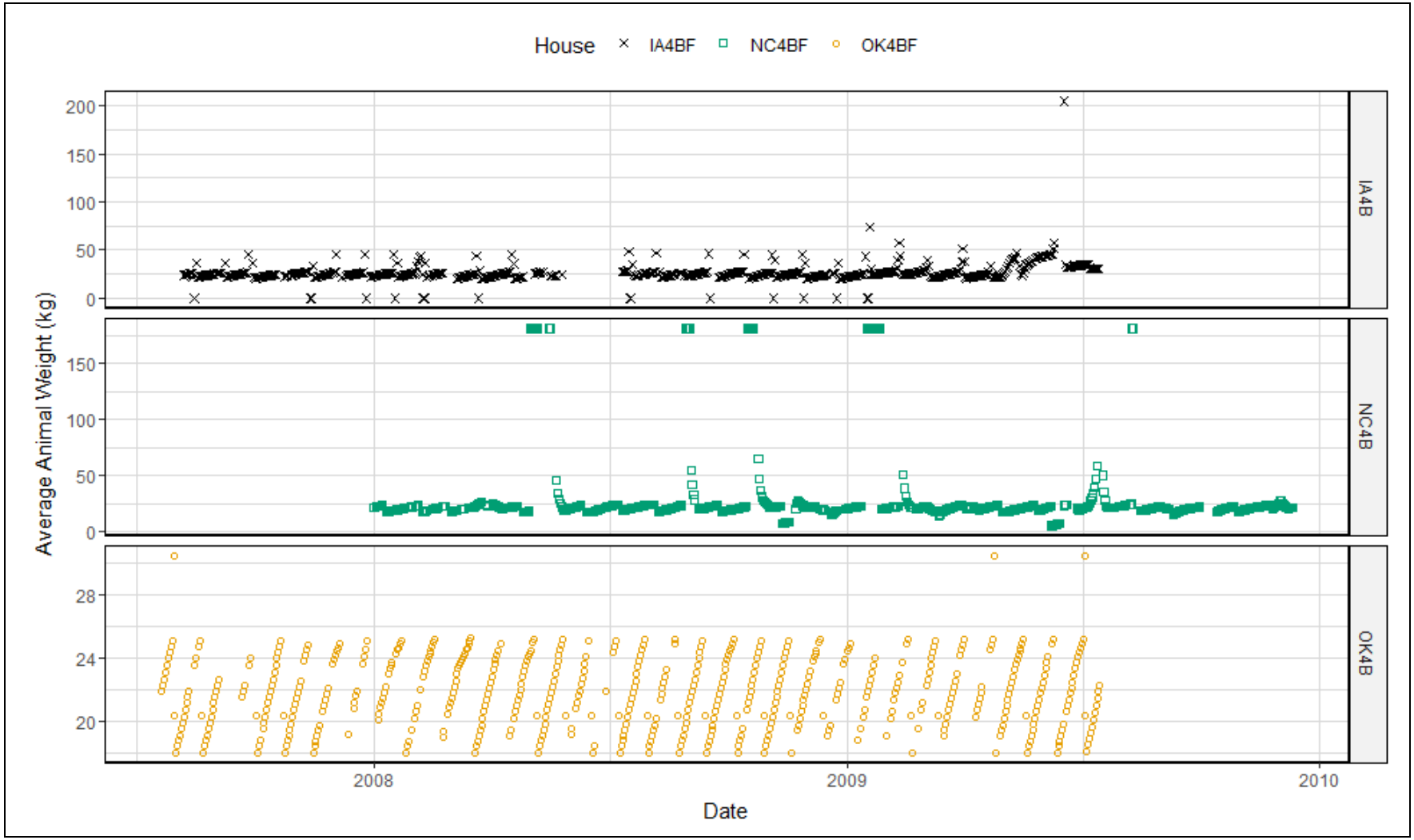


**Figure E-31. Average animal weight emission time series for swine farrowing rooms (kg).**

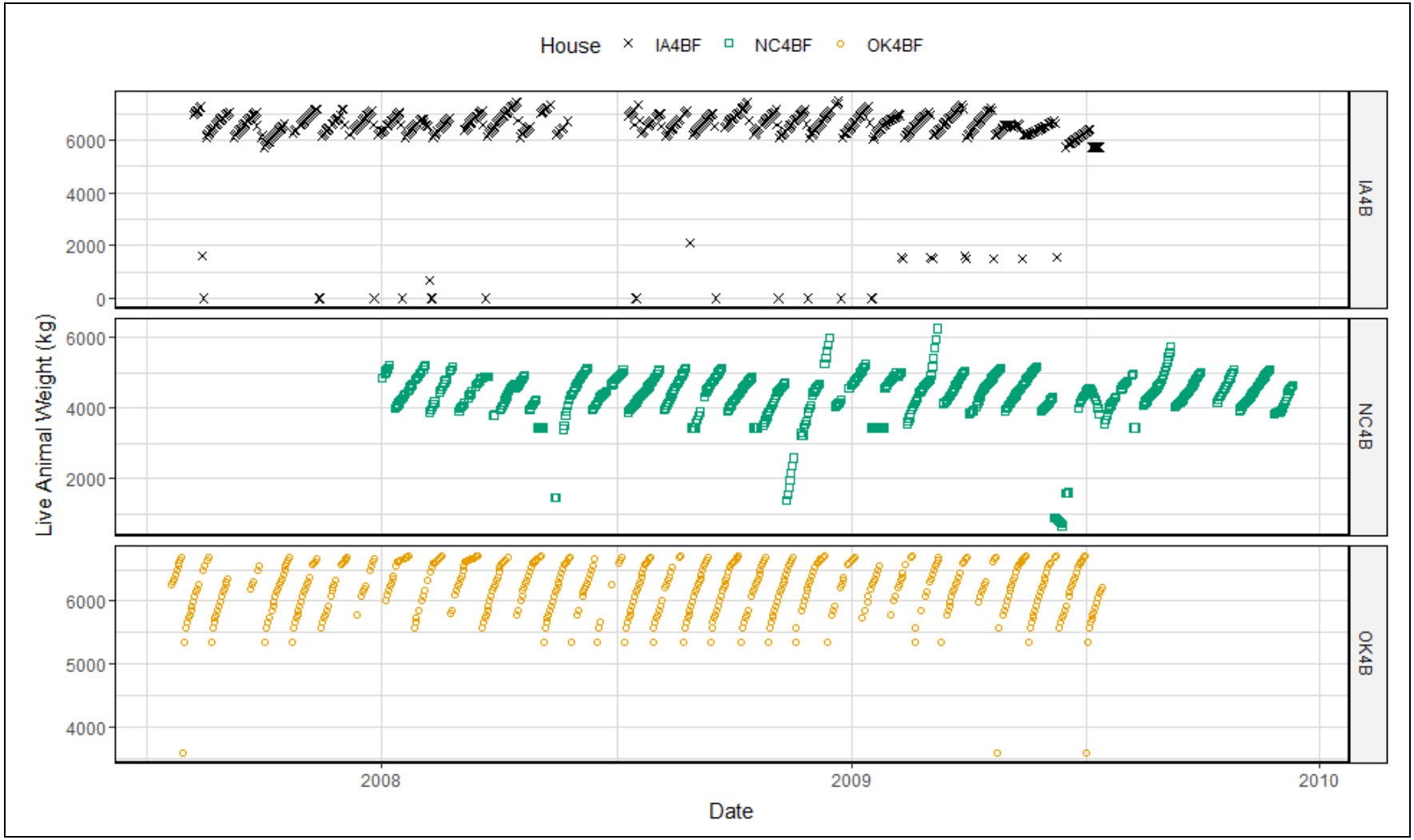


**Figure E-32. Live animal weight time series for swine farrowing rooms (kg).**

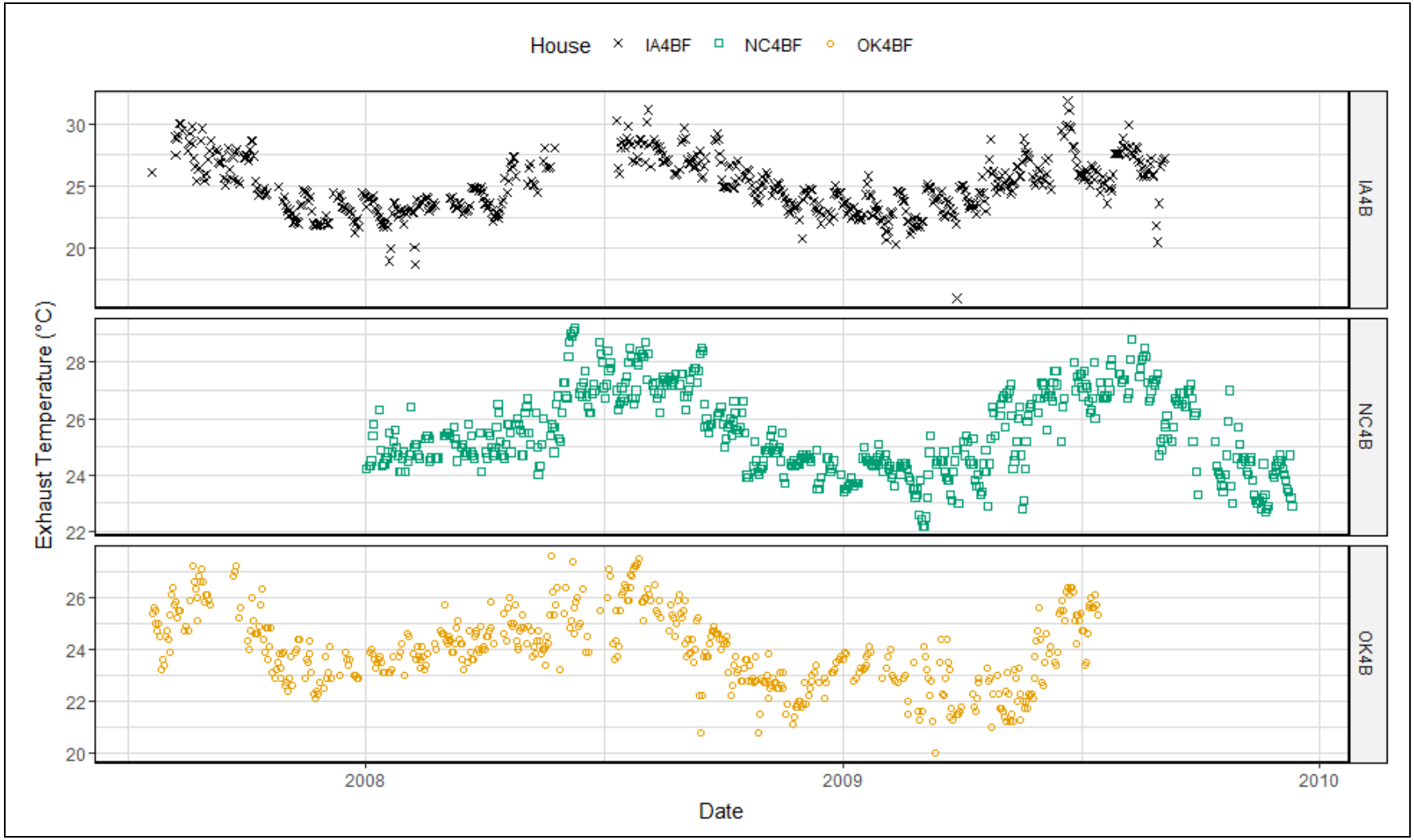


**Figure E-33. Exhaust temperature time series for swine farrowing rooms (°C).**

**Figure E-34. Exhaust relative humidity time series for swine farrowing rooms (%).**

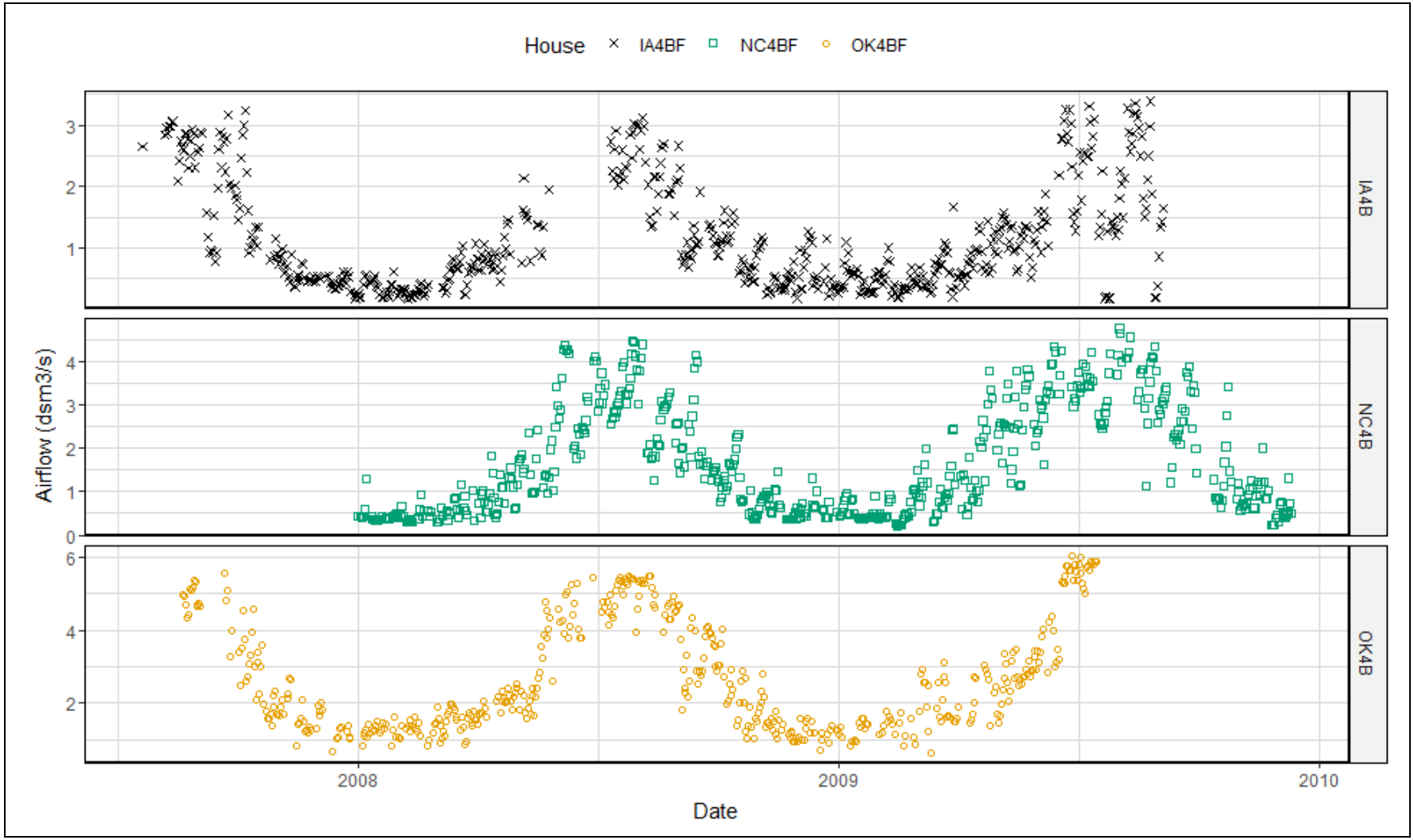


**Figure E-35. Airflow time series for swine farrowing rooms (dscm$^3$s$^{-1}$).**

### E.2.3 Ambient

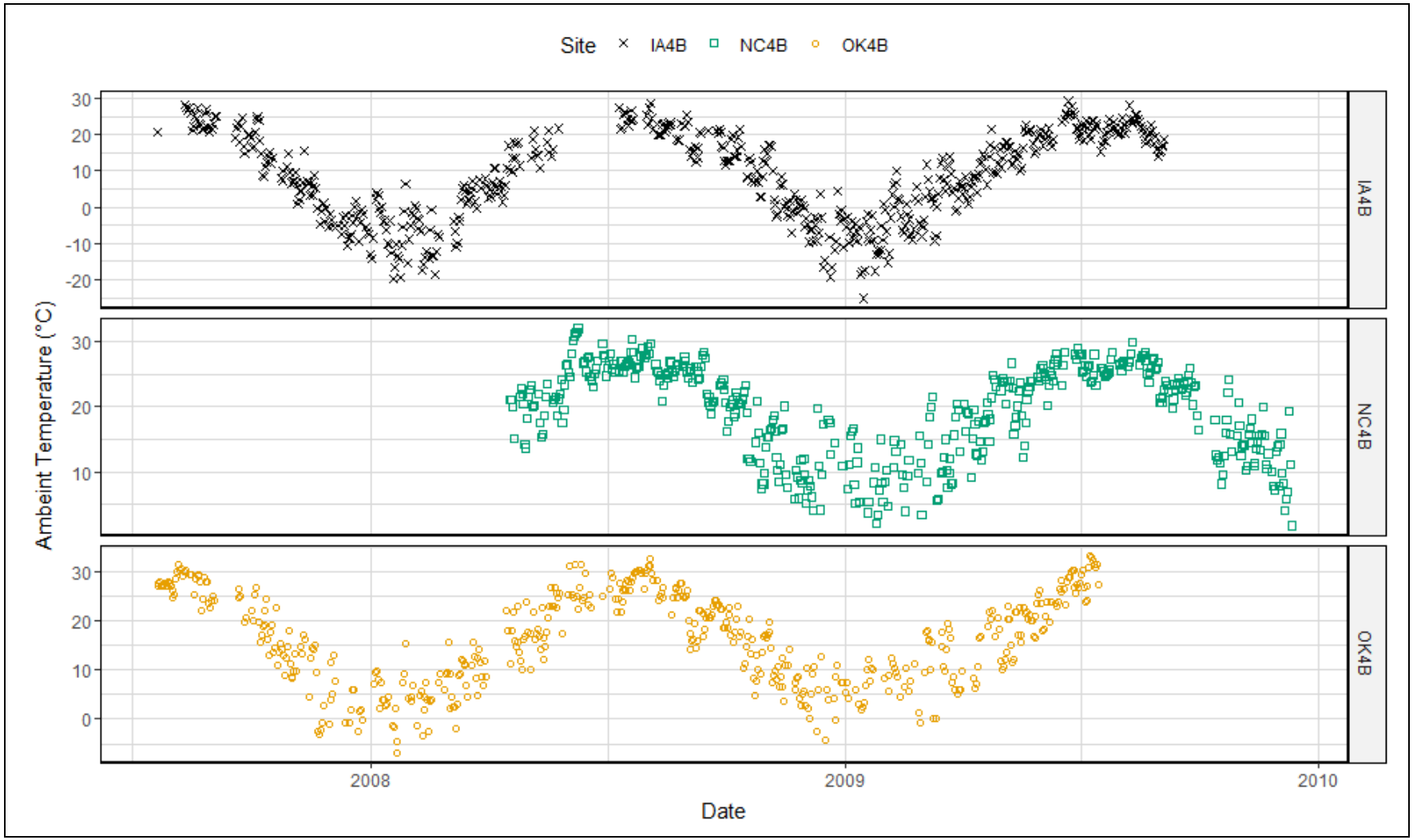


**Figure E-36. Ambient temperature time series for swine farrowing rooms (°C).**

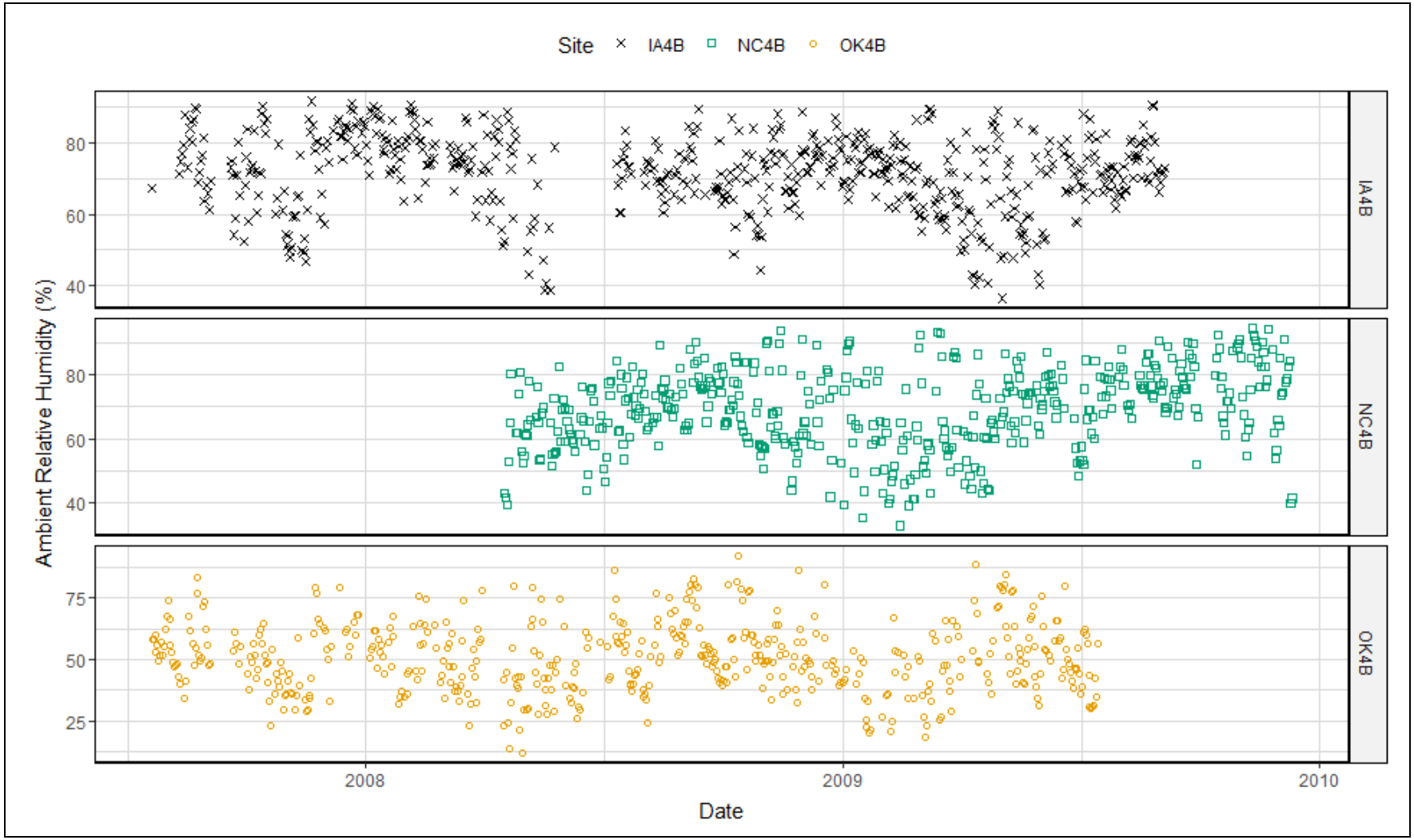


**Figure E-37. Ambient relative humidity time series for swine farrowing rooms (%).**

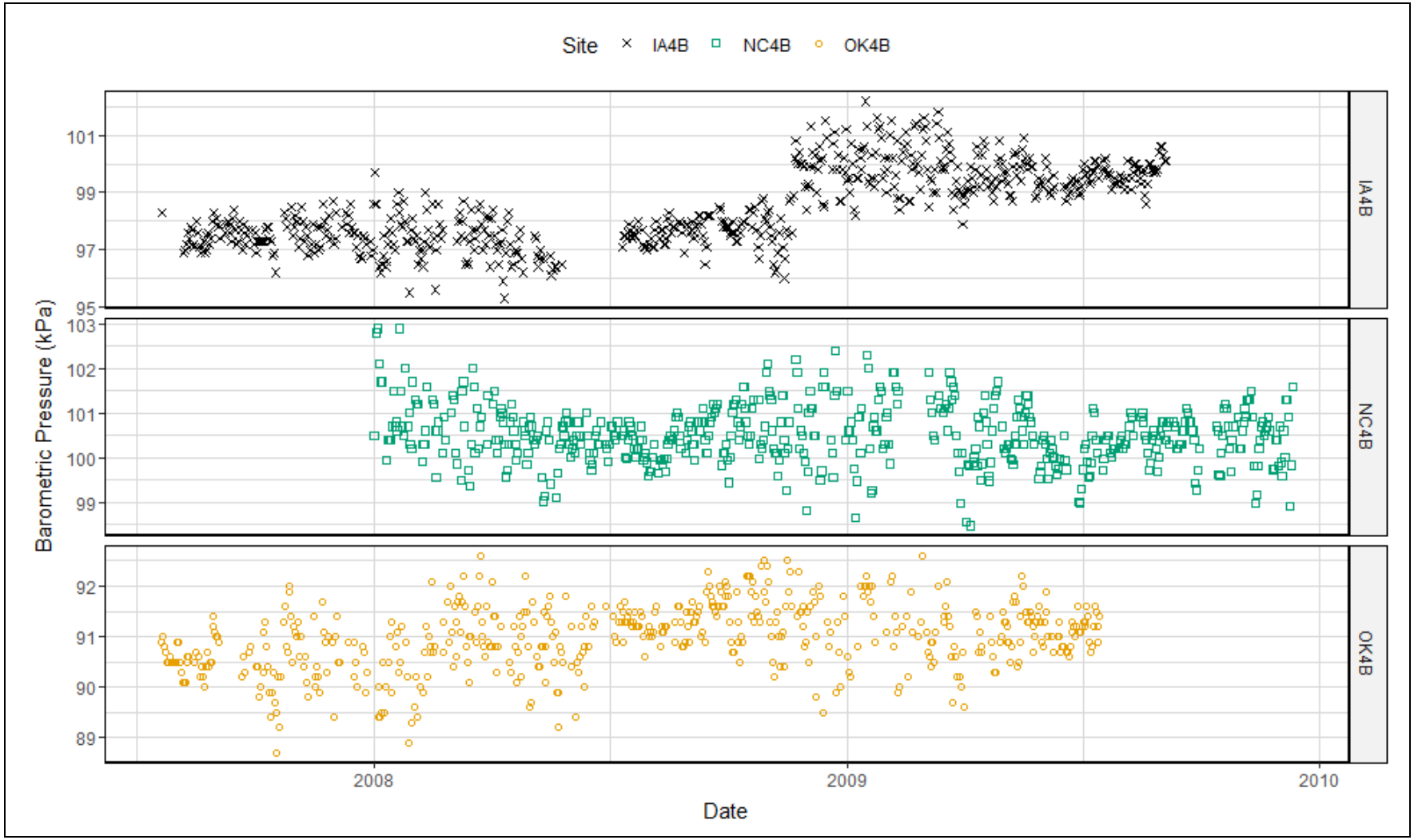


**Figure E-38. Barometric pressure time series for swine farrowing rooms (kPa).**

## E.3 Grow-Finish

### E.3.1 Emissions

#### E.3.1.1 Ammonia ($NH_3$)

**Figure E-39. $NH_3$ emission time series for swine grow-finish barns (kg $d^{-1}$).**

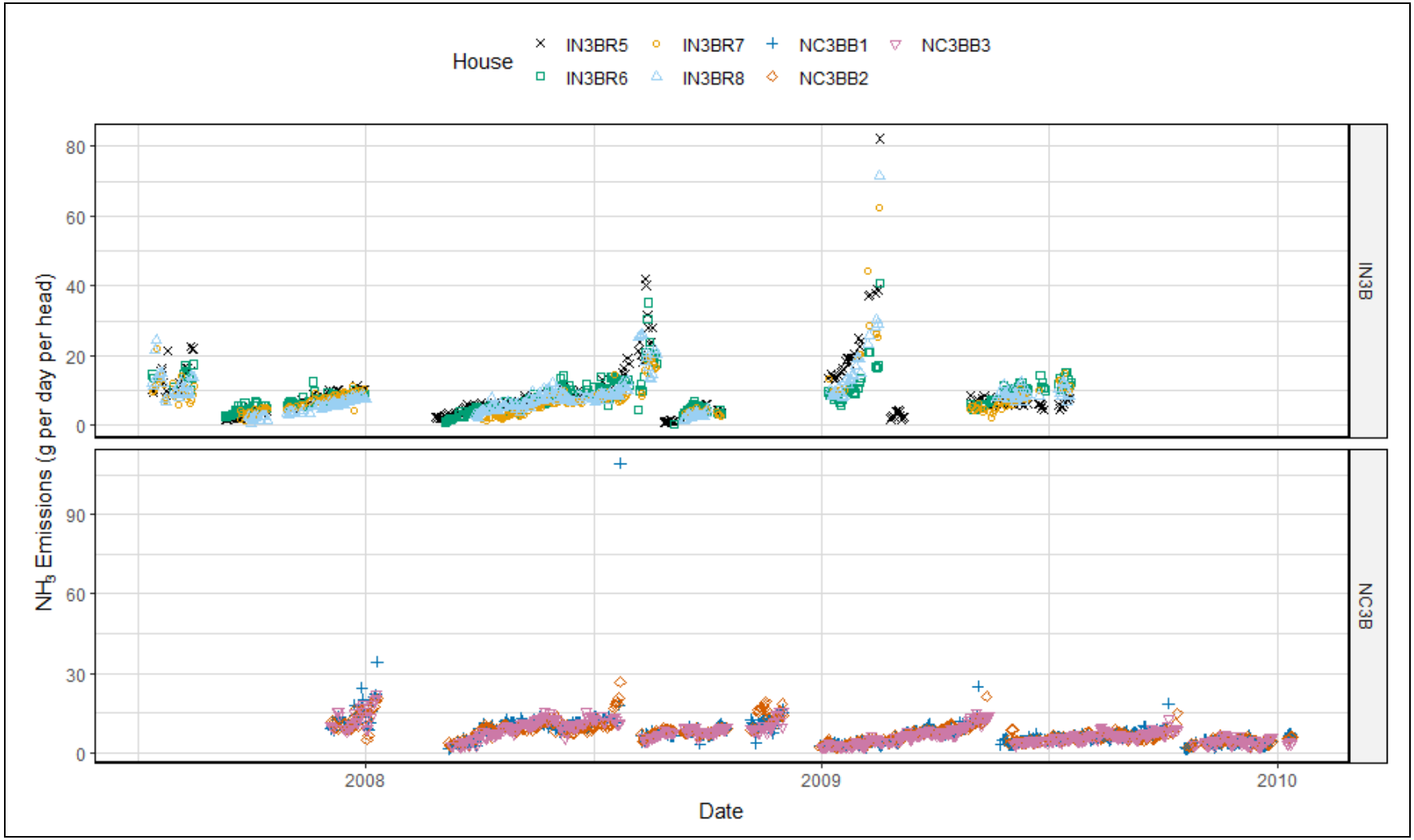


**Figure E-40. $NH_3$ emission time series for swine grow-finish barns (g $d^{-1}hd^{-1}$).**

### E.3.1.2 Hydrogen Sulfide ($H_2S$)

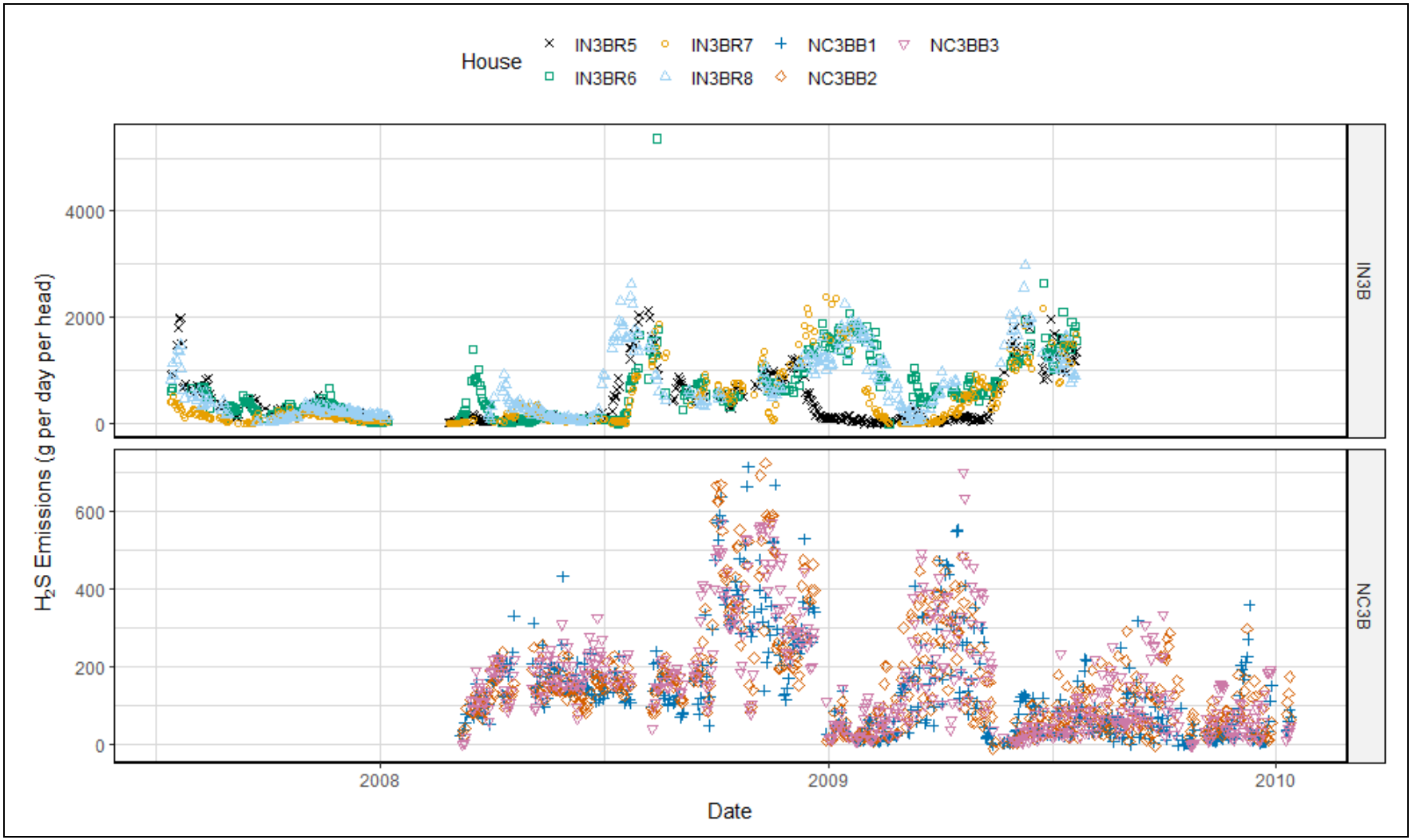


**Figure E-41. $H_2S$ emission time series for swine grow-finish barns (g $d^{-1}$).**

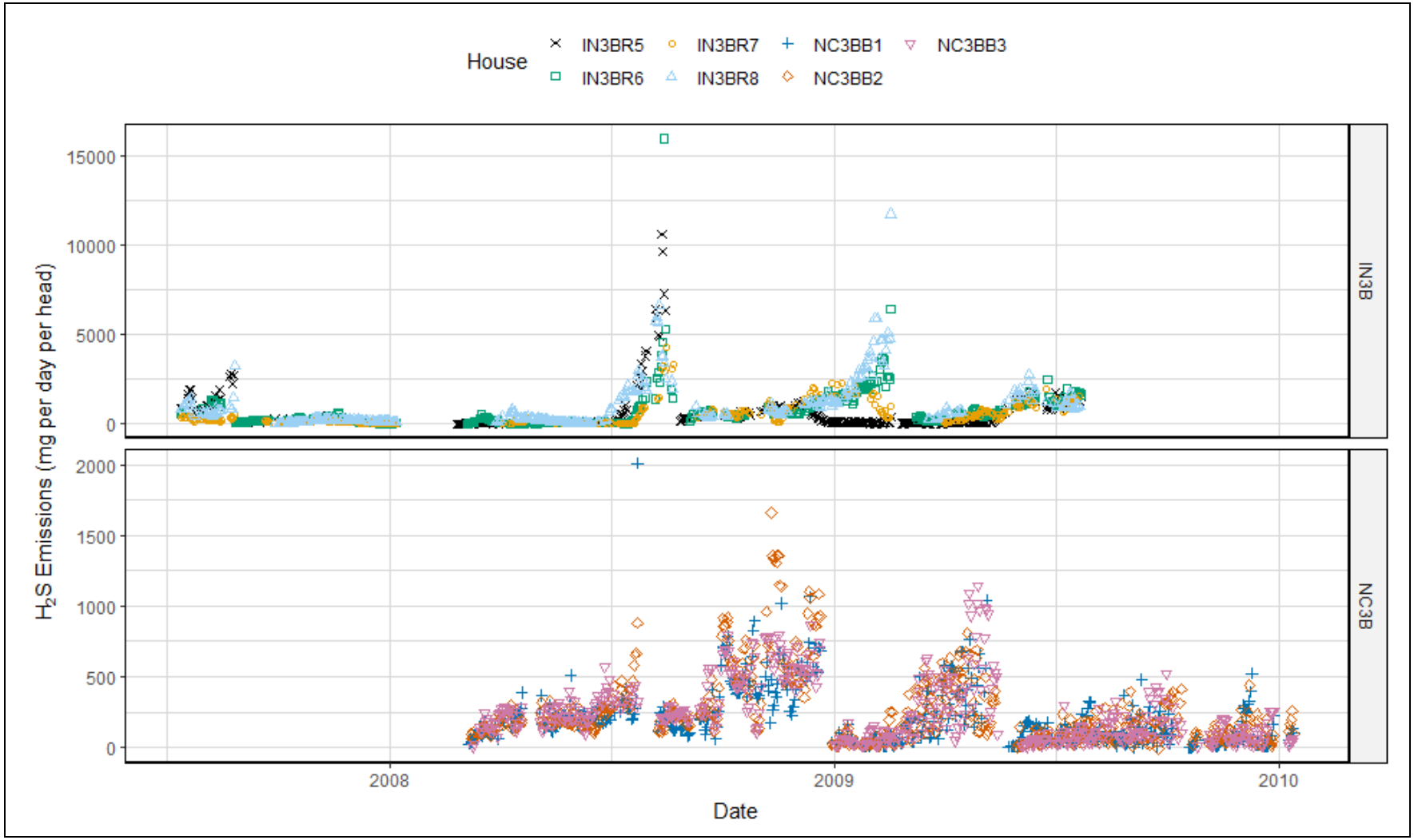


**Figure E-42. $H_2S$ emission time series for swine grow-finish barns (mg $d^{-1}hd^{-1}$).**

### E.3.1.3 Particulate Matter ($PM_{10}$)

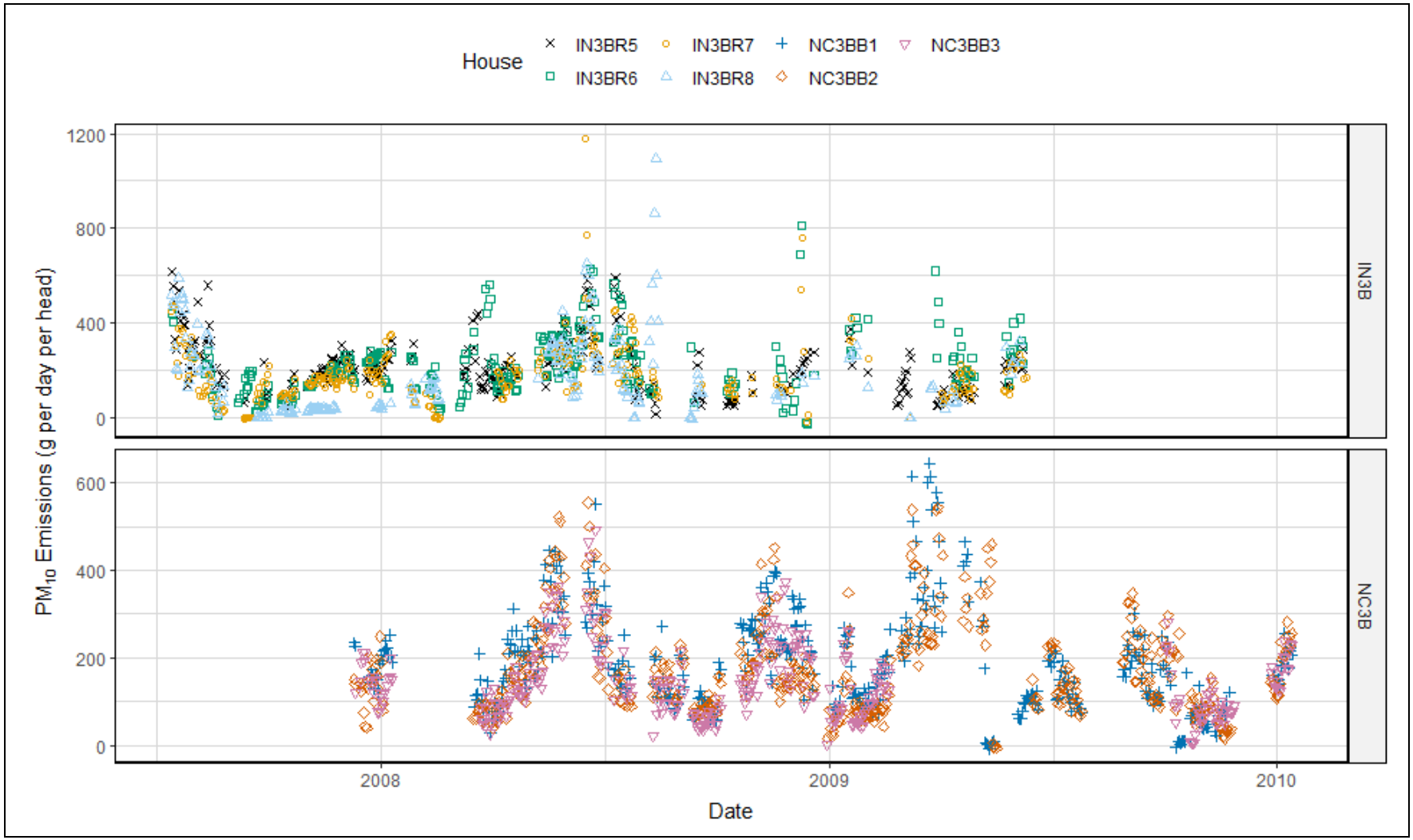


**Figure E-43. $PM_{10}$ emission time series for swine grow-finish barns (g $d^{-1}$).**

**Figure E-44. $PM_{10}$ emission time series for swine grow-finish barns (mg $d^{-1}hd^{-1}$).**

### E.3.1.4 Particulate Matter ($PM_{2.5}$)

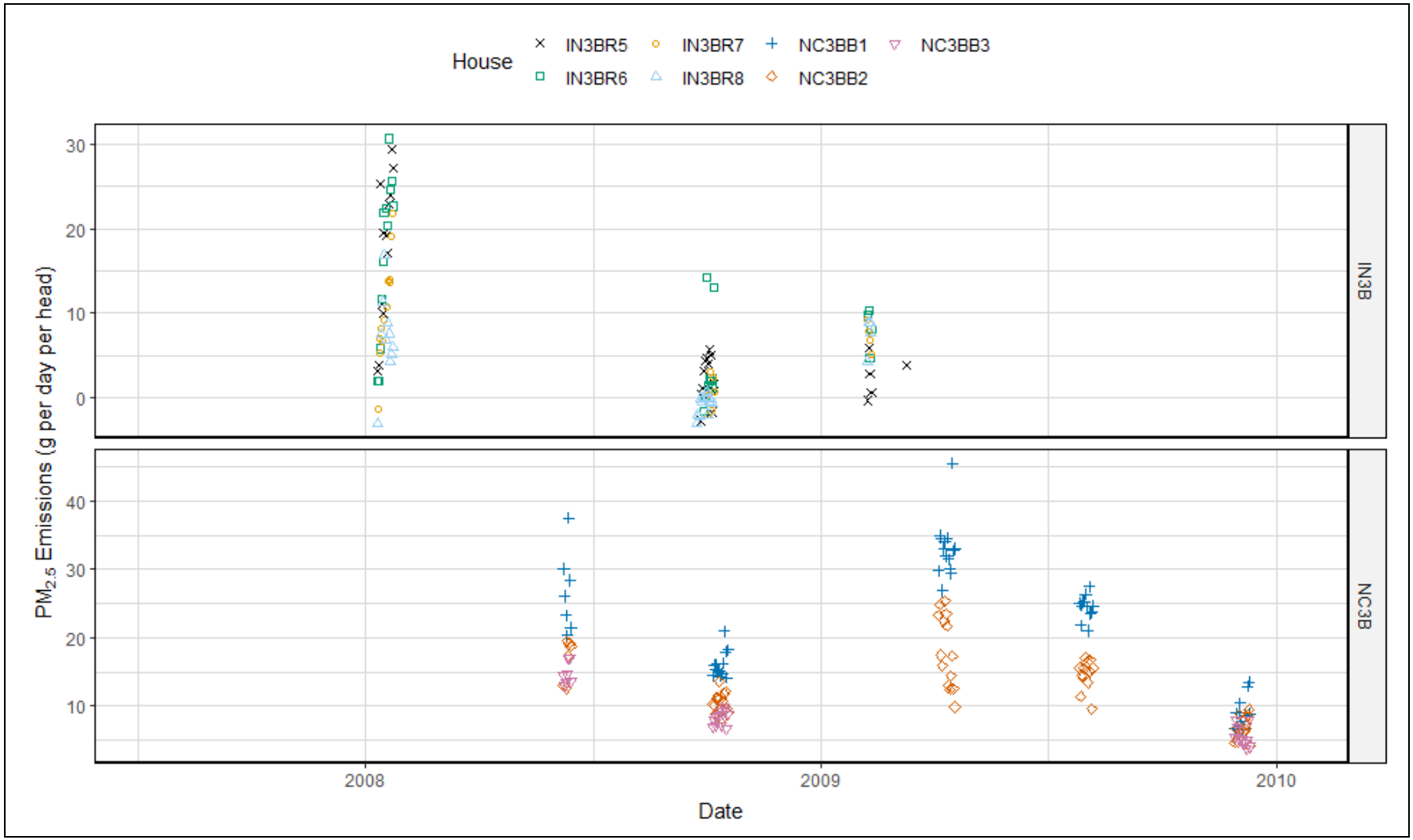


**Figure E-45. $PM_{2.5}$ emission time series for swine grow-finish barns (g $d^{-1}$).**

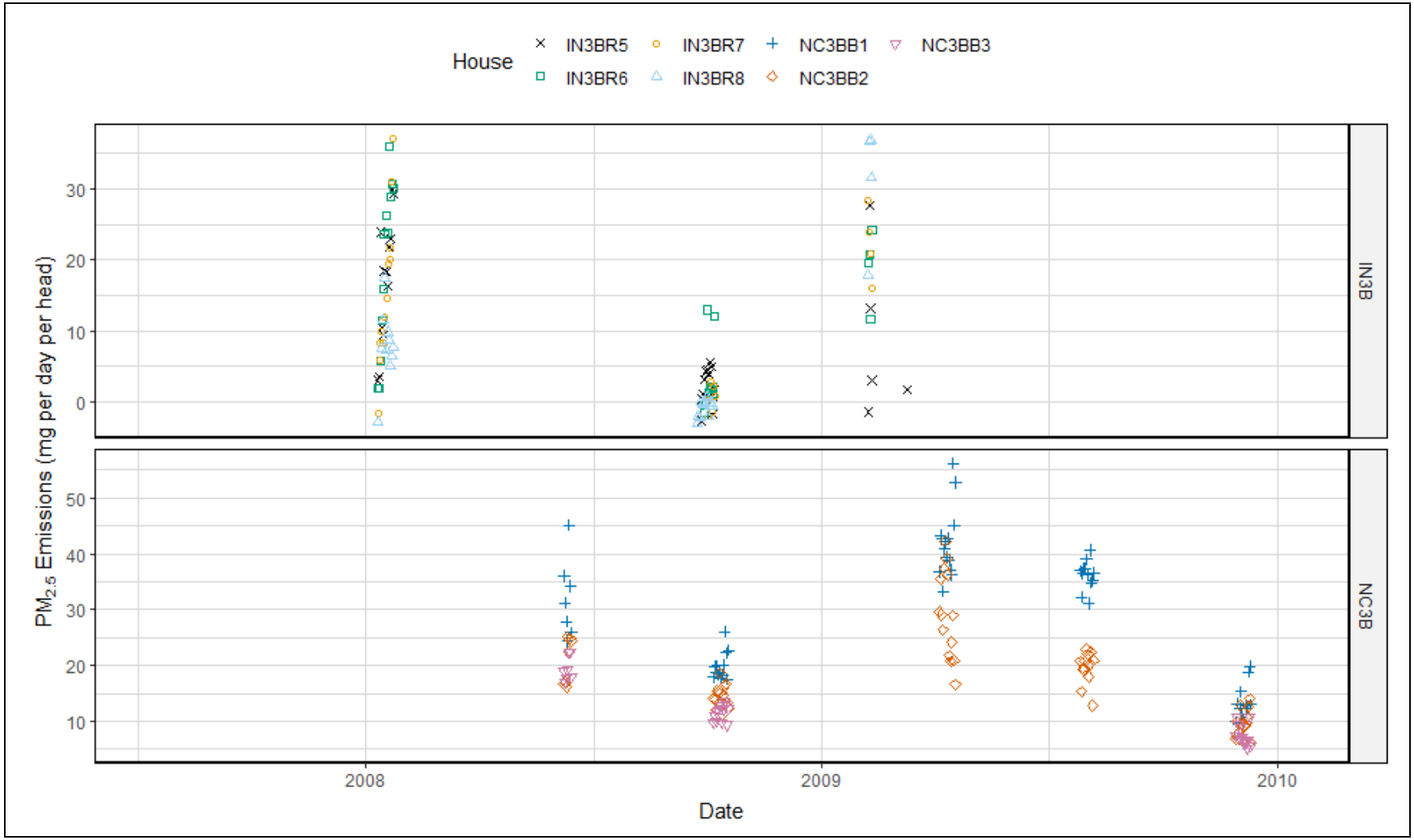


**Figure E-46. $PM_{2.5}$ emission time series for swine grow-finish barns (mg $d^{-1}hd^{-1}$).**

### E.3.1.5 Total Suspended Particulates (TSP)

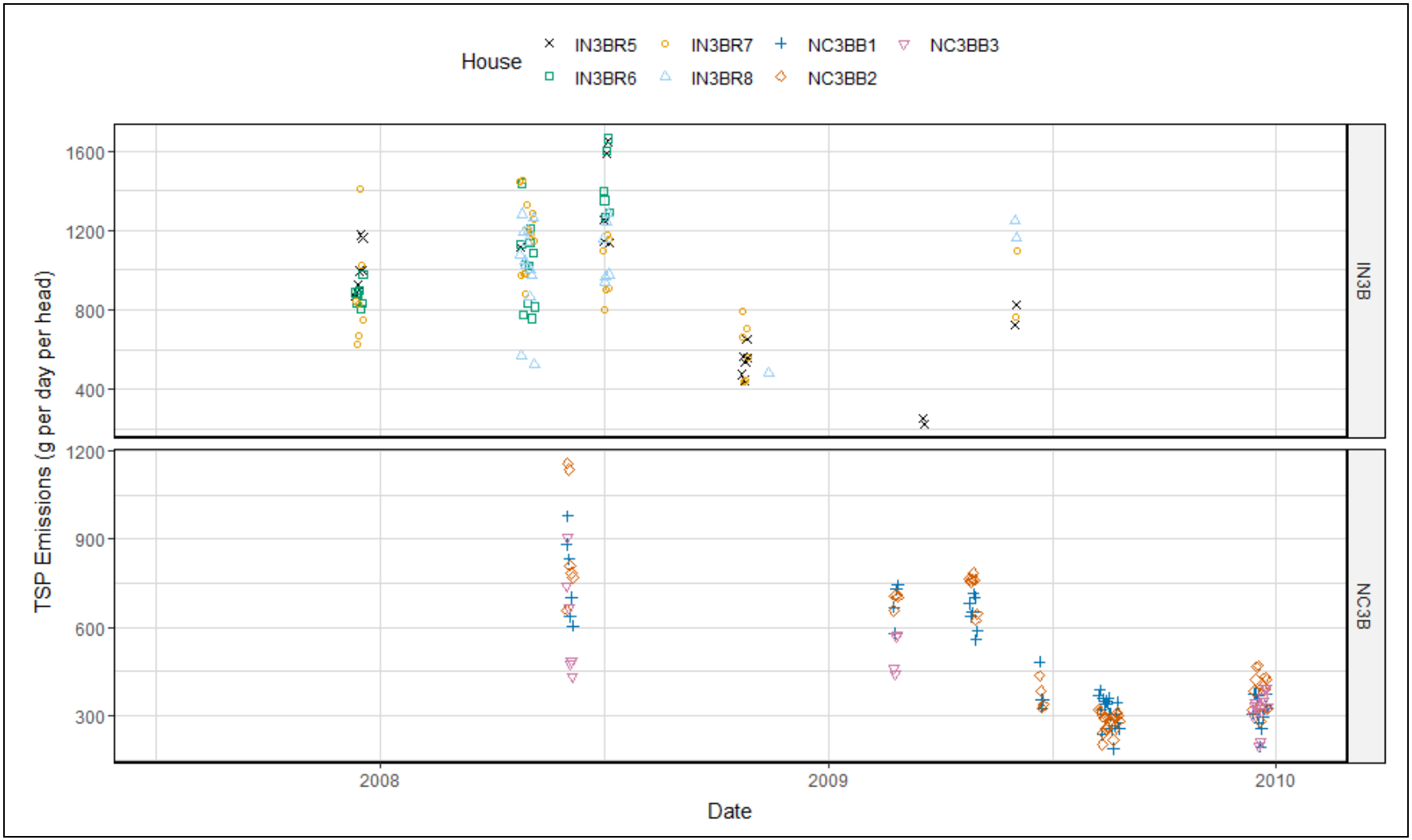


**Figure E-47. TSP emission time series for swine grow-finish barns (g $d^{-1}$).**

**Figure E-48. TSP emission time series for swine grow-finish barns (mg $d^{-1}hd^{-1}$).**

## E.3.2 Environmental

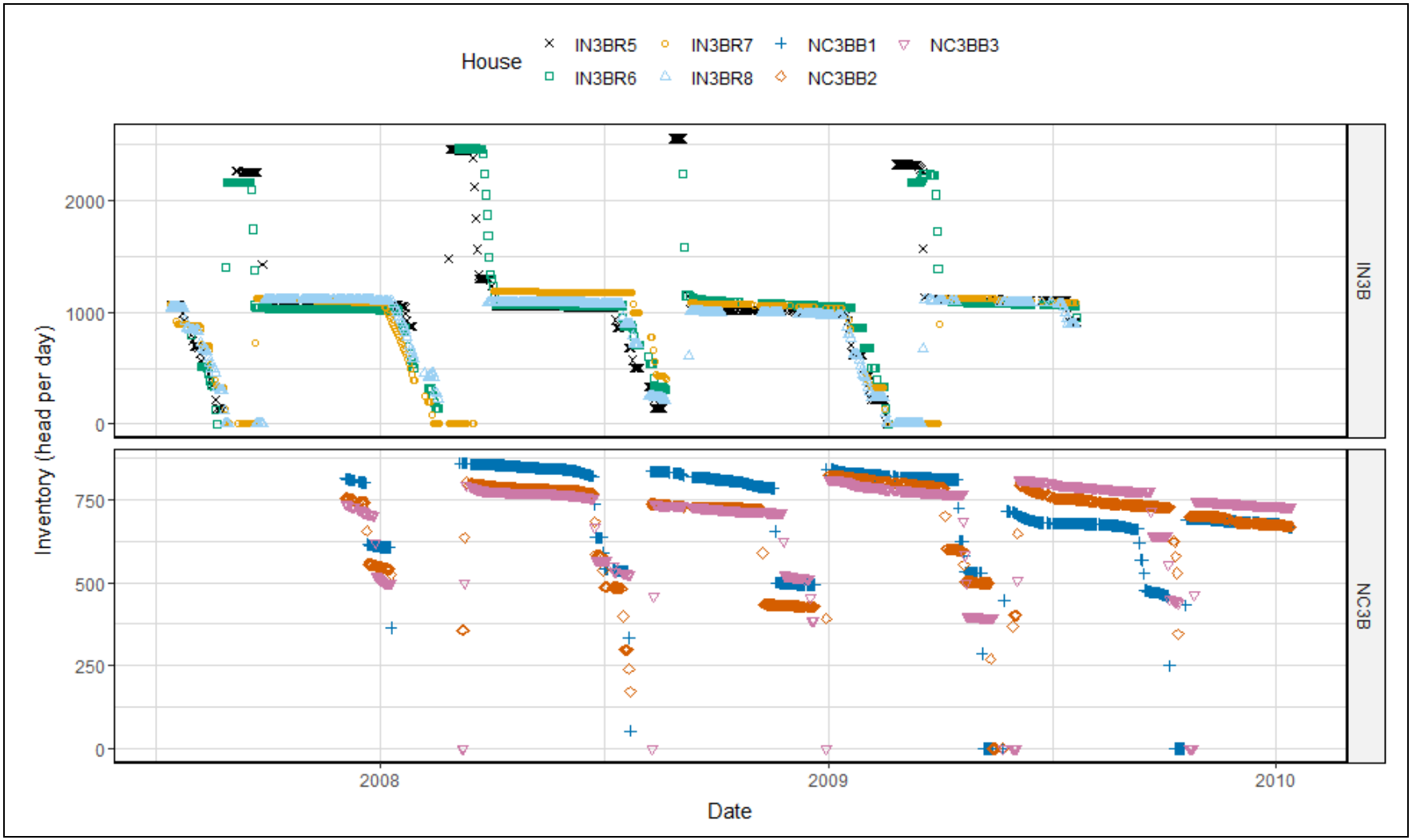


**Figure E-49. Inventory time series for swine grow-finish barns (hd).**

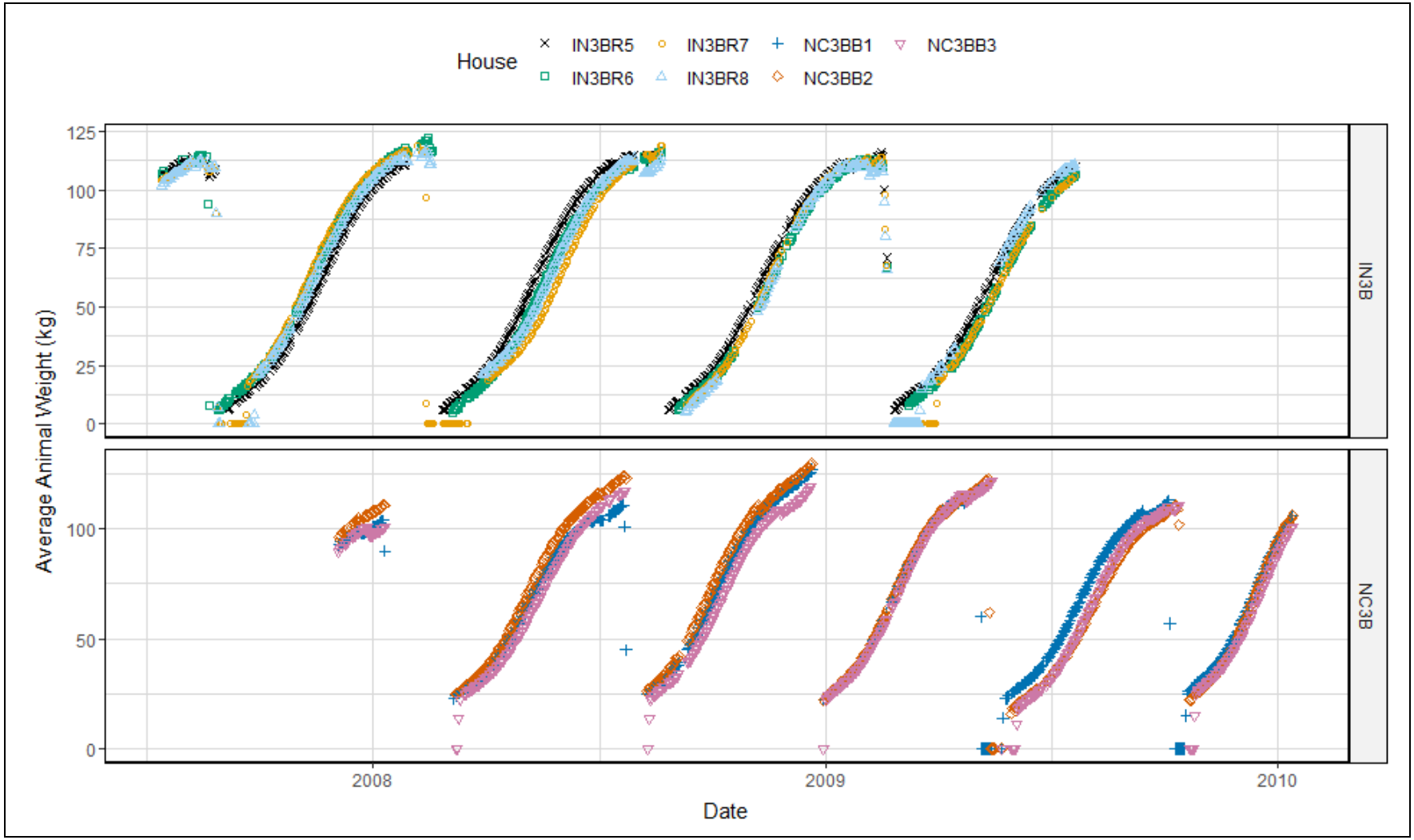


**Figure E-50. Average animal weight time series for swine grow-finish barns (kg).**

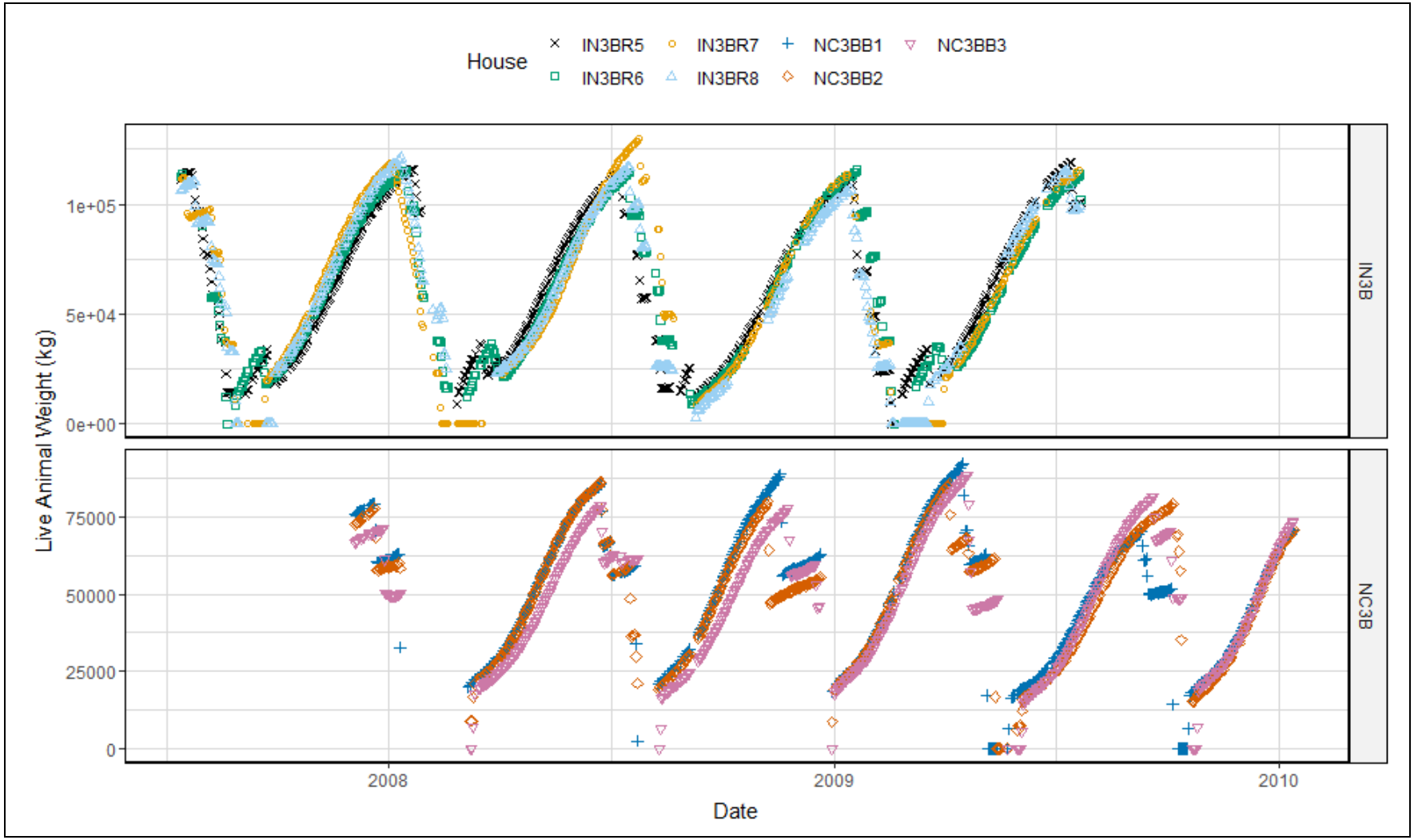


**Figure E-51. Live animal weight time series for swine grow-finish barns (kg).**

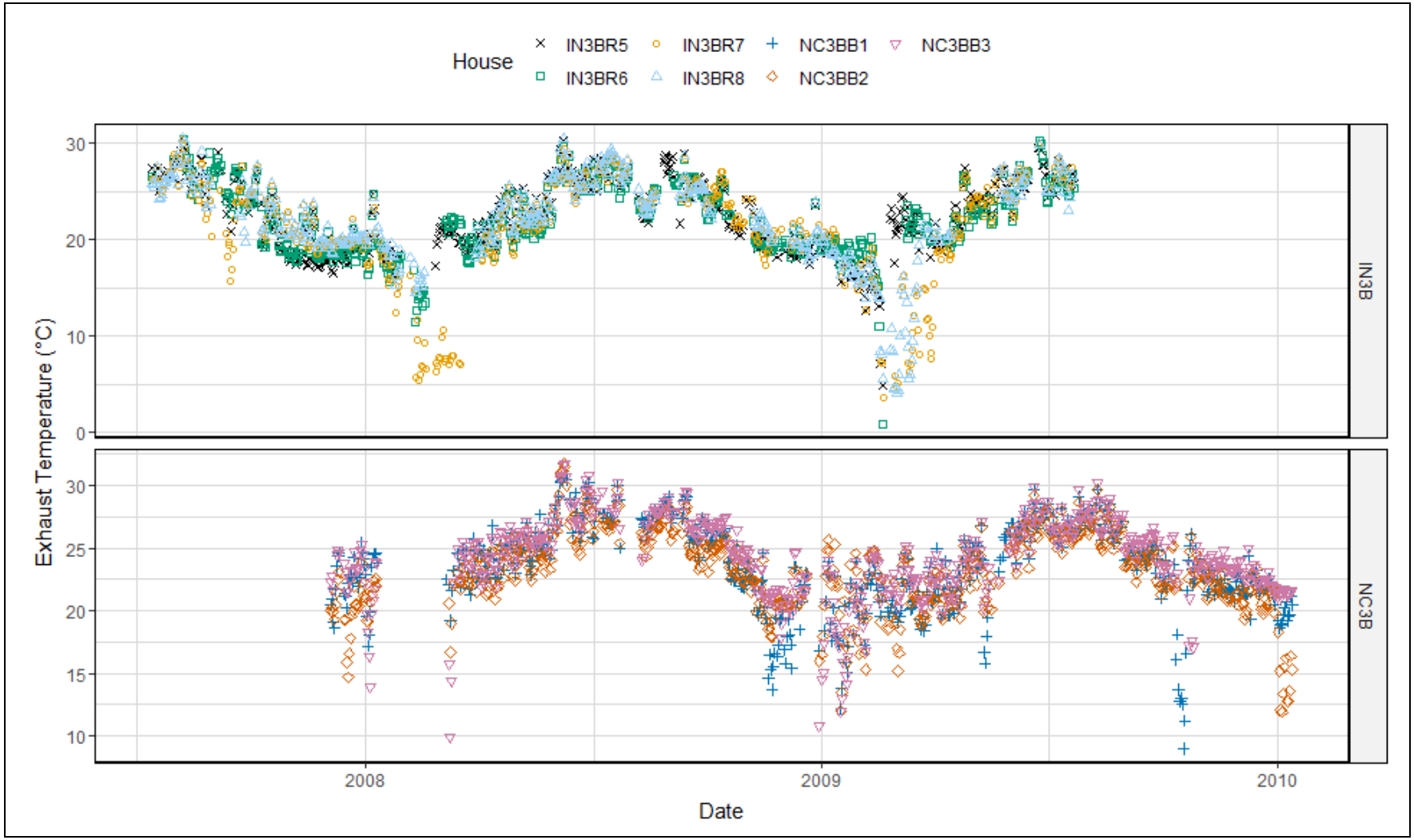


**Figure E-52. Exhaust temperature time series for swine grow-finish barns (°C).**

**Figure E-53. Exhaust relative humidity time series for swine grow-finish barns (%).**

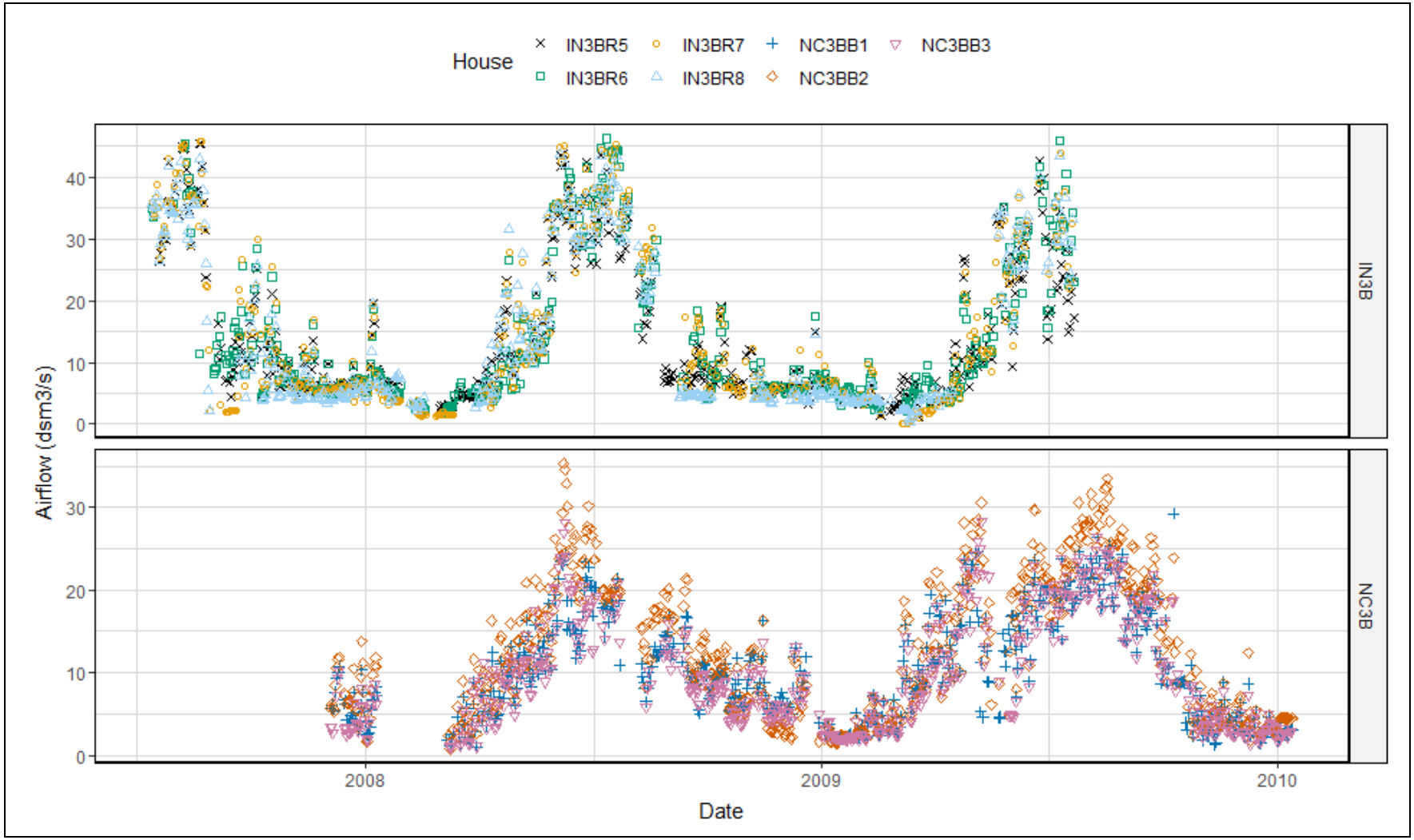


**Figure E-54. Airflow time series for swine grow-finish barns (dscm$^3$s$^{-1}$).**

### E.3.3 Ambient

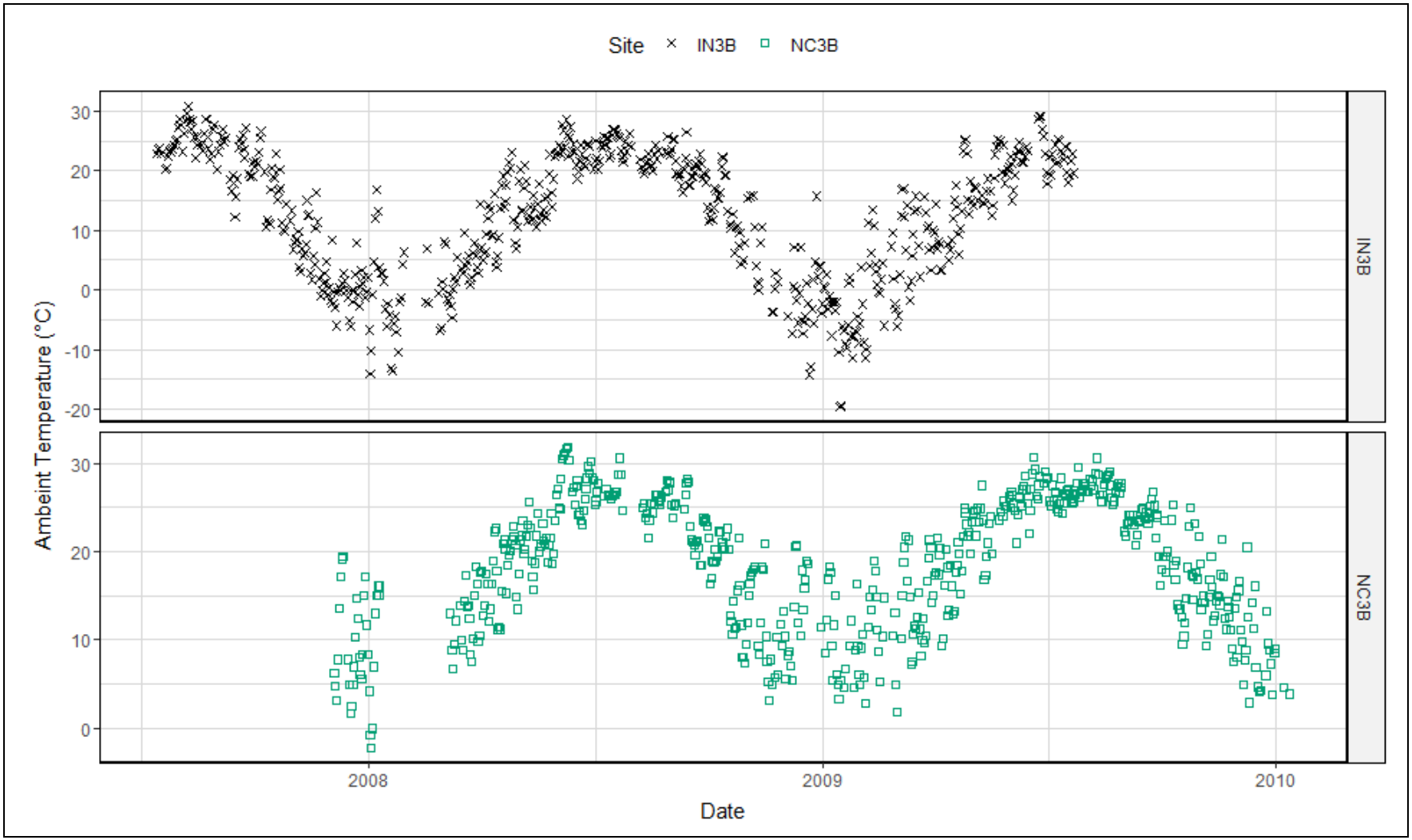


**Figure E-55. Ambient temperature time series for swine grow-finish barns (°C).**

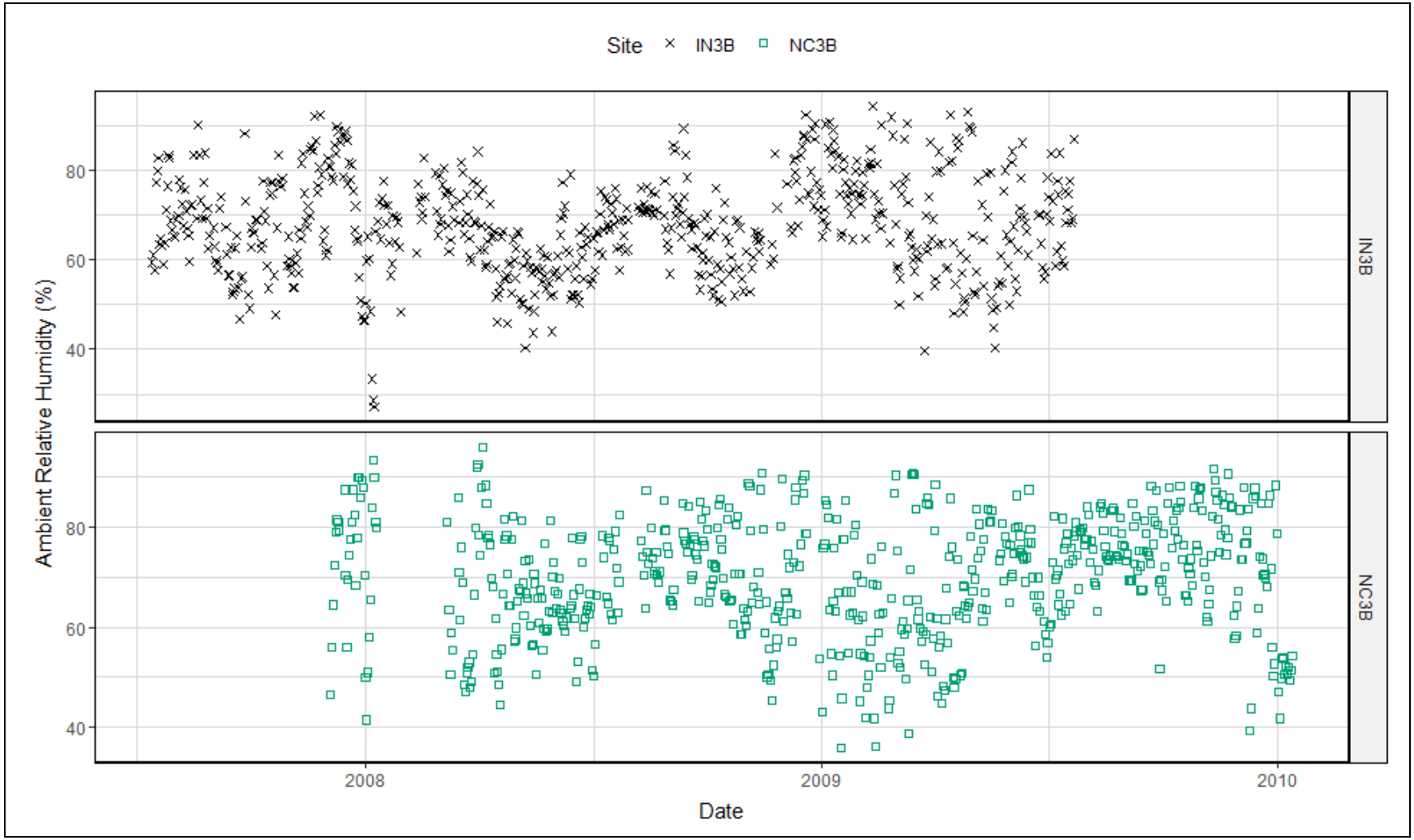


**Figure E-56. Ambient relative humidity time series for swine grow-finish barns (%).**

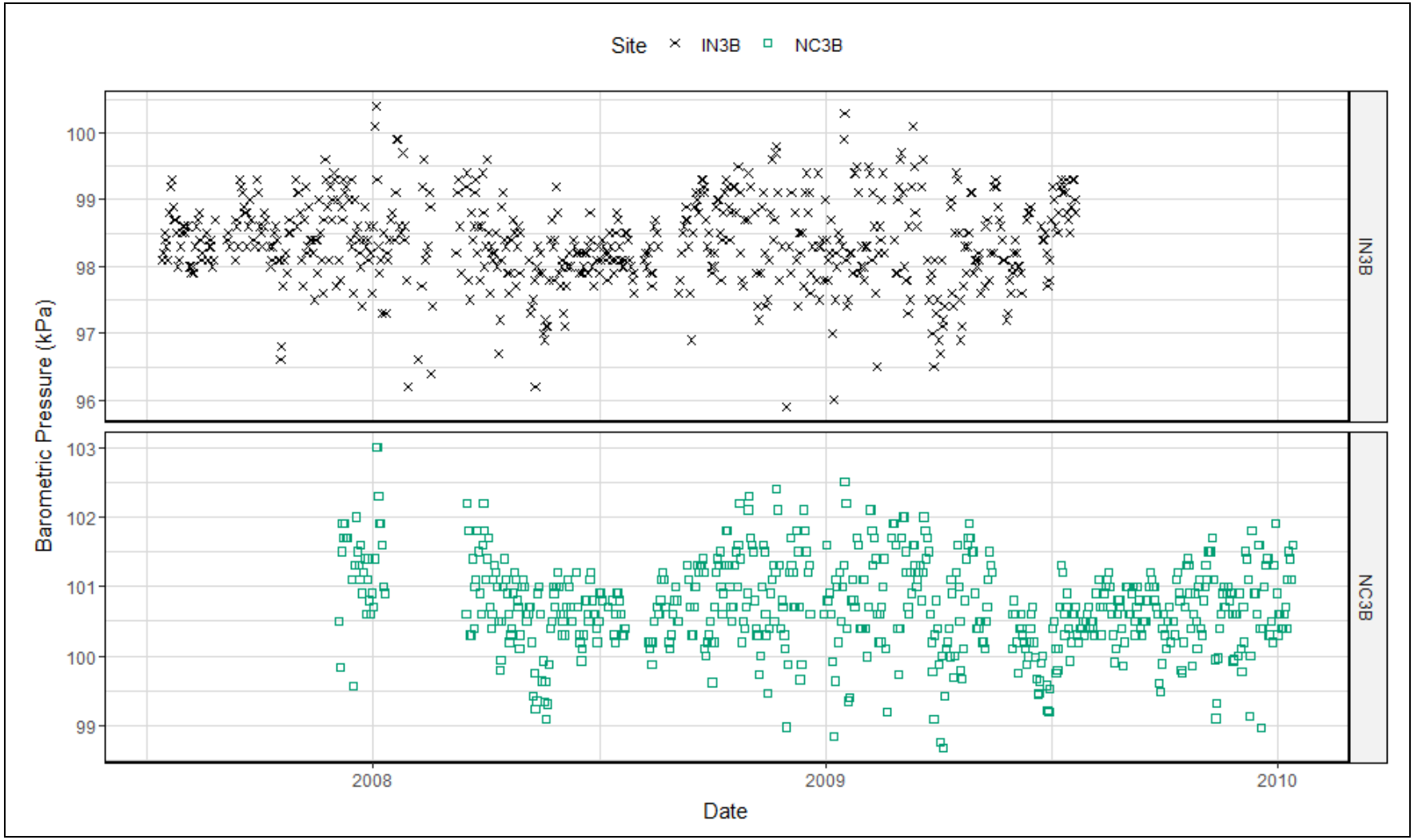


**Figure E-57. Barometric pressure time series for swine grow-finish barns (kPa).**

## E.4 Lagoons

### E.4.1 Emissions

#### E.4.1.1 Ammonia ($NH_3$)

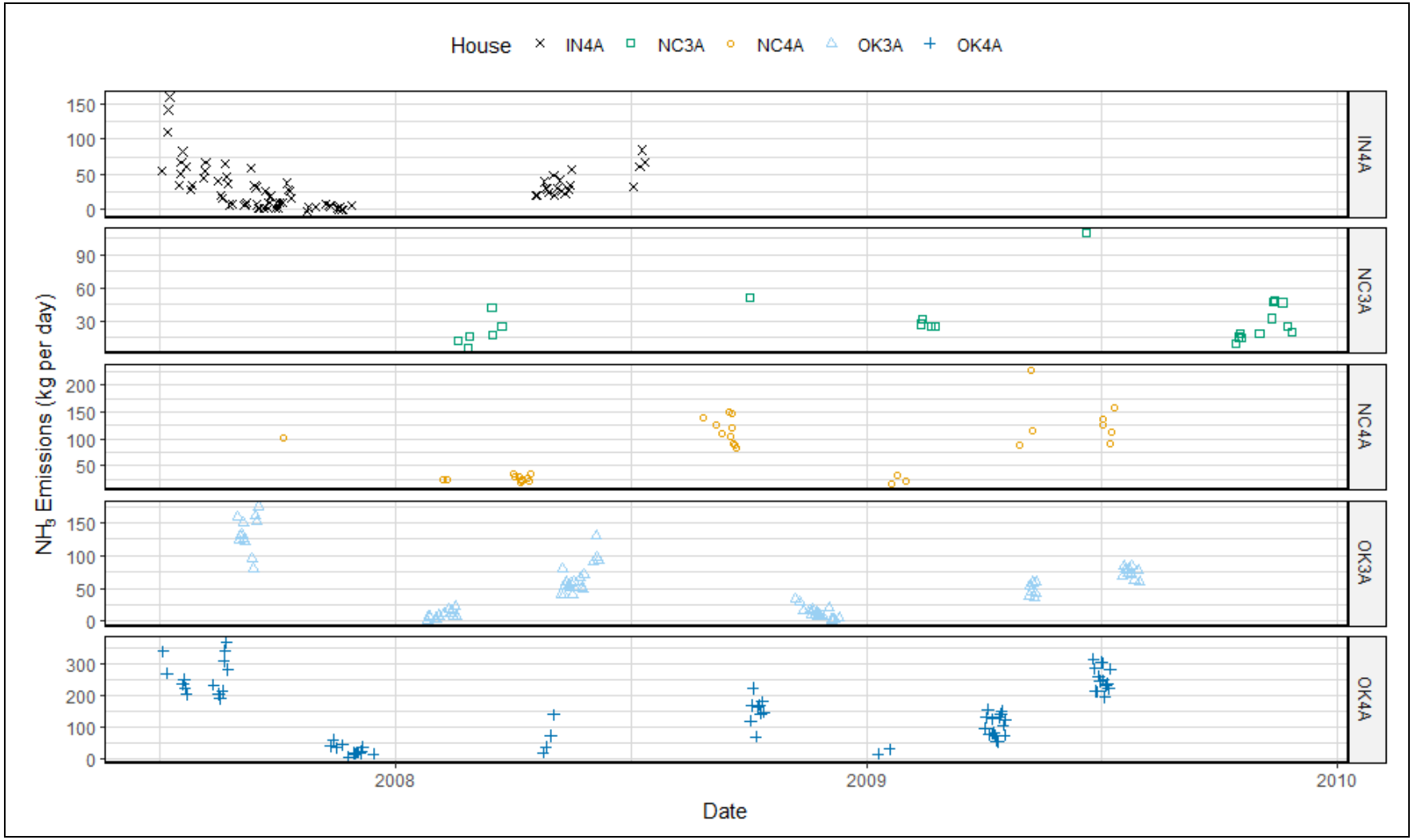


**Figure E-58. $NH_3$ emission time series for swine lagoons (kg $d^{-1}$).**

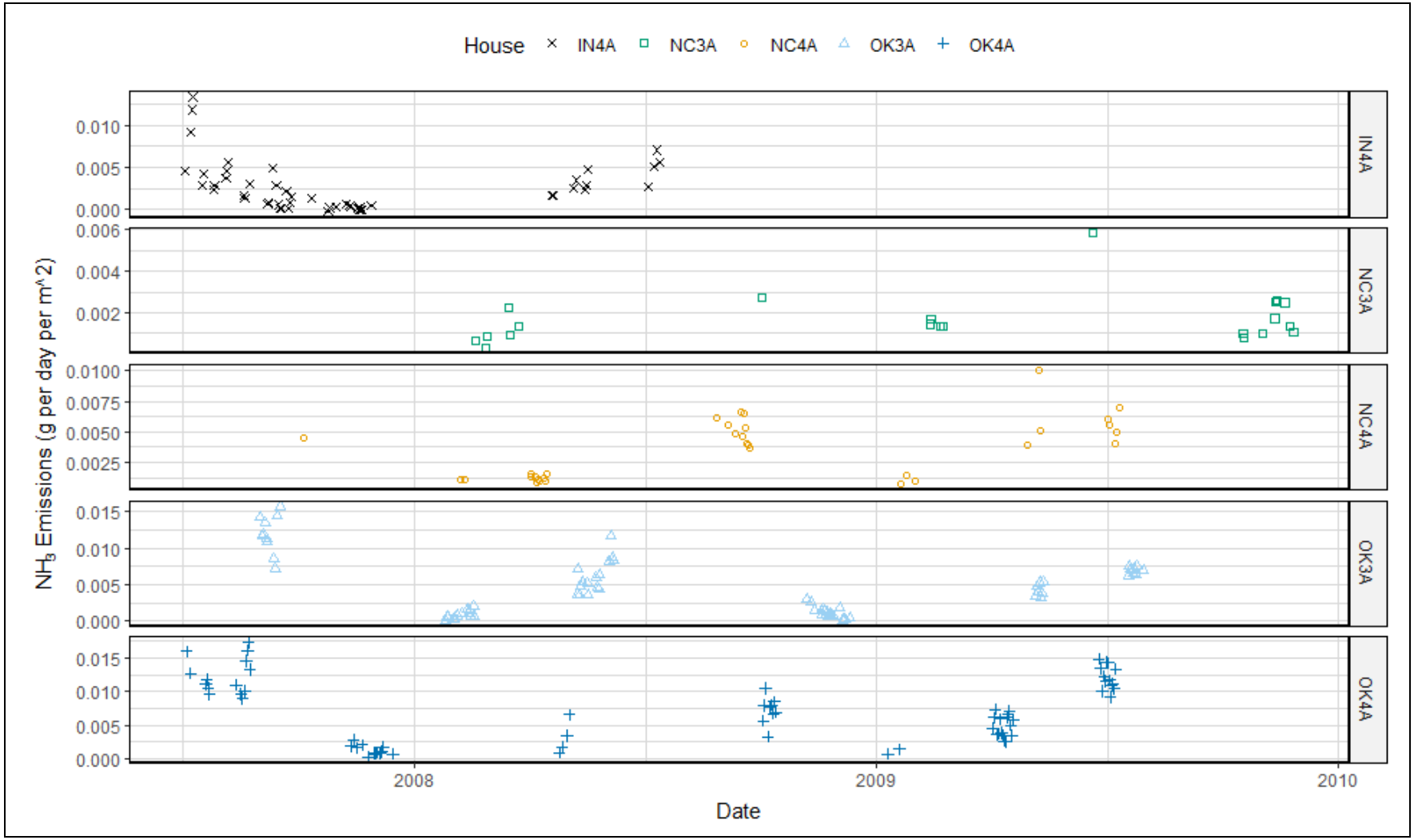


**Figure E-59. $NH_3$ emission time series for swine lagoons (g $d^{-1}m^{-2}$).**

### E.4.1.2 Hydrogen Sulfide ($H_2S$)

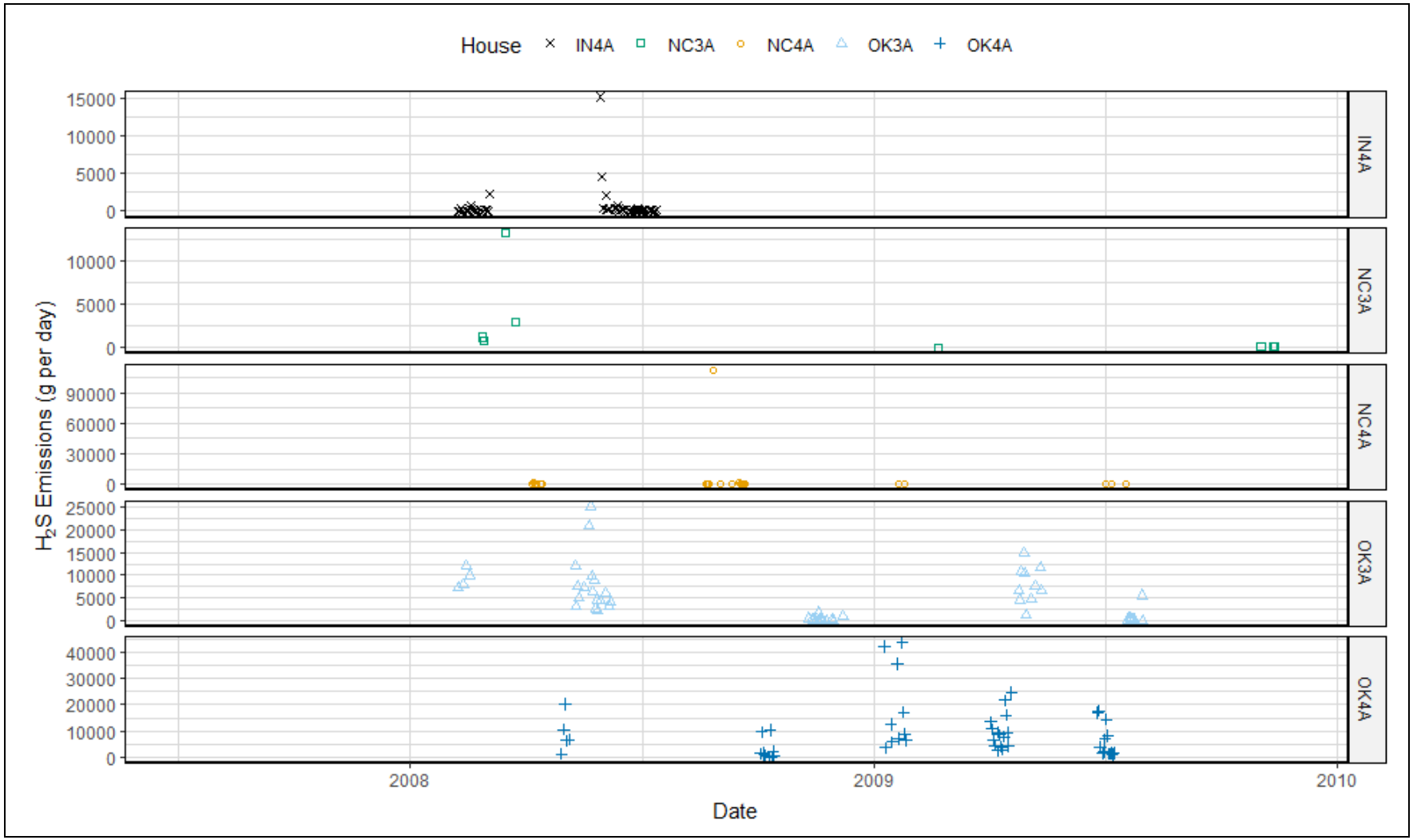


**Figure E-60. $H_2S$ emission time series for swine lagoons (g $d^{-1}$).**

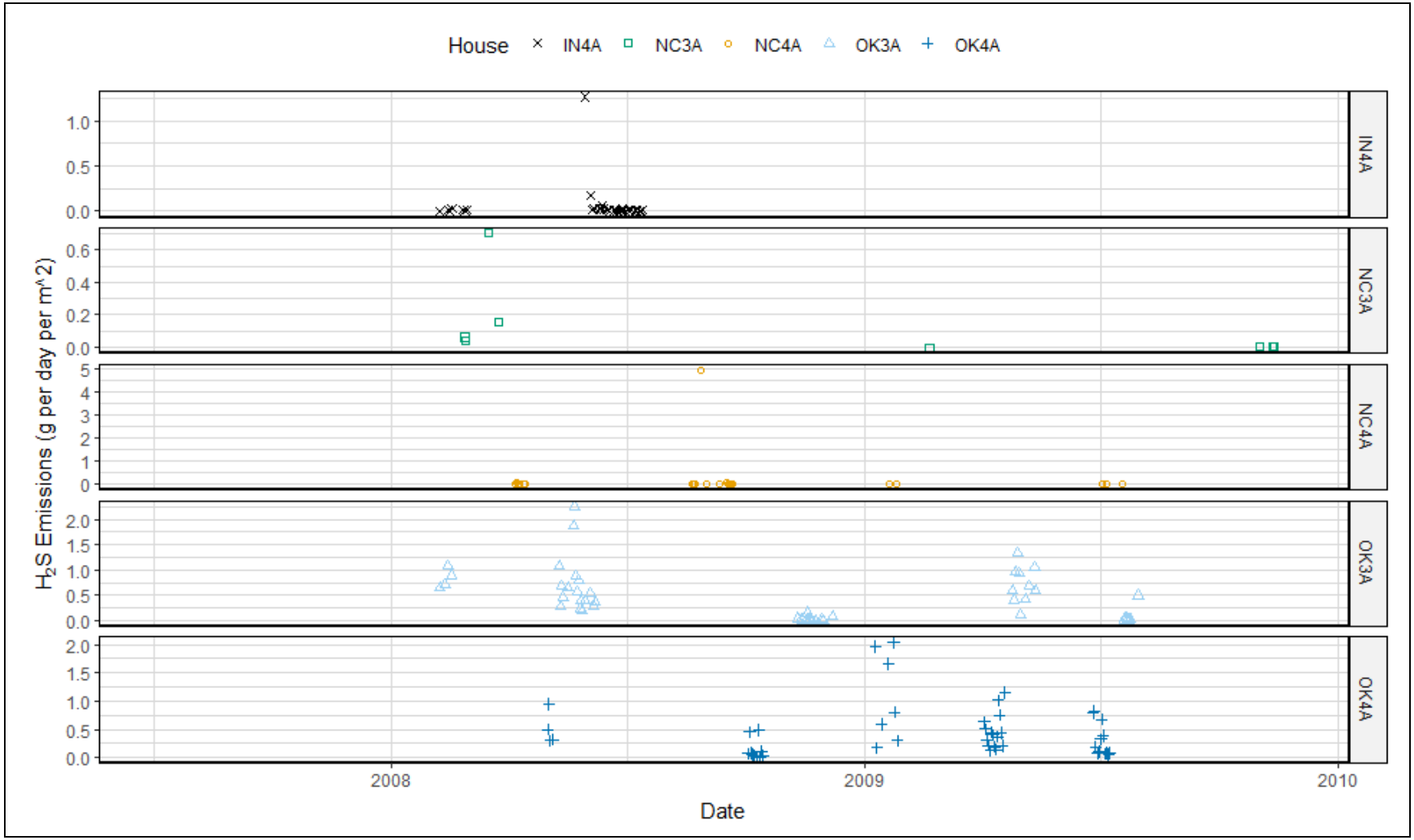


**Figure E-61. $H_2S$ emission time series for swine lagoons (mg $d^{-1}m^{-2}$).**

## E.4.2 Environmental

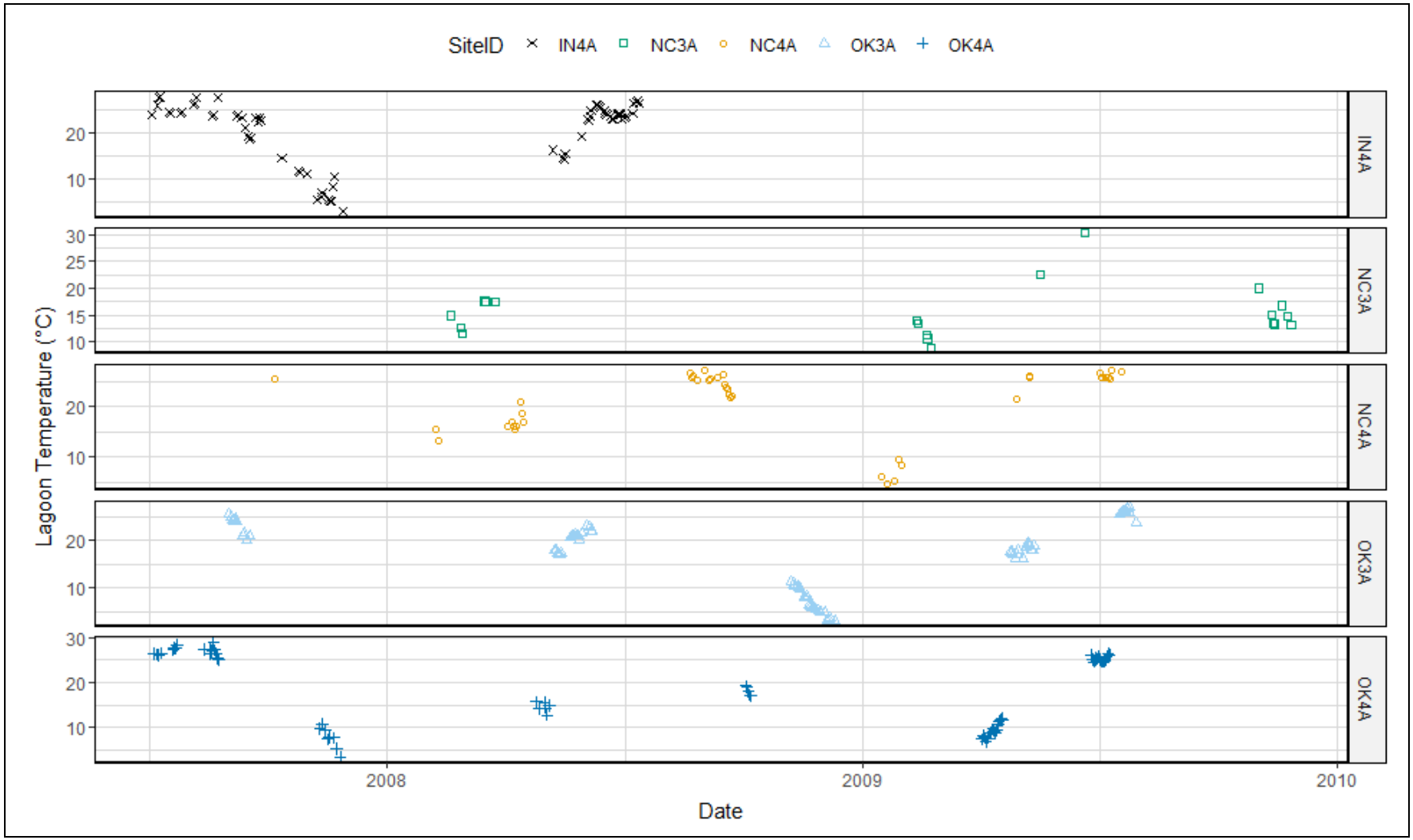


**Figure E-62. Lagoon liquid temperature series for swine lagoons.**

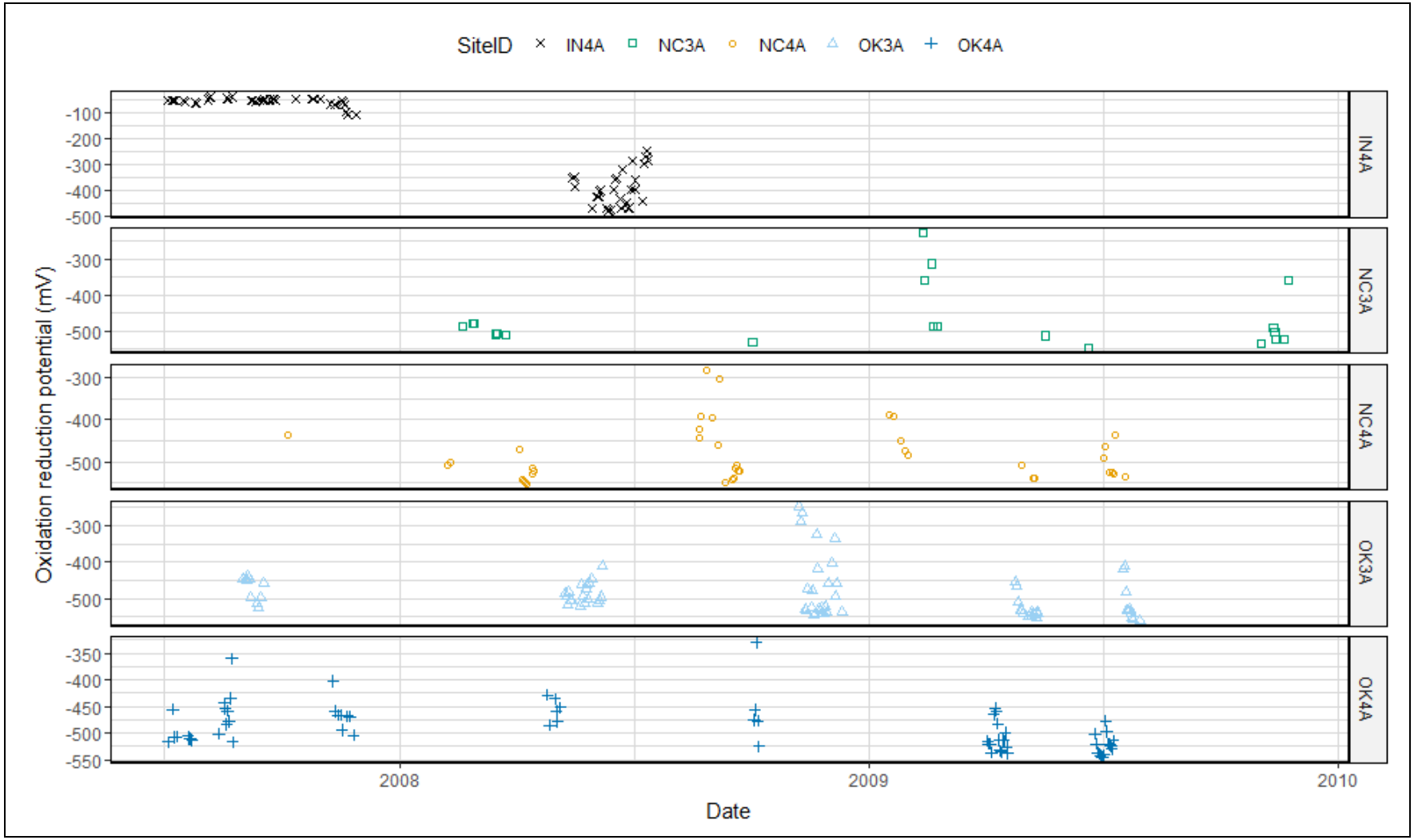


**Figure E-63. ORP time series for swine lagoons.**

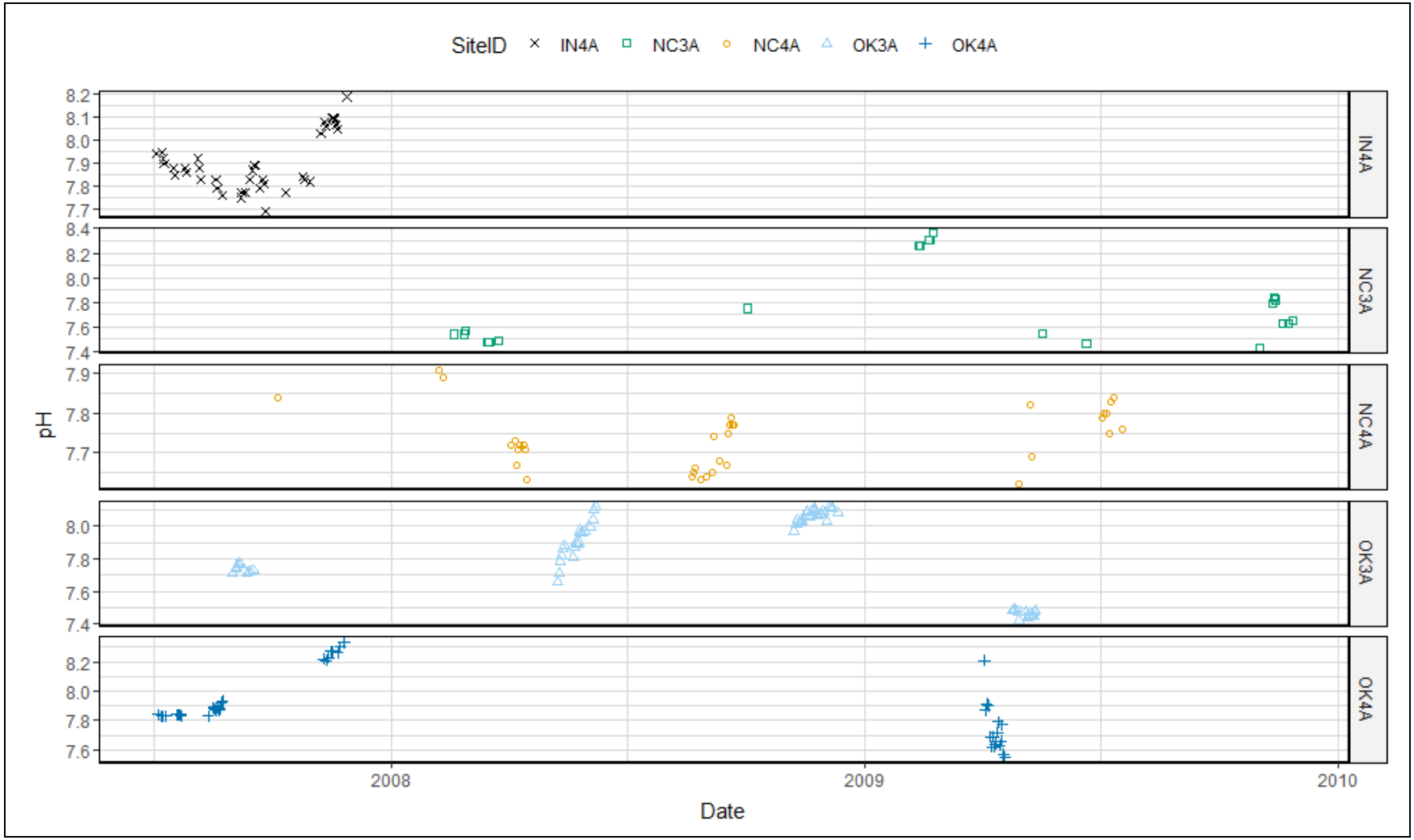


**Figure E-64. pH time series for swine lagoons.**

### E.4.3 Ambient

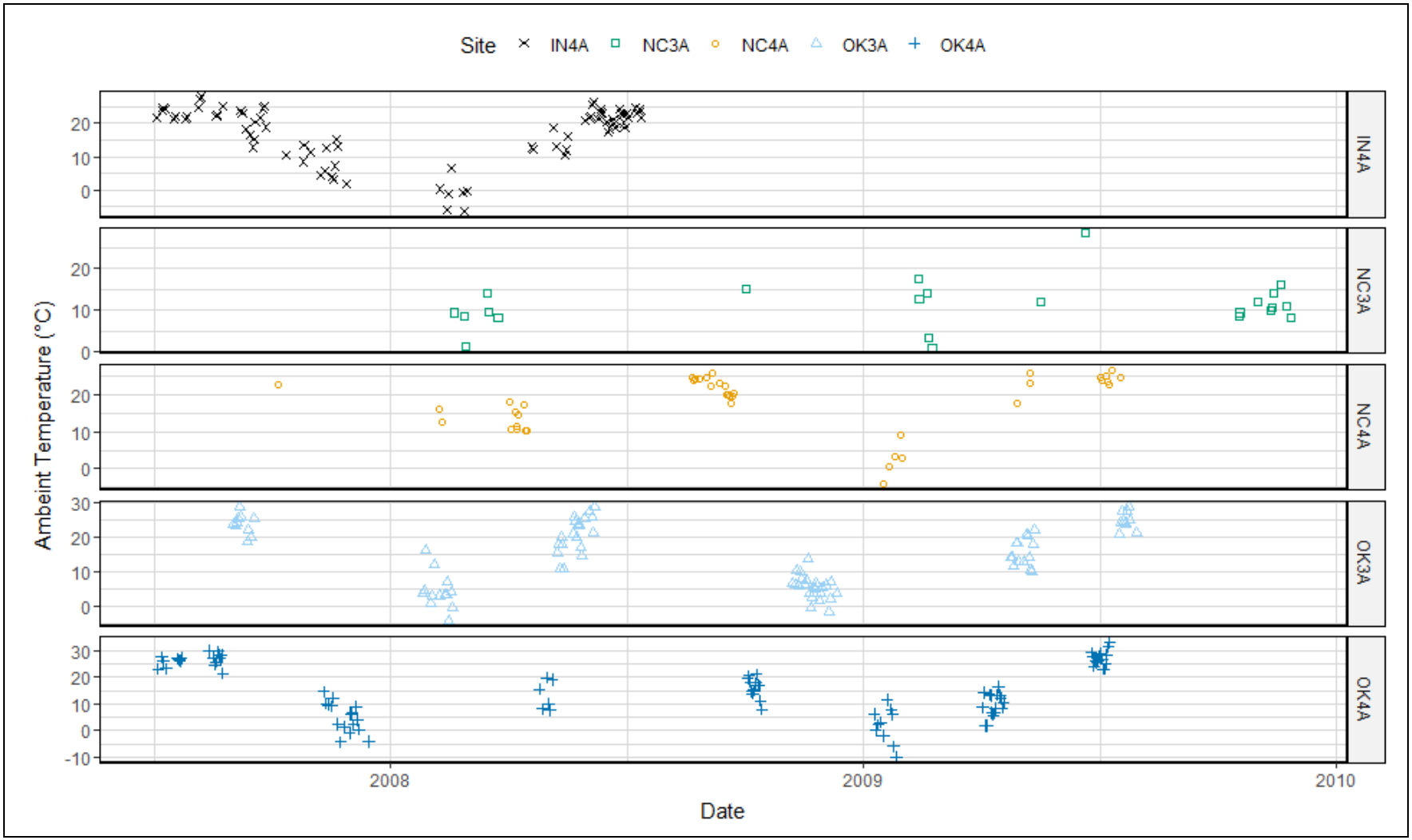


**Figure E-65. Ambient temperature time series for swine lagoons (°C).**

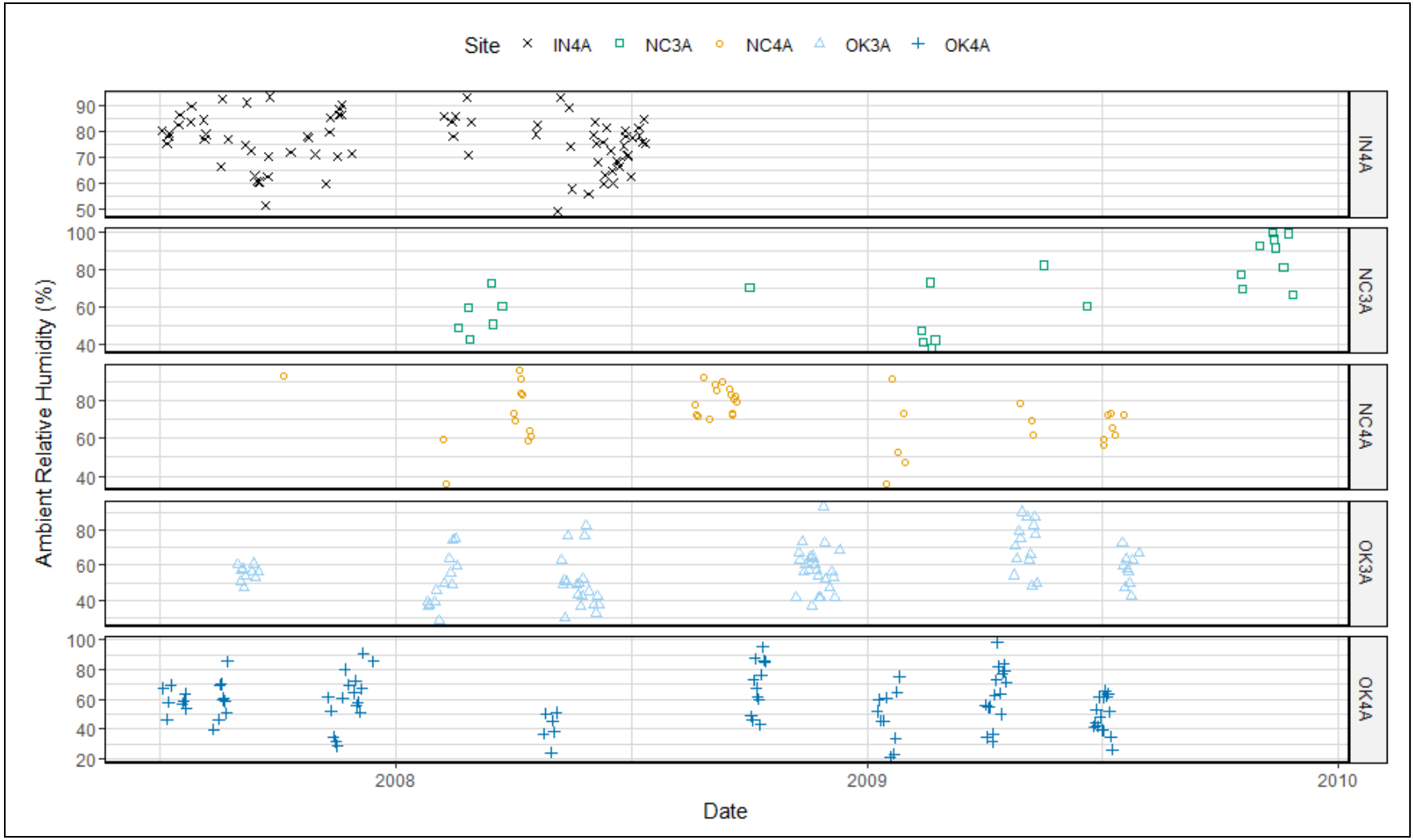


**Figure E-66. Ambient relative humidity time series for swine lagoons (%).**

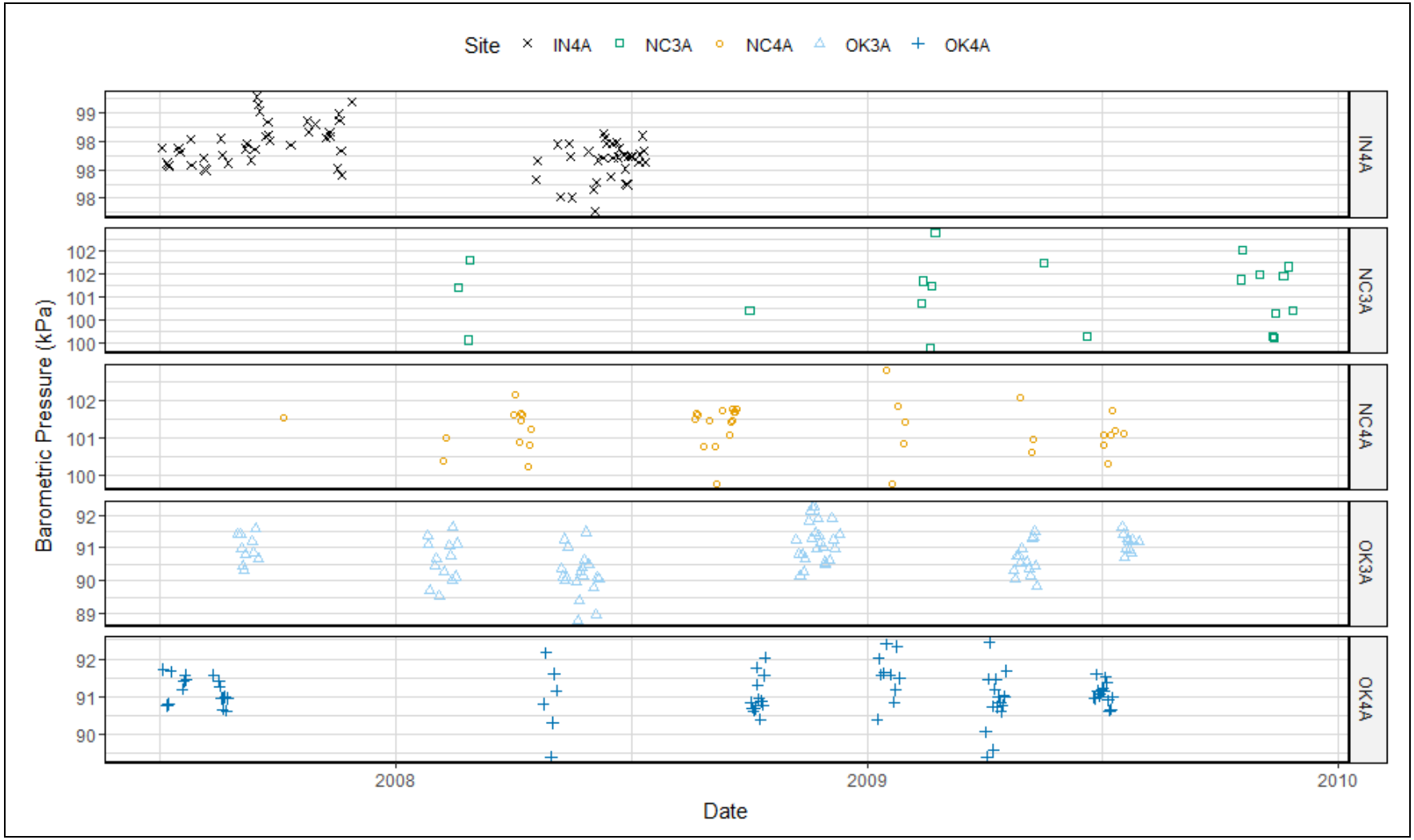


**Figure E-67. Barometric pressure time series for swine lagoons (kPa).**

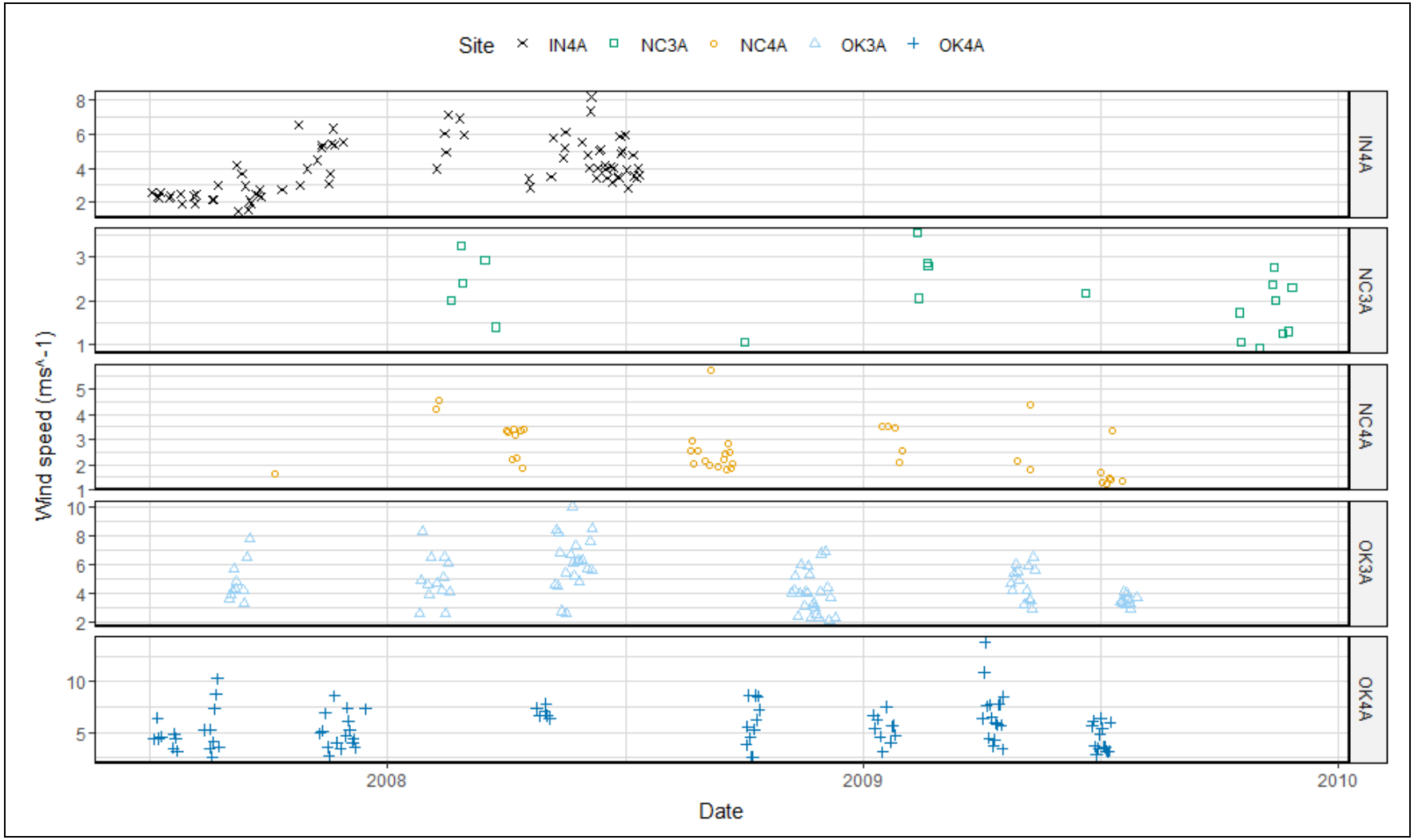


**Figure E-68. Wind Speed time series for swine lagoons ($ms^{-1}$).**

## E.5 Basins

### E.5.1 Emissions

#### E.5.1.1 Ammonia ($NH_3$)

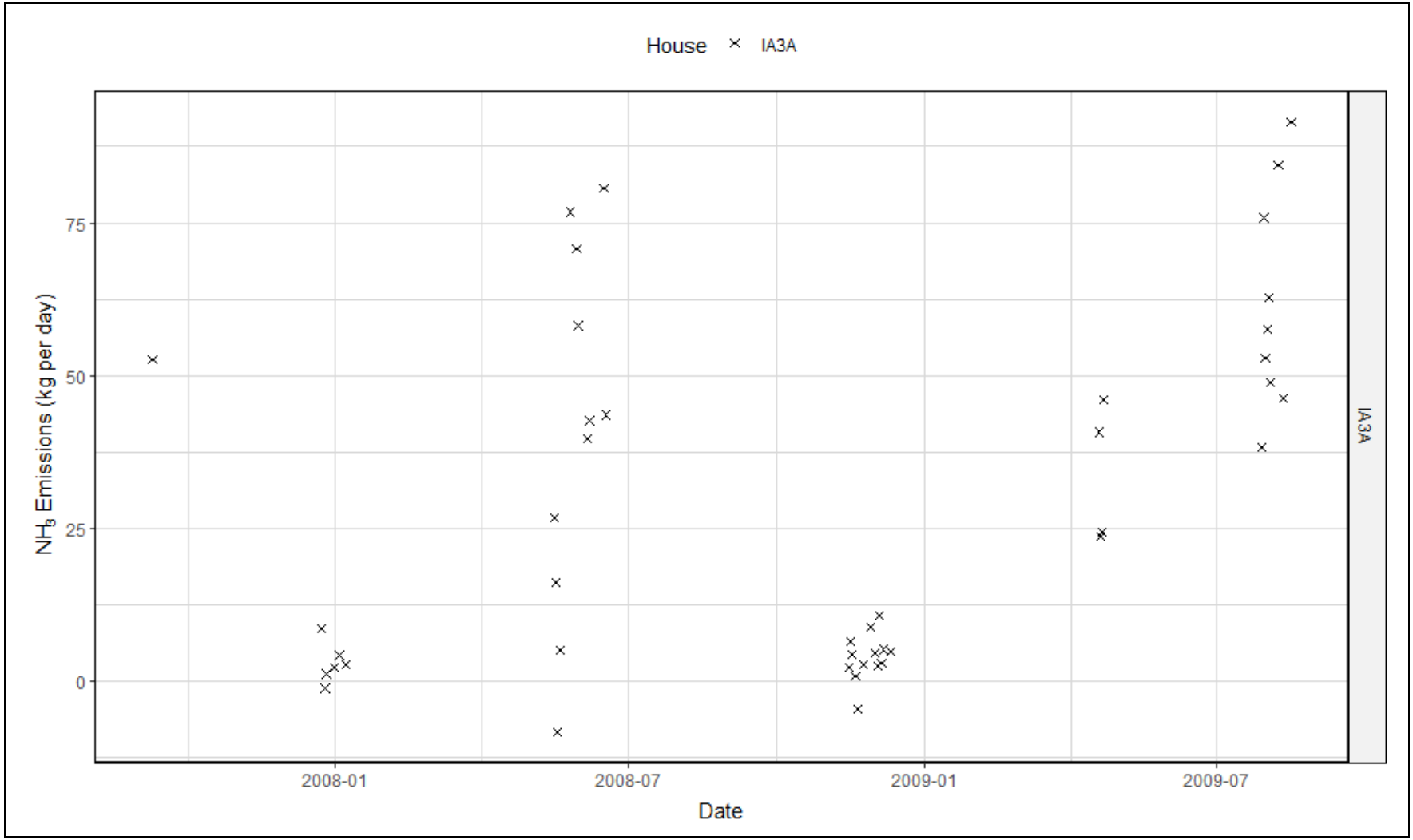


**Figure E-69. $NH_3$ emission time series for swine basin (kg $d^{-1}$).**

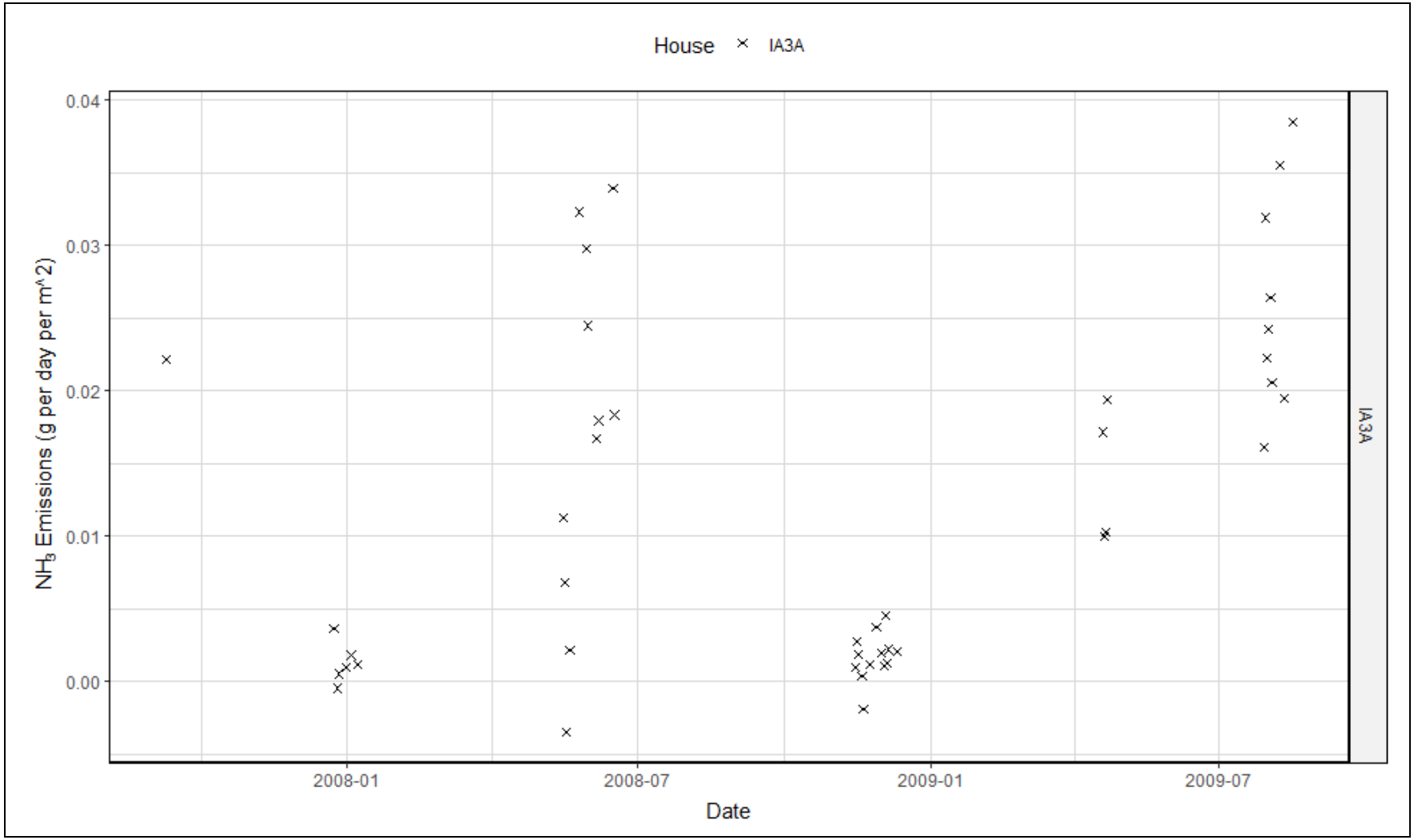


**Figure E-70. $NH_3$ emission time series for swine basin (g $d^{-1}m^{-2}$).**

### E.5.1.2 Hydrogen Sulfide ($H_2S$)

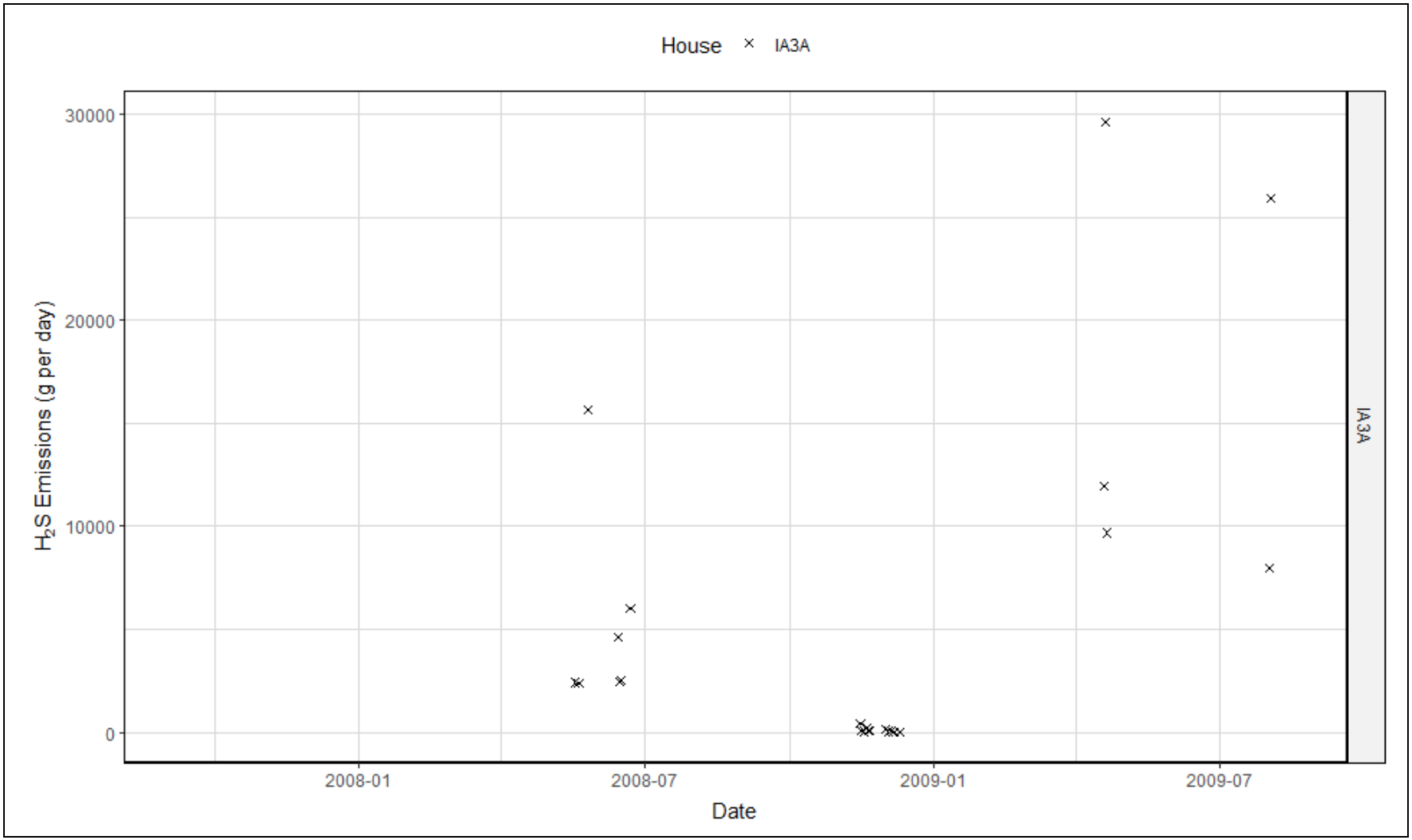


**Figure E-71. $H_2S$ emission time series for swine basin (g $d^{-1}$).**

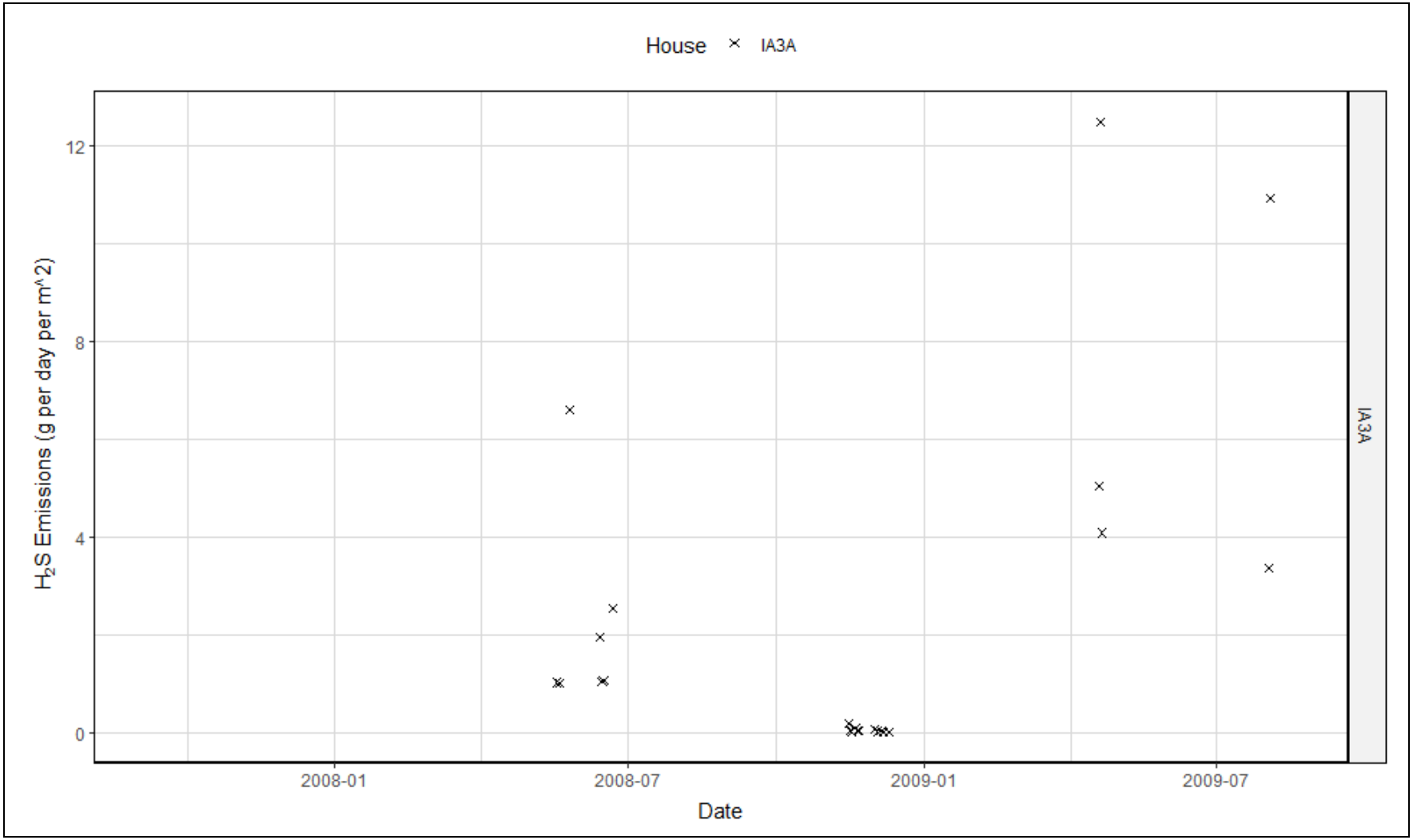


**Figure E-72. $H_2S$ emission time series for swine basin (mg $d^{-1}m^{-2}$).**

### E.5.2 Ambient

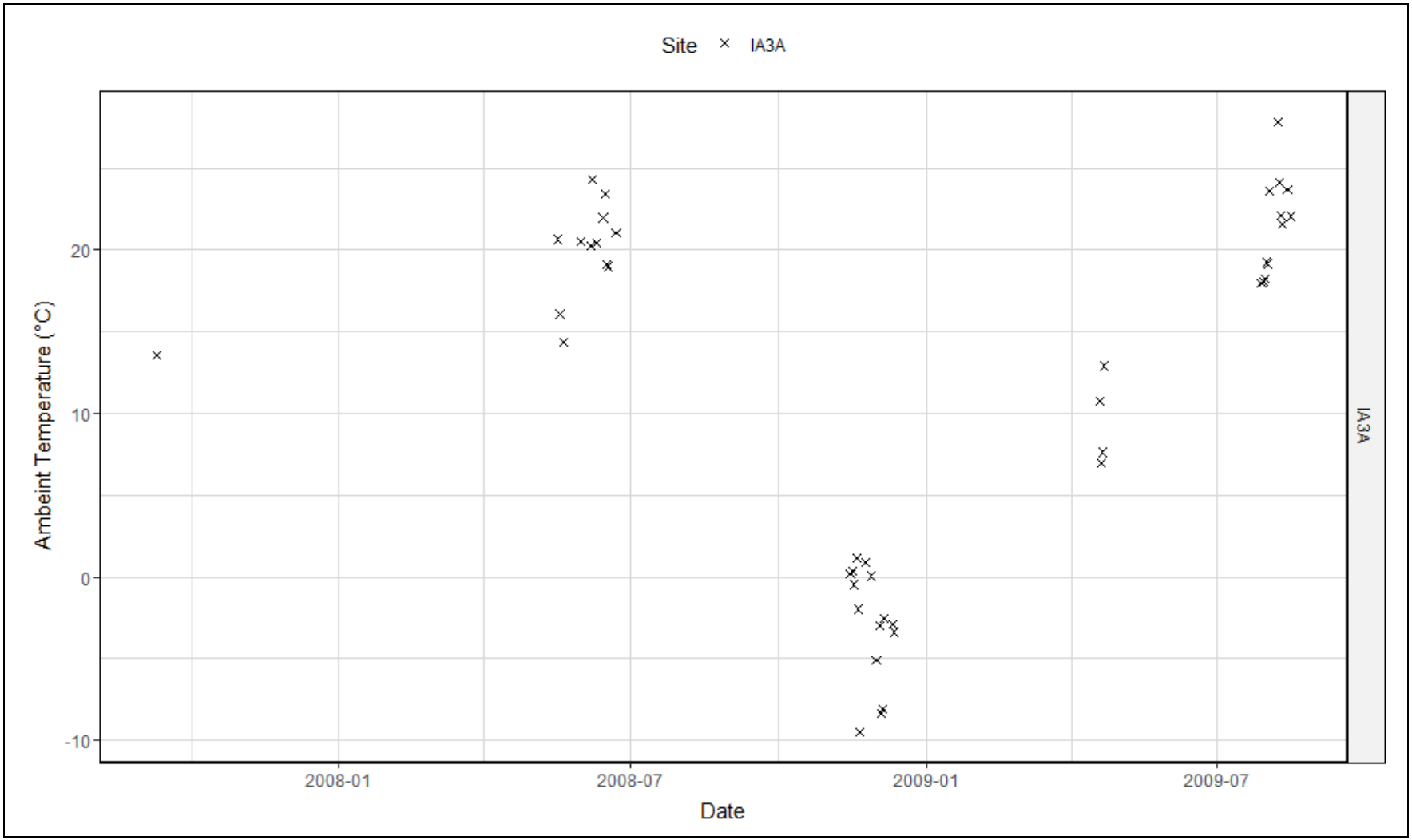


**Figure E-73. Ambient temperature time series for swine basin (°C).**

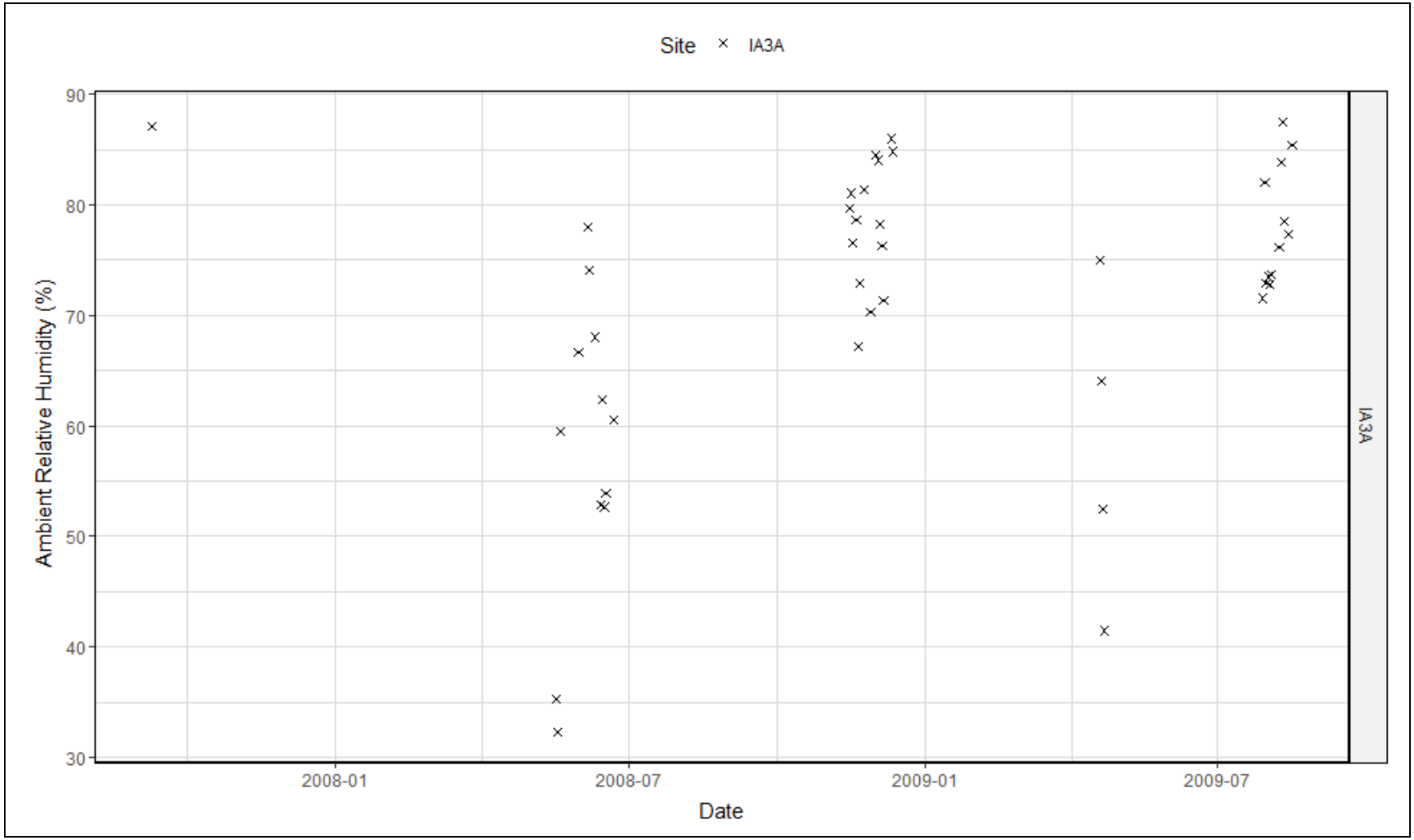


**Figure E-74. Ambient relative humidity time series for swine basin (%).**

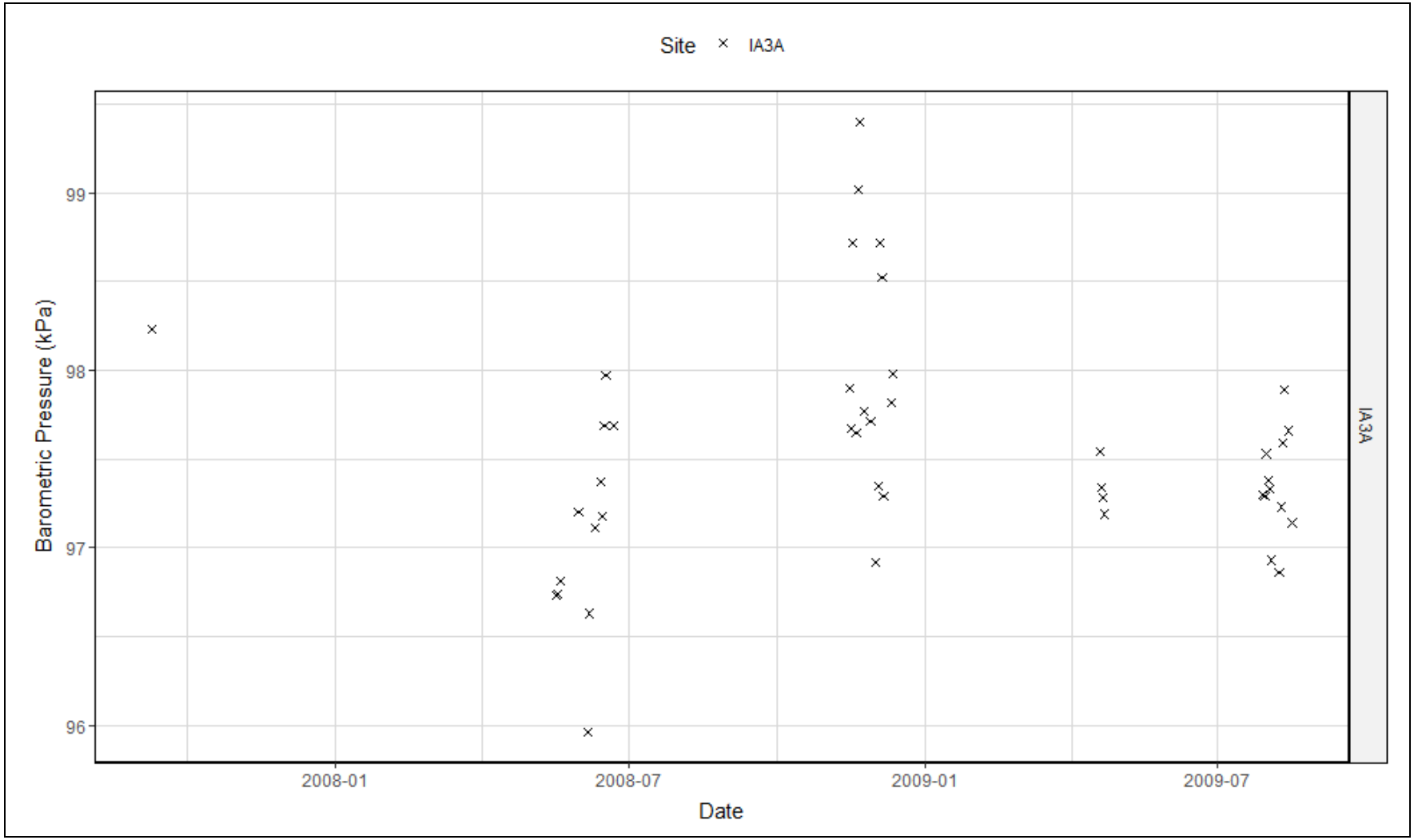


**Figure E-75. Barometric pressure time series for swine basin (kPa).**

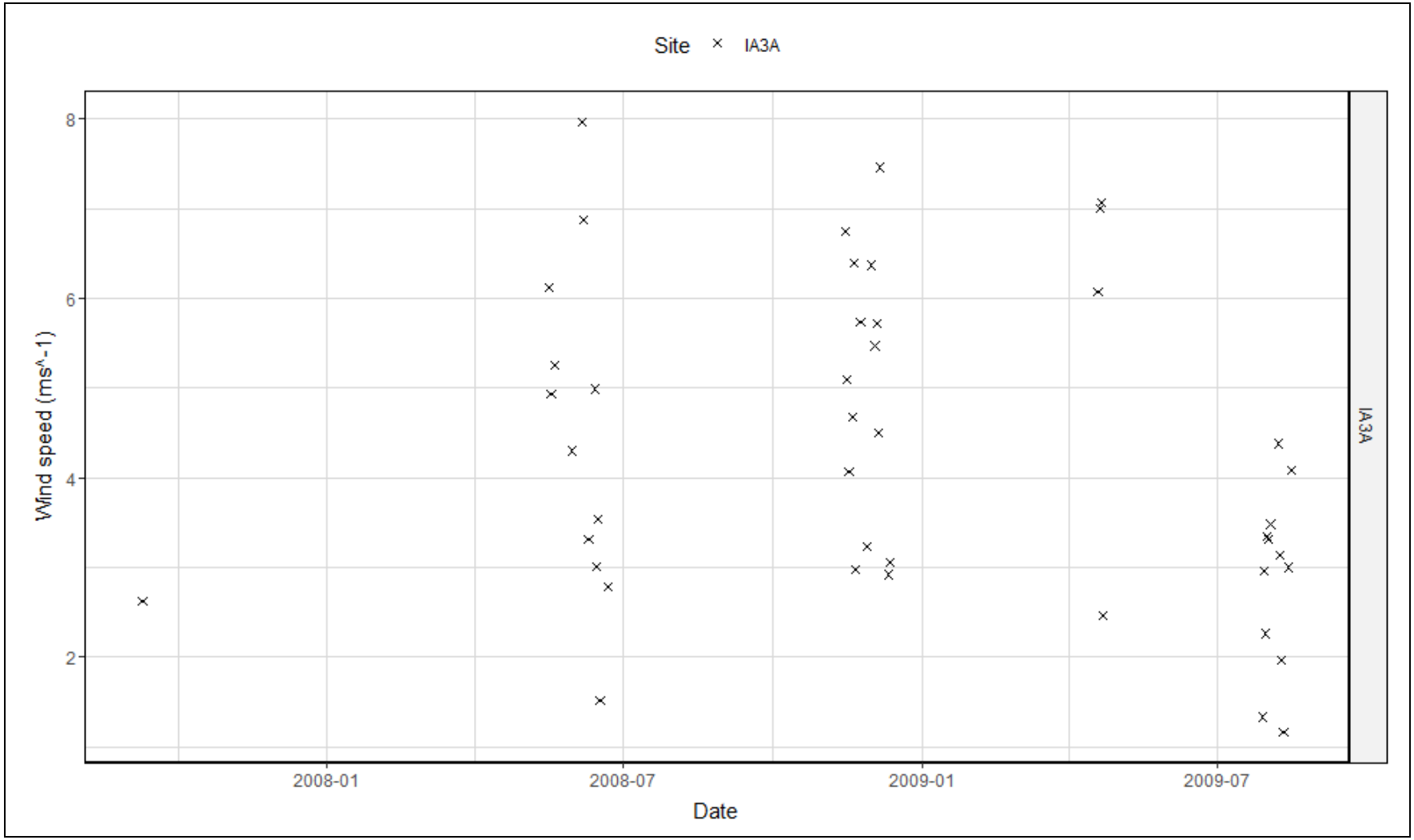


**Figure E-76. Wind Speed time series for swine basin ($ms^{-1}$).**

# Appendix F: Scatter Plots

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## F.1 Introduction

To further explore the trends between the predictor variables and emissions and determine whether the parameter should be included in developing an EEM, EPA prepared scatter plots of emissions versus the process, environmental, and manure parameters and conducted least squares regression analysis to assess the influence of each variable on emissions. For the regressions, EPA classified the linear relationships based on the ranges in Table F.1.1.

**Table F.1.1. Relationship classification based on $R^2$ values.**

| Range of $R^2$ | Relationship strength |
|---|---|
| $R^2 = 0$ | none |
| $0 < R^2 \leq 0.2$ | slight or weak |
| $0.2 < R^2 \leq 0.4$ | modest |
| $0.4 < R^2 \leq 0.6$ | moderate |
| $0.6 < R^2 \leq 0.8$ | moderately strong |
| $R^2 > 0.8$ | strong |

## F.2 Gestation Barns

### *F.2.1 Environmental*

**Table F.2.1. Summary of swine gestation barn $R^2$ values for environmental parameters (kg $d^{-1}$).**

| Pollutant | Parameter | R | R2 | Strength | Figure |
|---|---|---|---|---|---|
| $NH_3$ ($kgd^{-1}$) | Inventory (hd) | 0.2 | 0.04 | slight or weak | F.2-1 |
| $NH_3$ ($gd^{-1}hd^{-1}$) | Inventory (hd) | 0.11 | 0.01 | slight or weak | F.2-2 |
| $NH_3$ ($kgd^{-1}$) | Average weight (kg) | 0.6 | 0.37 | modest | F.2-3 |
| $NH_3$ ($gd^{-1}hd^{-1}$) | Average weight (kg) | 0.58 | 0.33 | modest | F.2-4 |
| $NH_3$ ($kgd^{-1}$) | Live animal weight (kg) | 0.49 | 0.24 | modest | F.2-5 |
| $NH_3$ ($gd^{-1}hd^{-1}$) | Live animal weight (kg) | 0.42 | 0.18 | slight or weak | F.2-6 |
| $NH_3$ ($kgd^{-1}$) | Exhaust Temperature (°C) | -0.06 | 0 | slight or weak | F.2-7 |
| $NH_3$ ($gd^{-1}hd^{-1}$) | Exhaust Temperature (°C) | -0.07 | 0 | slight or weak | F.2-8 |
| $NH_3$ ($kgd^{-1}$) | Exhaust Relative humidity (%) | 0.13 | 0.02 | slight or weak | F.2-9 |
| $NH_3$ ($gd^{-1}hd^{-1}$) | Exhaust Relative humidity (%) | 0.12 | 0.01 | slight or weak | F.2-10 |
| $NH_3$ ($kgd^{-1}$) | Airflow ($dsm^3s^{-1}$) | 0.3 | 0.09 | slight or weak | F.2-11 |
| $NH_3$ ($gd^{-1}hd^{-1}$) | Airflow ($dsm^3s^{-1}$) | 0.25 | 0.06 | slight or weak | F.2-12 |
| $H_2S$ ($gd^{-1}$) | Inventory (hd) | 0.12 | 0.01 | slight or weak | F.2-13 |
| $H_2S$ ($mgd^{-1}hd^{-1}$) | Inventory (hd) | 0.09 | 0.01 | slight or weak | F.2-14 |
| $H_2S$ ($gd^{-1}$) | Average weight (kg) | 0.74 | 0.54 | moderate | F.2-15 |
| $H_2S$ ($mgd^{-1}hd^{-1}$) | Average weight (kg) | 0.73 | 0.53 | moderate | F.2-16 |
| $H_2S$ ($gd^{-1}$) | Live animal weight (kg) | 0.53 | 0.28 | modest | F.2-17 |
| $H_2S$ ($mgd^{-1}hd^{-1}$) | Live animal weight (kg) | 0.51 | 0.26 | modest | F.2-18 |
| $H_2S$ ($gd^{-1}$) | Exhaust Temperature (°C) | -0.26 | 0.07 | slight or weak | F.2-19 |
| $H_2S$ ($mgd^{-1}hd^{-1}$) | Exhaust Temperature (°C) | -0.26 | 0.07 | slight or weak | F.2-20 |

| Pollutant | Parameter | R | R2 | Strength | Figure |
|---|---|---|---|---|---|
| $H_2S$ ($gd^{-1}$) | Exhaust Relative humidity (%) | 0.09 | 0.01 | slight or weak | F.2-21 |
| $H_2S$ ($mgd^{-1}hd^{-1}$) | Exhaust Relative humidity (%) | 0.08 | 0.01 | slight or weak | F.2-22 |
| $H_2S$ ($gd^{-1}$) | Airflow ($dsm^3s^{-1}$) | 0.17 | 0.03 | slight or weak | F.2-23 |
| $H_2S$ ($mgd^{-1}hd^{-1}$) | Airflow ($dsm^3s^{-1}$) | 0.14 | 0.02 | slight or weak | F.2-24 |
| $PM_{10}$ ($gd^{-1}$) | Inventory (hd) | 0.2 | 0.04 | slight or weak | F.2-25 |
| $PM_{10}$ ($mgd^{-1}hd^{-1}$) | Inventory (hd) | -0.03 | 0 | slight or weak | F.2-26 |
| $PM_{10}$ ($gd^{-1}$) | Average weight (kg) | 0.35 | 0.12 | slight or weak | F.2-27 |
| $PM_{10}$ ($mgd^{-1}hd^{-1}$) | Average weight (kg) | 0.29 | 0.08 | slight or weak | F.2-28 |
| $PM_{10}$ ($gd^{-1}$) | Live animal weight (kg) | 0.35 | 0.12 | slight or weak | F.2-29 |
| $PM_{10}$ ($mgd^{-1}hd^{-1}$) | Live animal weight (kg) | 0.18 | 0.03 | slight or weak | F.2-30 |
| $PM_{10}$ ($gd^{-1}$) | Exhaust Temperature (°C) | -0.21 | 0.04 | slight or weak | F.2-31 |
| $PM_{10}$ ($mgd^{-1}hd^{-1}$) | Exhaust Temperature (°C) | -0.17 | 0.03 | slight or weak | F.2-32 |
| $PM_{10}$ ($gd^{-1}$) | Exhaust Relative humidity (%) | -0.29 | 0.08 | slight or weak | F.2-33 |
| $PM_{10}$ ($mgd^{-1}hd^{-1}$) | Exhaust Relative humidity (%) | -0.2 | 0.04 | slight or weak | F.2-34 |
| $PM_{10}$ ($gd^{-1}$) | Airflow ($dsm^3s^{-1}$) | -0.02 | 0 | slight or weak | F.2-35 |
| $PM_{10}$ ($mgd^{-1}hd^{-1}$) | Airflow ($dsm^3s^{-1}$) | -0.05 | 0 | slight or weak | F.2-36 |
| $PM_{2.5}$ ($gd^{-1}$) | Inventory (hd) | 0.11 | 0.01 | slight or weak | F.2-37 |
| $PM_{2.5}$ ($mgd^{-1}hd^{-1}$) | Inventory (hd) | -0.09 | 0.01 | slight or weak | F.2-38 |
| $PM_{2.5}$ ($gd^{-1}$) | Average weight (kg) | 0.24 | 0.06 | slight or weak | F.2-39 |
| $PM_{2.5}$ ($mgd^{-1}hd^{-1}$) | Average weight (kg) | 0.18 | 0.03 | slight or weak | F.2-40 |
| $PM_{2.5}$ ($gd^{-1}$) | Live animal weight (kg) | 0.23 | 0.05 | slight or weak | F.2-41 |
| $PM_{2.5}$ ($mgd^{-1}hd^{-1}$) | Live animal weight (kg) | 0.08 | 0.01 | slight or weak | F.2-42 |
| $PM_{2.5}$ ($gd^{-1}$) | Exhaust Temperature (°C) | -0.23 | 0.05 | slight or weak | F.2-43 |
| $PM_{2.5}$ ($mgd^{-1}hd^{-1}$) | Exhaust Temperature (°C) | -0.22 | 0.05 | slight or weak | F.2-44 |
| $PM_{2.5}$ ($gd^{-1}$) | Exhaust Relative humidity (%) | 0.1 | 0.01 | slight or weak | F.2-45 |
| $PM_{2.5}$ ($mgd^{-1}hd^{-1}$) | Exhaust Relative humidity (%) | 0.11 | 0.01 | slight or weak | F.2-46 |
| $PM_{2.5}$ ($gd^{-1}$) | Airflow ($dsm^3s^{-1}$) | -0.04 | 0 | slight or weak | F.2-47 |
| $PM_{2.5}$ ($mgd^{-1}hd^{-1}$) | Airflow ($dsm^3s^{-1}$) | -0.11 | 0.01 | slight or weak | F.2-48 |
| TSP ($gd^{-1}$) | Inventory (hd) | 0.22 | 0.05 | slight or weak | F.2-49 |
| TSP ($mgd^{-1}hd^{-1}$) | Inventory (hd) | 0.04 | 0 | slight or weak | F.2-50 |
| TSP ($gd^{-1}$) | Average weight (kg) | 0.36 | 0.13 | slight or weak | F.2-51 |
| TSP ($mgd^{-1}hd^{-1}$) | Average weight (kg) | 0.33 | 0.11 | slight or weak | F.2-52 |
| TSP ($gd^{-1}$) | Live animal weight (kg) | 0.38 | 0.14 | slight or weak | F.2-53 |
| TSP ($mgd^{-1}hd^{-1}$) | Live animal weight (kg) | 0.25 | 0.06 | slight or weak | F.2-54 |
| TSP ($gd^{-1}$) | Exhaust Temperature (°C) | -0.41 | 0.17 | slight or weak | F.2-55 |
| TSP ($mgd^{-1}hd^{-1}$) | Exhaust Temperature (°C) | -0.38 | 0.14 | slight or weak | F.2-56 |
| TSP ($gd^{-1}$) | Exhaust Relative humidity (%) | -0.52 | 0.27 | modest | F.2-57 |
| TSP ($mgd^{-1}hd^{-1}$) | Exhaust Relative humidity (%) | -0.48 | 0.23 | modest | F.2-58 |
| TSP ($gd^{-1}$) | Airflow ($dsm^3s^{-1}$) | -0.42 | 0.17 | slight or weak | F.2-59 |
| TSP ($mgd^{-1}hd^{-1}$) | Airflow ($dsm^3s^{-1}$) | -0.41 | 0.17 | slight or weak | F.2-60 |

F.2.1.1.1 Ammonia ($NH_3$)

F.2.1.1.2 Inventory

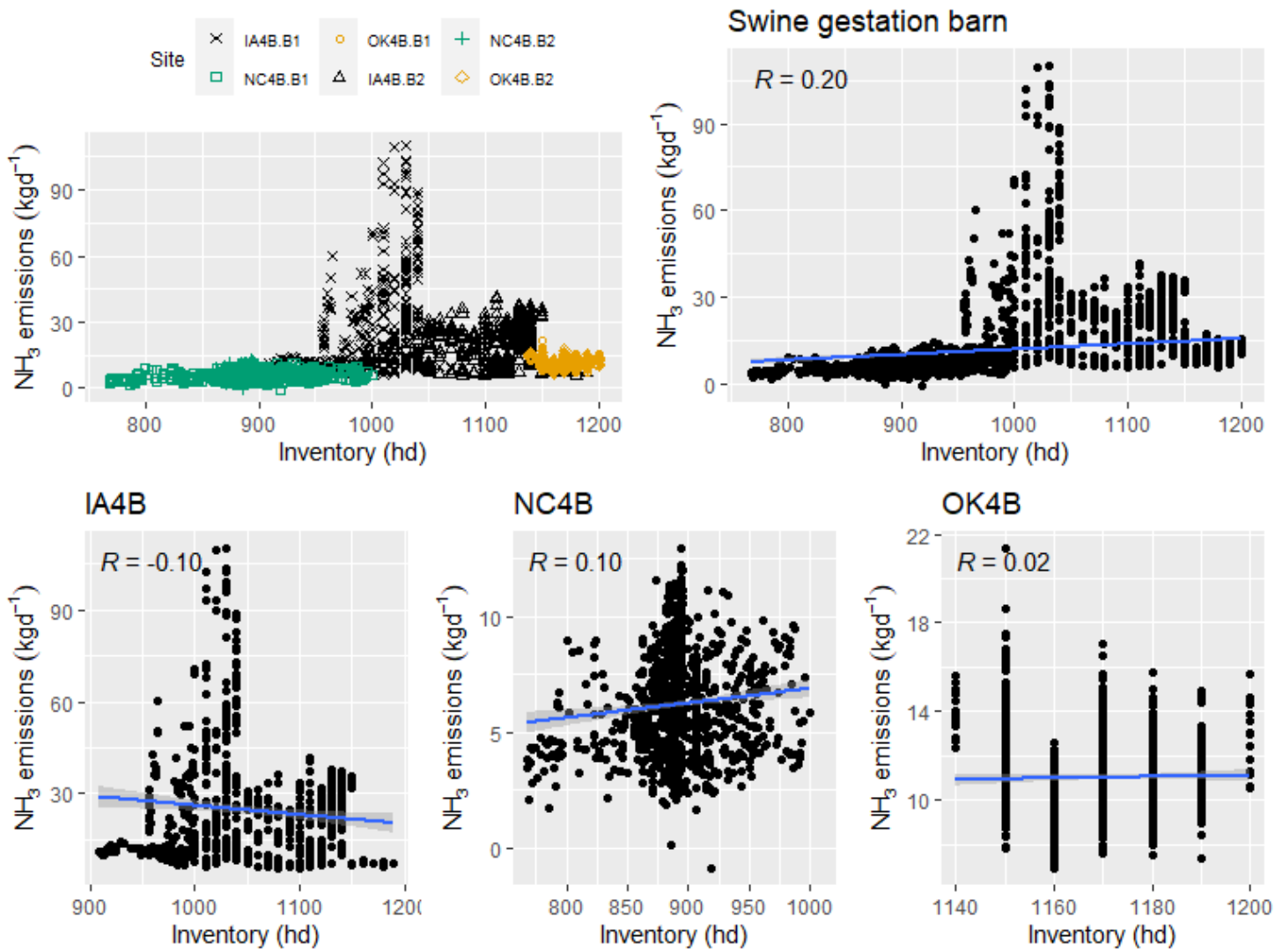


**Figure F.2-1. Scatter plot of swine gestation barn $NH_3$ emissions (kg $d^{-1}$) versus Inventory.**

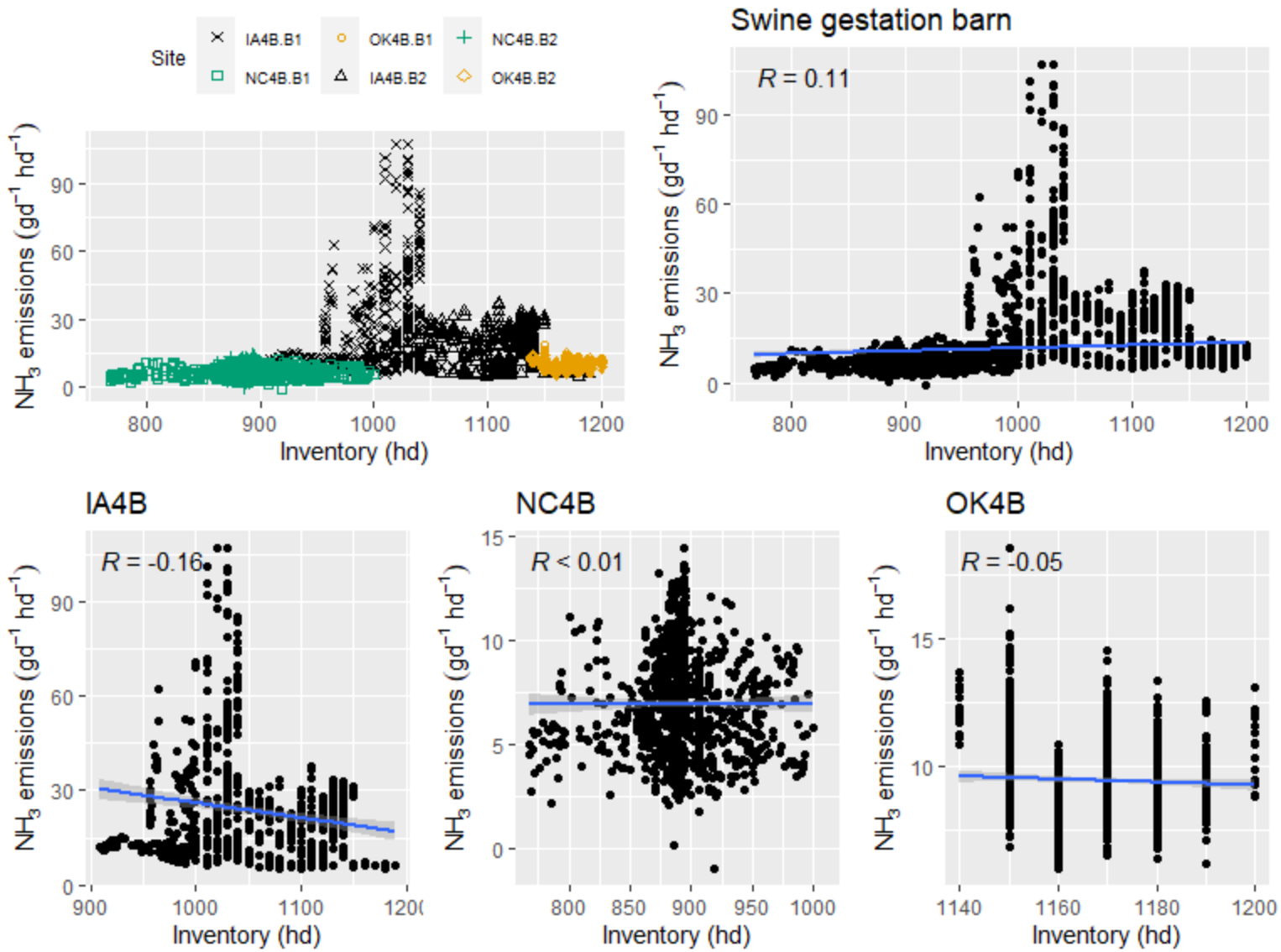


**Figure F.2-2. Scatter plot of swine gestation barn $NH_3$ emissions (g $d^{-1}hd^{-1}$) versus Inventory.**

F.2.1.1.3 Average animal weight

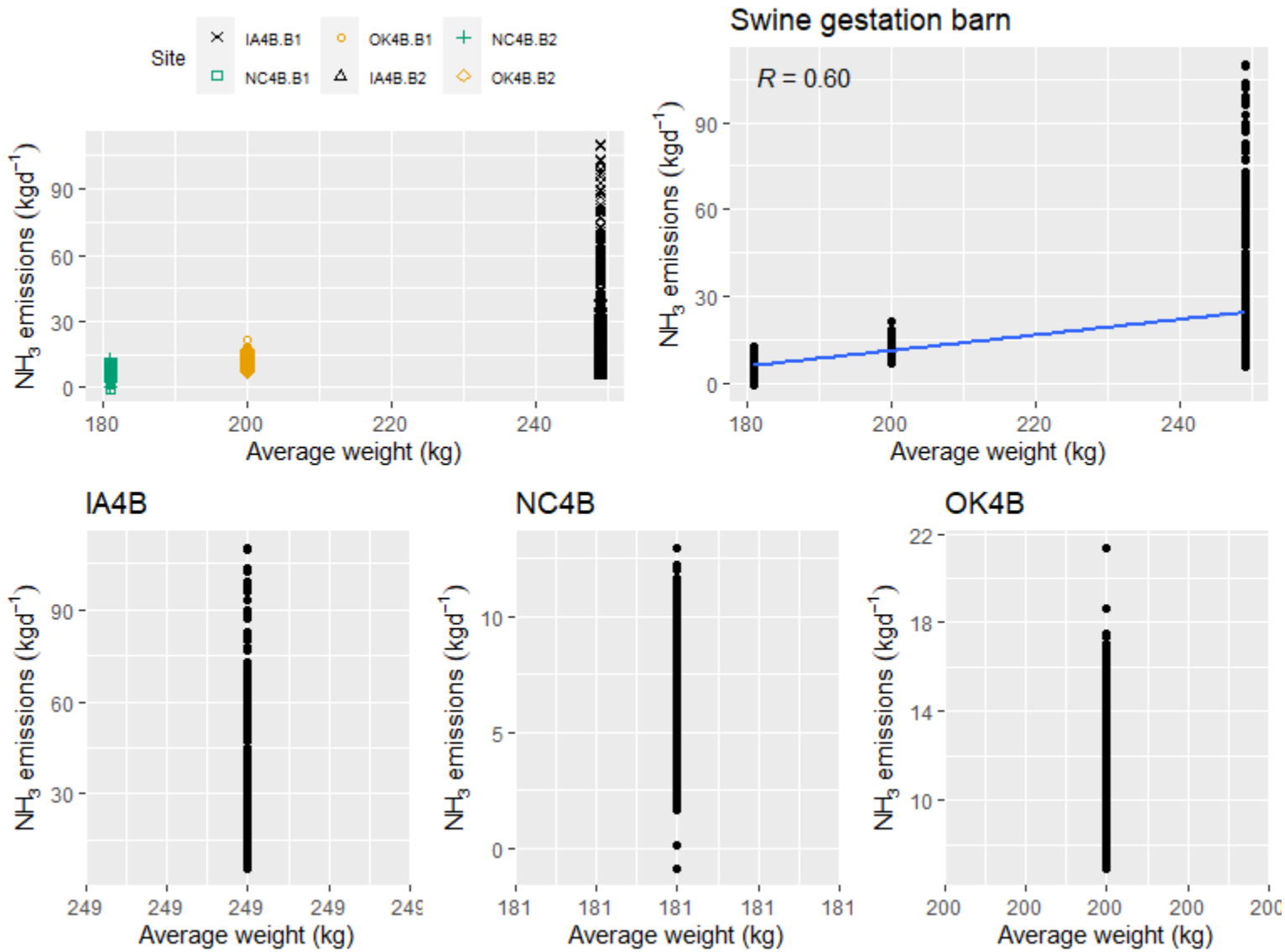


**Figure F.2-3. Scatter plot of swine gestation barn $NH_3$ emissions (kg $d^{-1}$) versus average animal weight.**

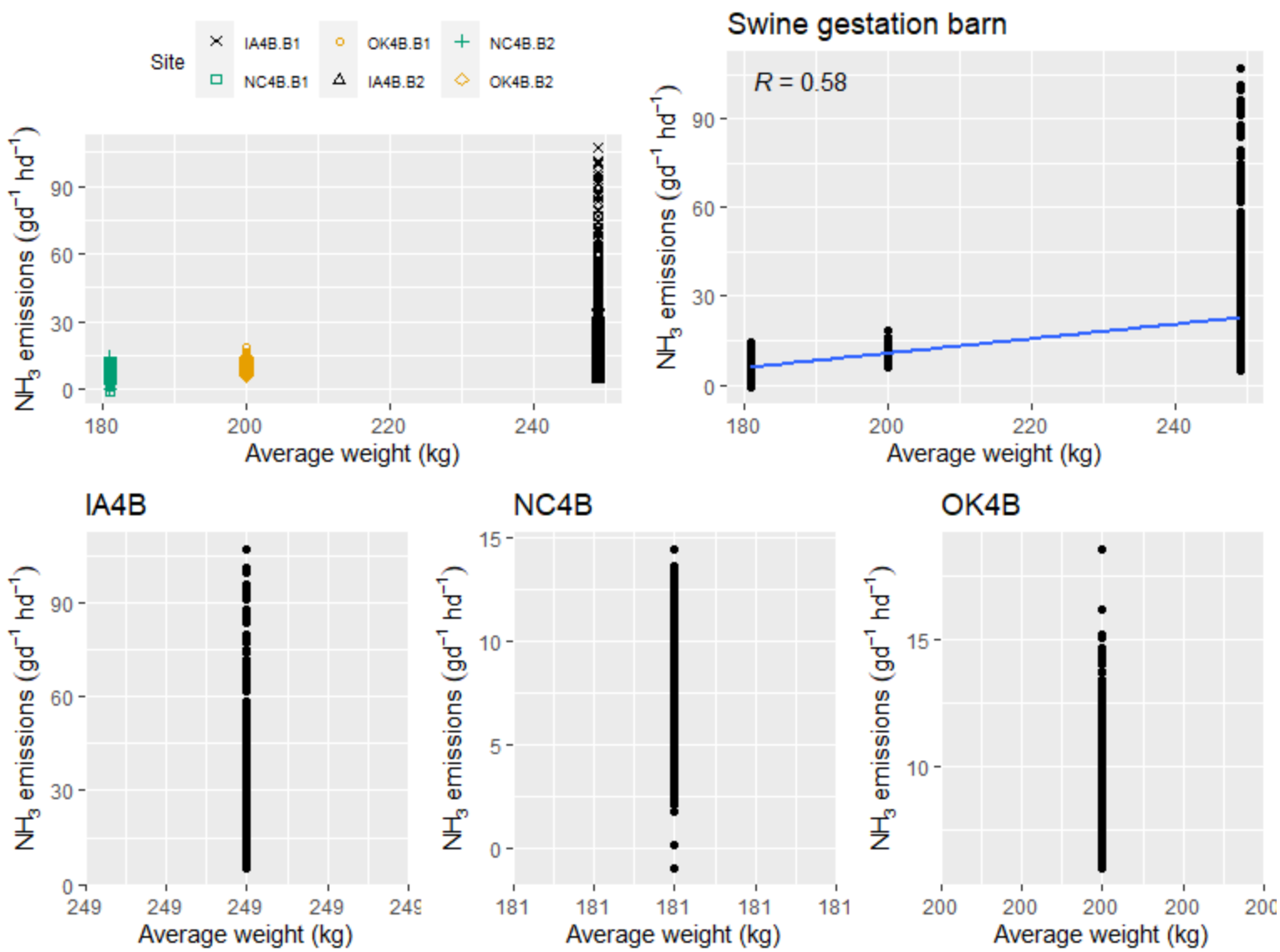


**Figure F.2-4. Scatter plot of swine gestation barn $NH_3$ emissions (g $d^{-1}hd^{-1}$) versus average animal weight.**

F.2.1.1.4 Live animal weight

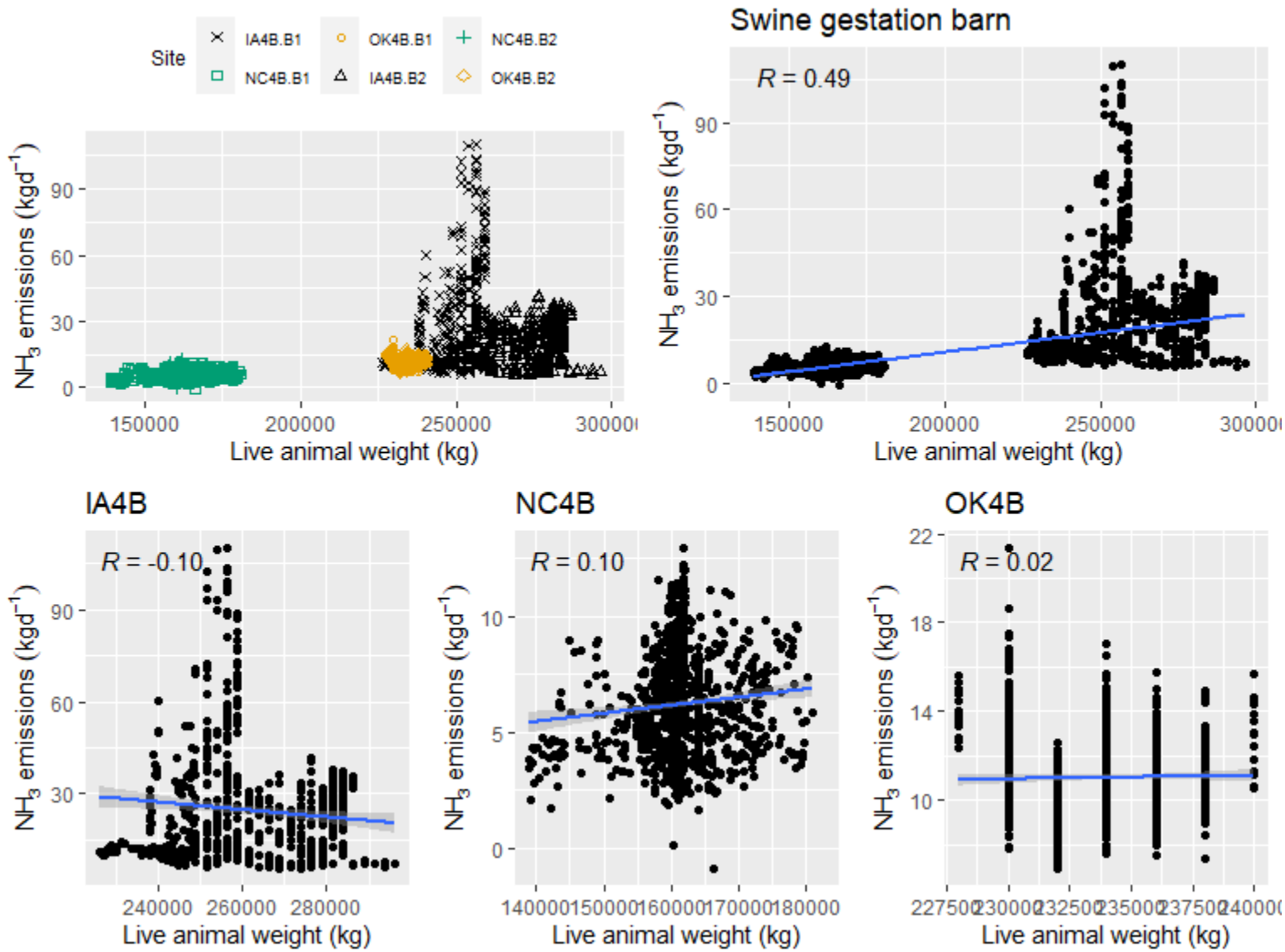


**Figure F.2-5. Scatter plot of swine gestation barn $NH_3$ emissions (kg $d^{-1}$) versus live animal weight.**

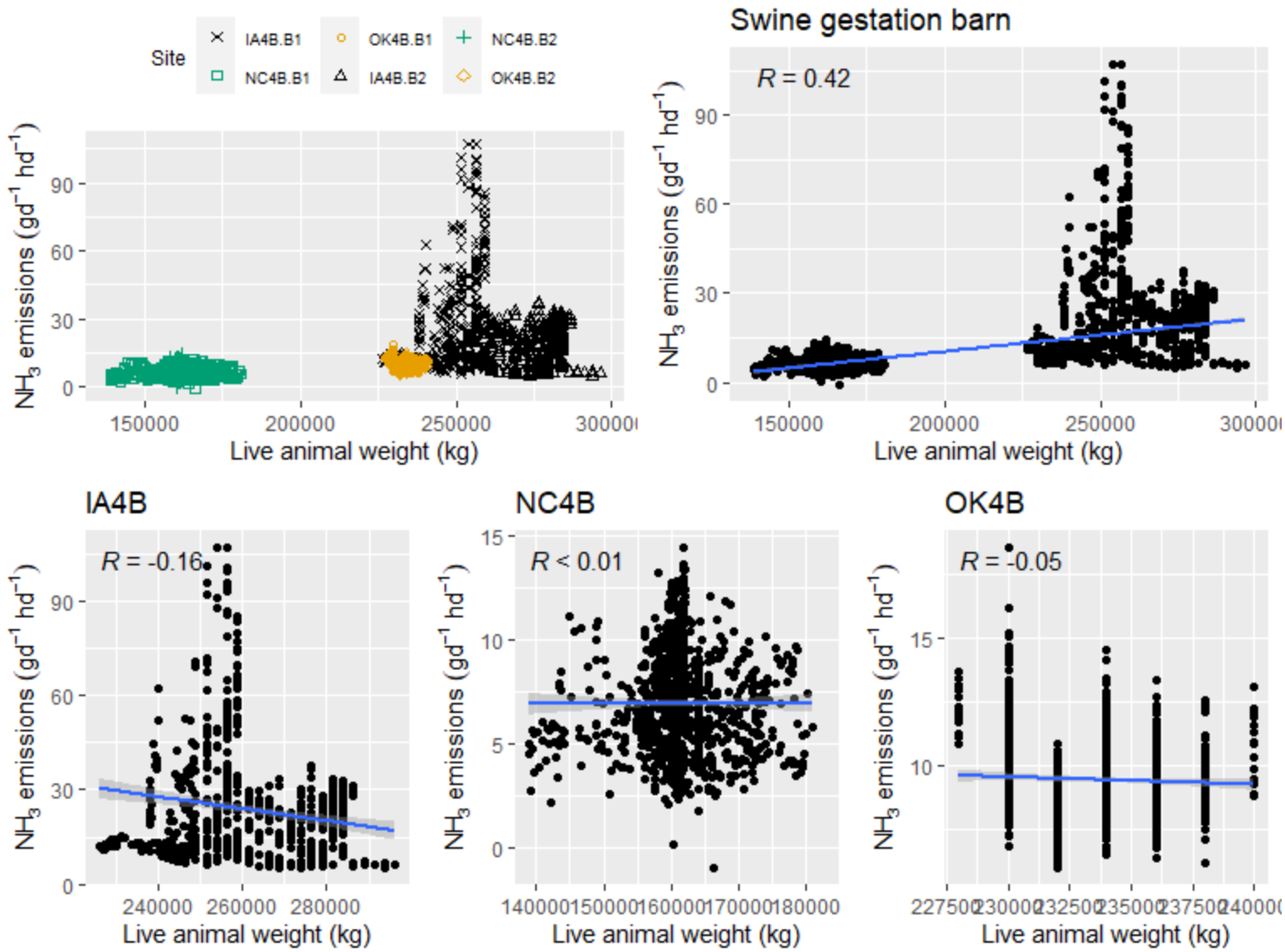


**Figure F.2-6. Scatter plot of swine gestation barn $NH_3$ emissions (g $d^{-1}hd^{-1}$) versus live animal weight.**

F.2.1.1.5 Exhaust temperature

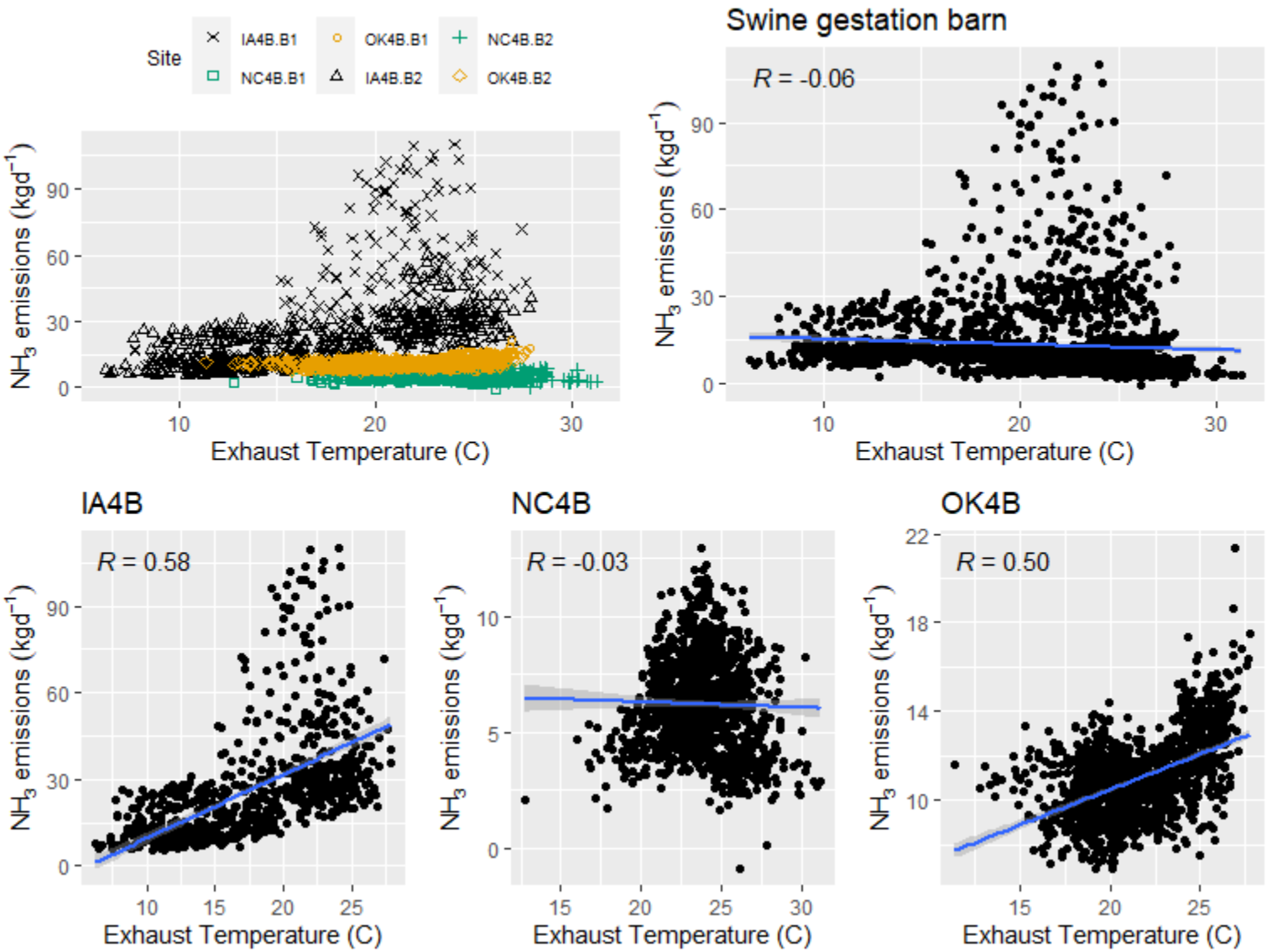


**Figure F.2-7. Scatter plot of swine gestation barn $NH_3$ emissions (kg $d^{-1}$) versus exhaust temperature.**

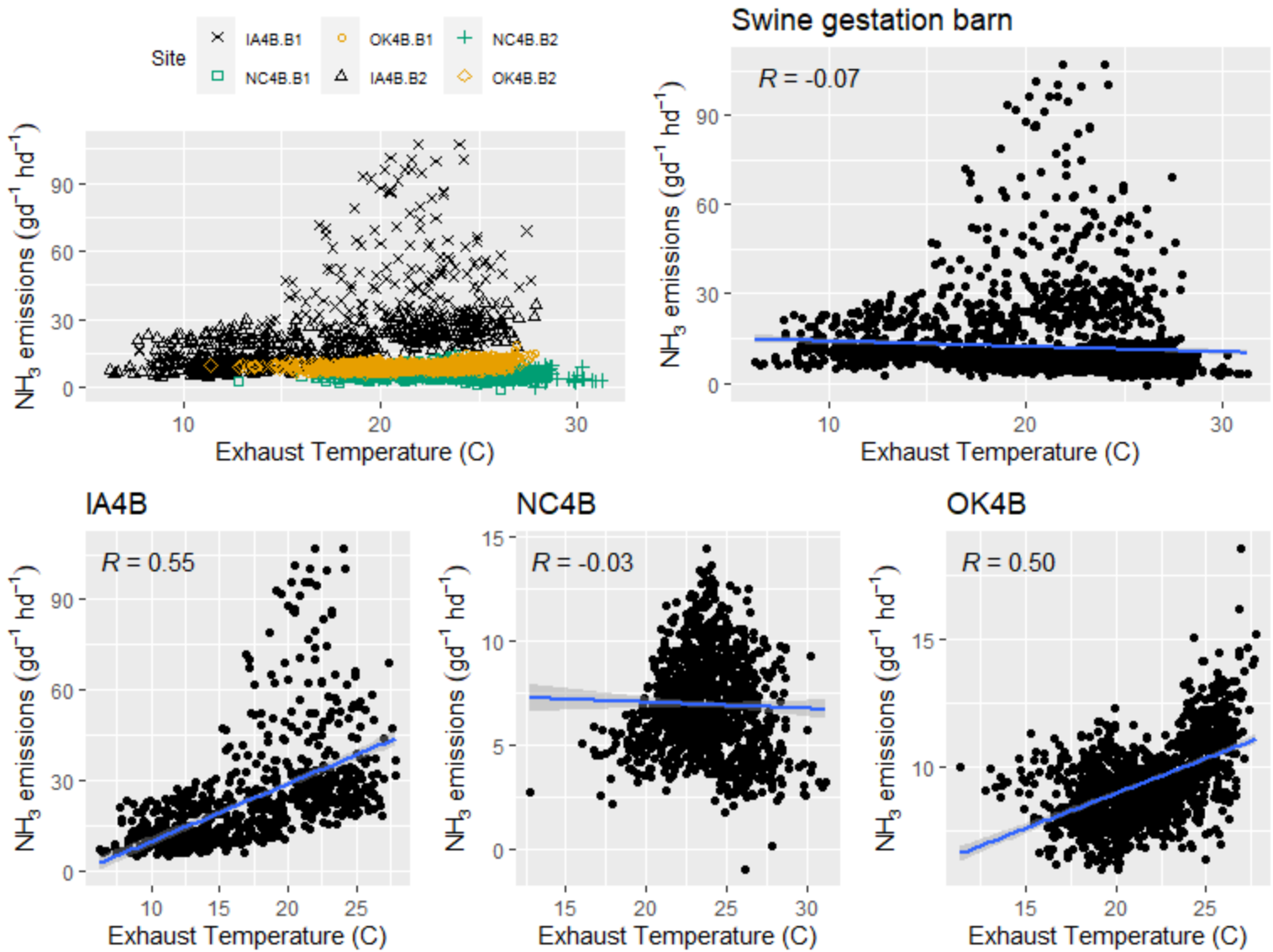


**Figure F.2-8. Scatter plot of swine gestation barn $NH_3$ emissions (g $d^{-1}hd^{-1}$) versus exhaust temperature.**

F.2.1.1.6 Exhaust relative humidity

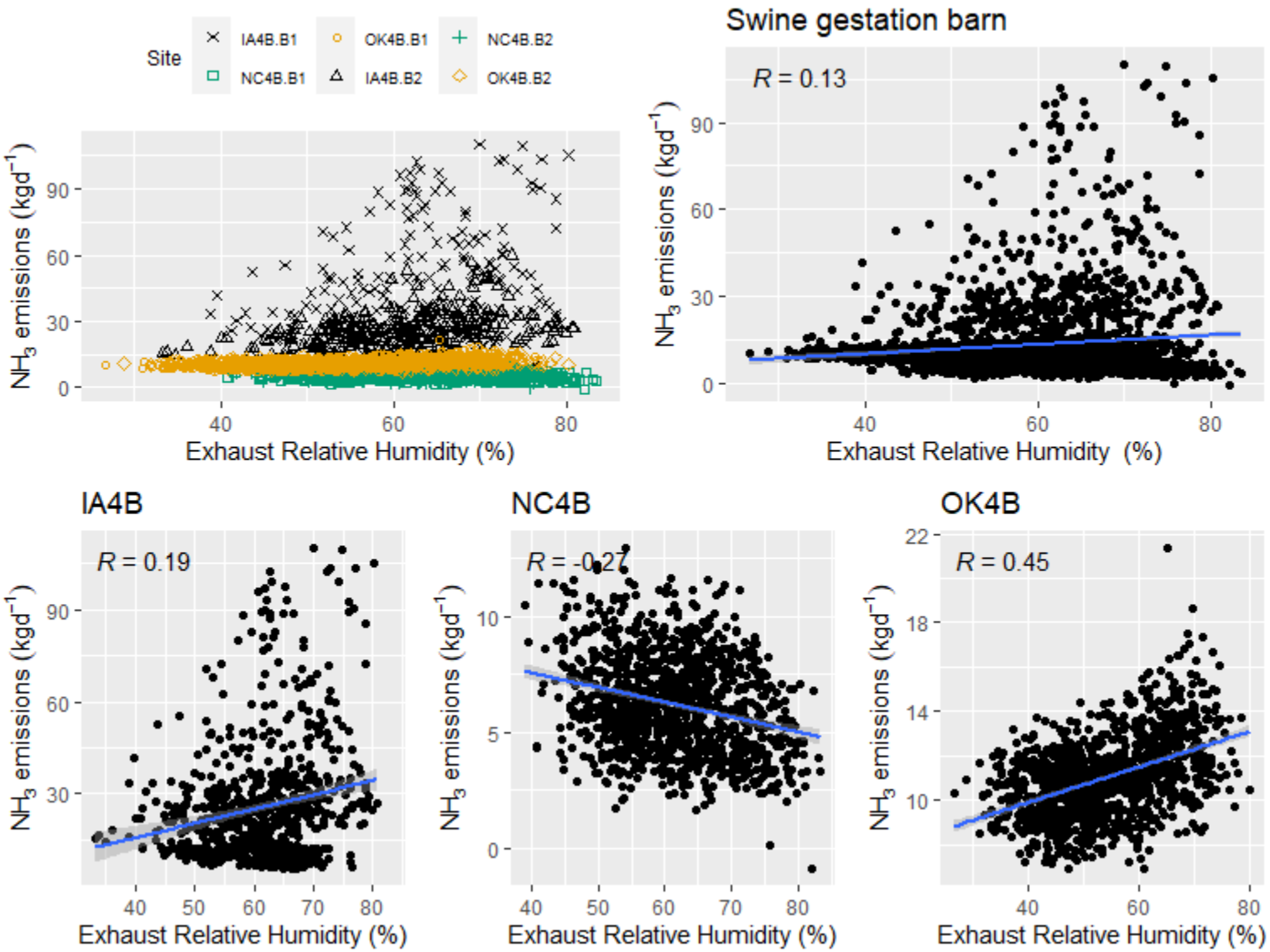


**Figure F.2-9. Scatter plot of swine gestation barn $NH_3$ emissions (kg $d^{-1}$) versus exhaust relative humidity.**

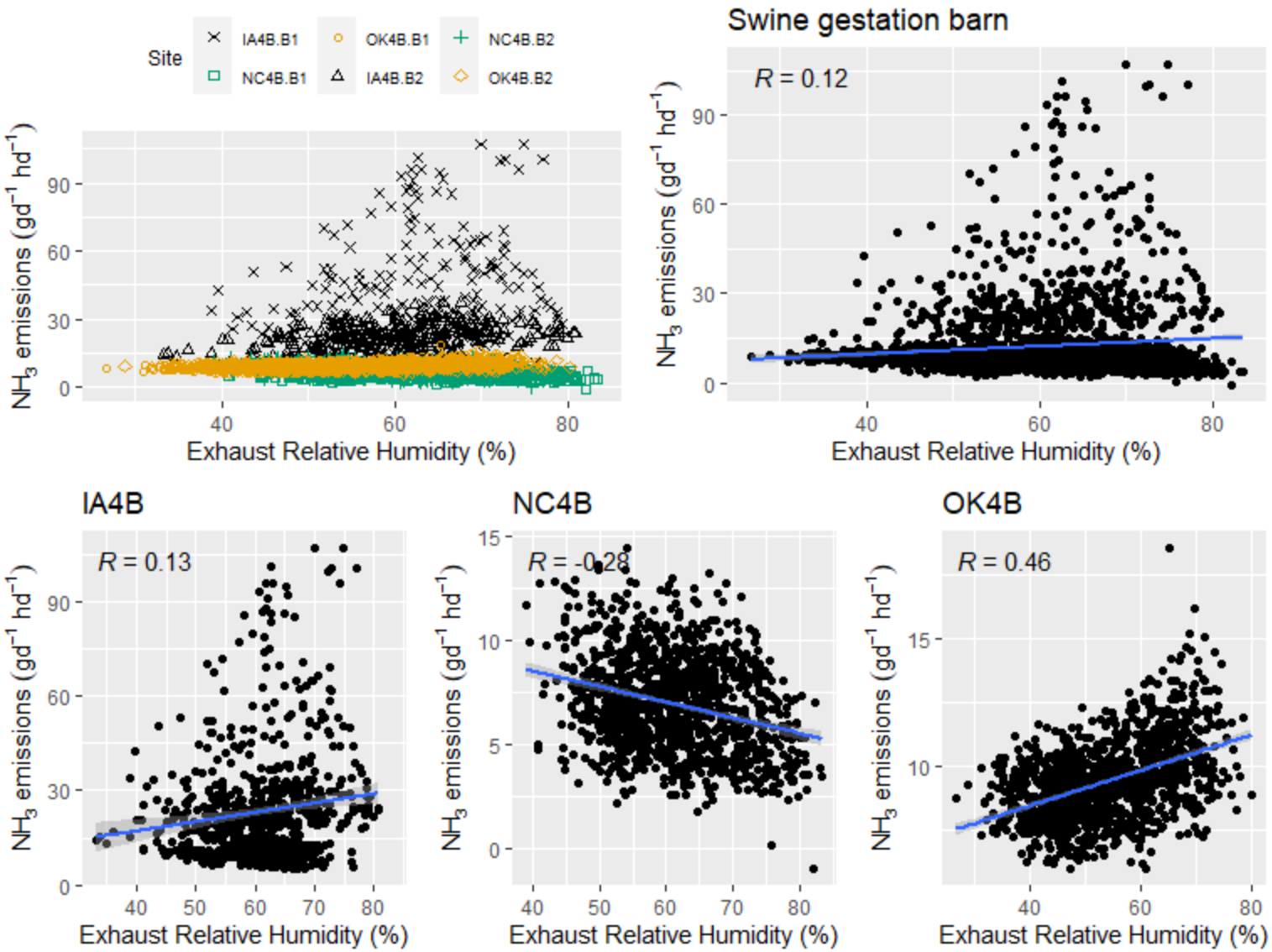


**Figure F.2-10. Scatter plot of swine gestation barn $NH_3$ emissions (g $d^{-1}hd^{-1}$) versus exhaust relative humidity.**

F.2.1.1.7 Airflow

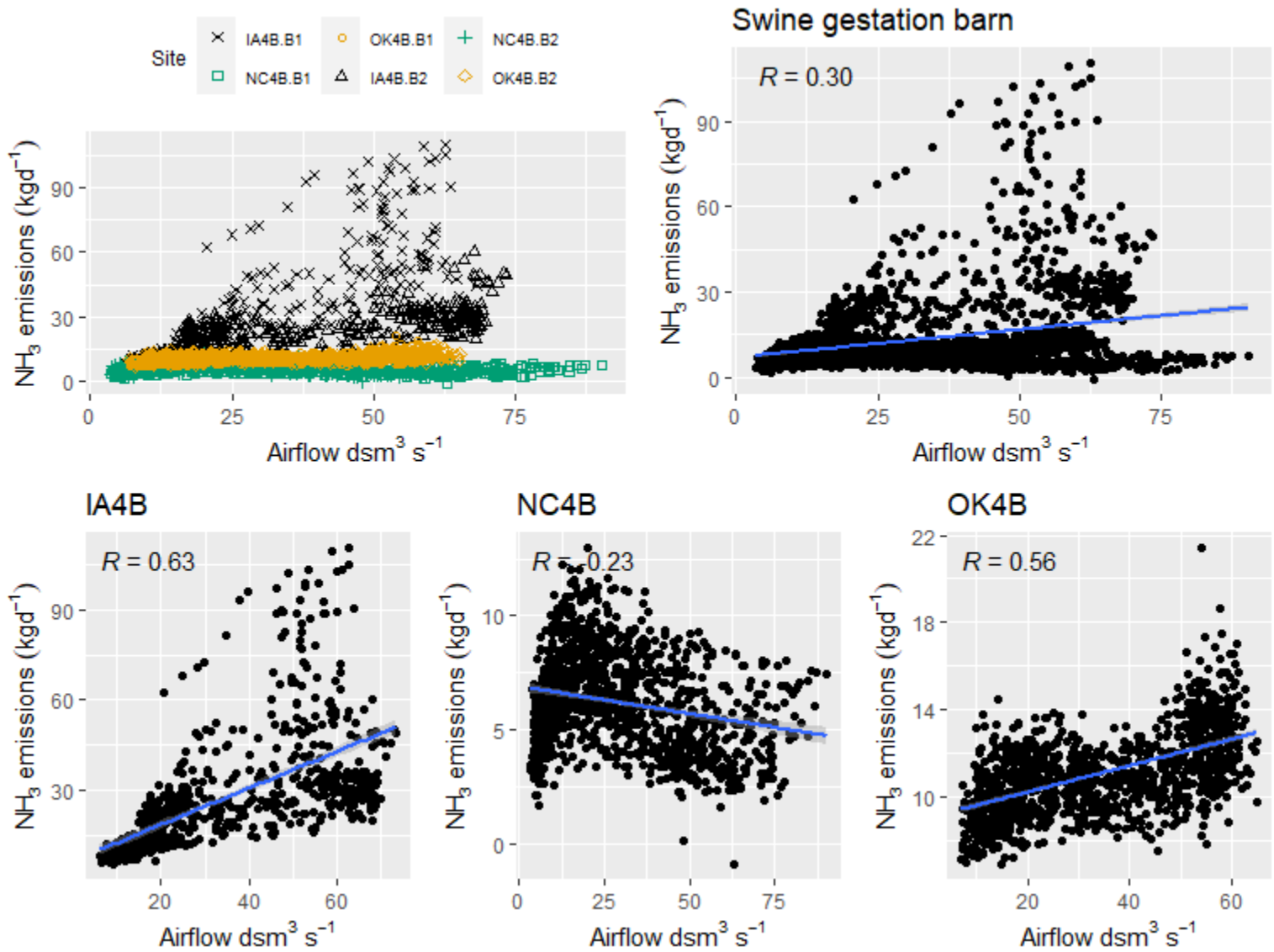


**Figure F.2-11. Scatter plot of swine gestation barn $NH_3$ emissions (kg $d^{-1}$) versus airflow.**

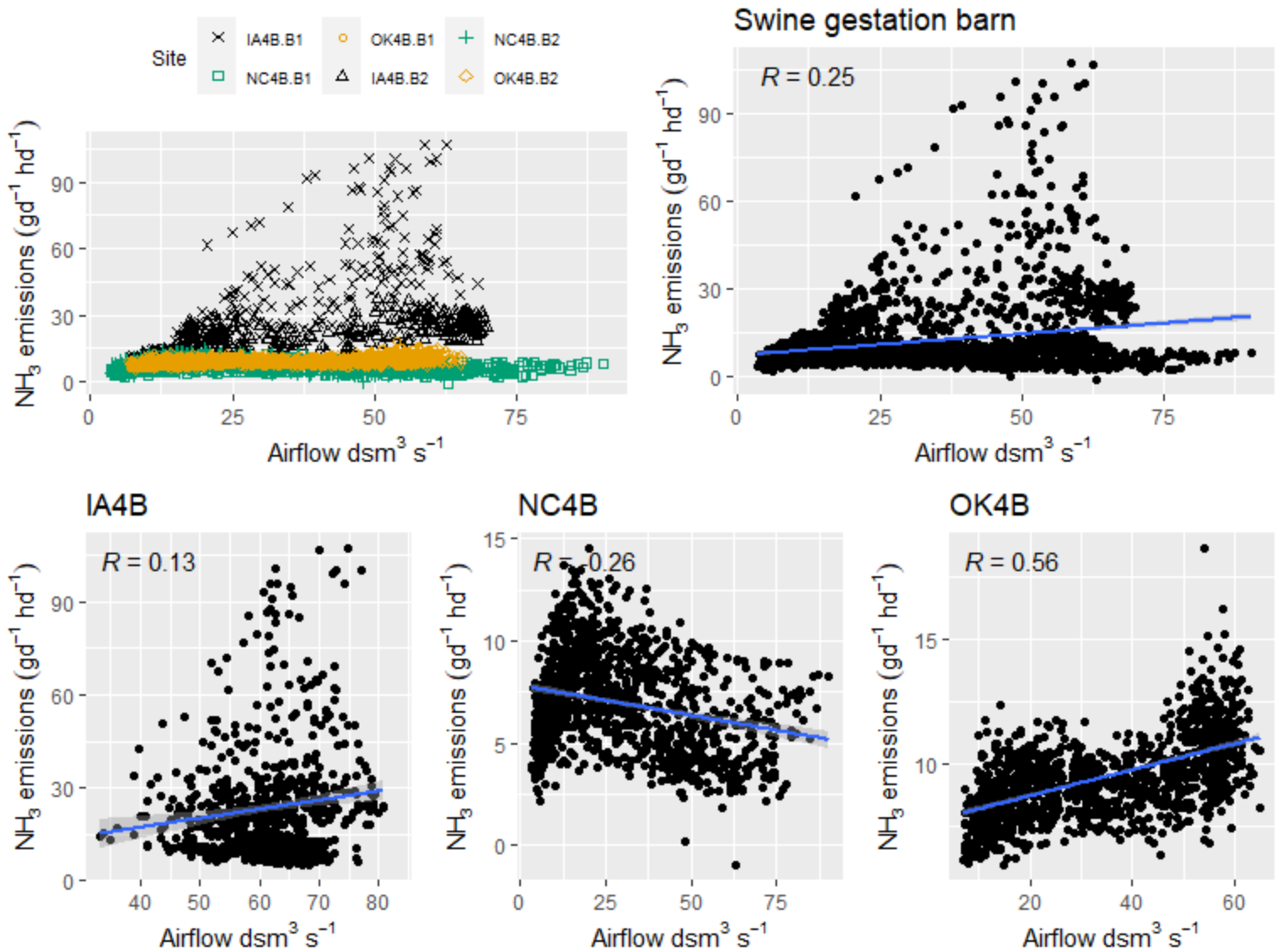


**Figure F.2-12. Scatter plot of swine gestation barn $NH_3$ emissions (g $d^{-1}hd^{-1}$) versus airflow.**

### *F.2.1.2 Hydrogen Sulfide ($H_2S$)*

F.2.1.2.1 Inventory

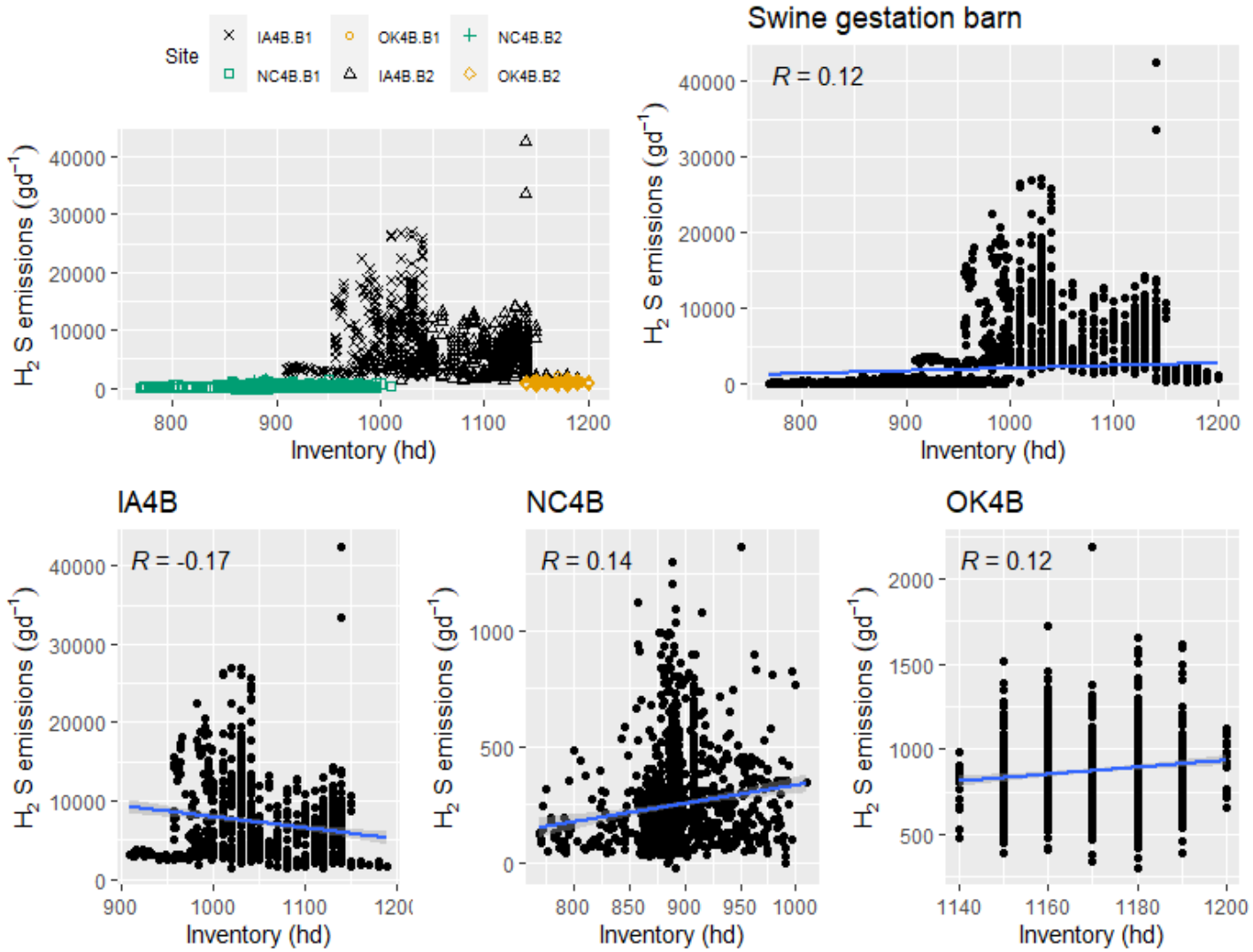


**Figure F.2-13. Scatter plot of swine gestation barn $H_2S$ emissions (g $d^{-1}$) versus Inventory.**

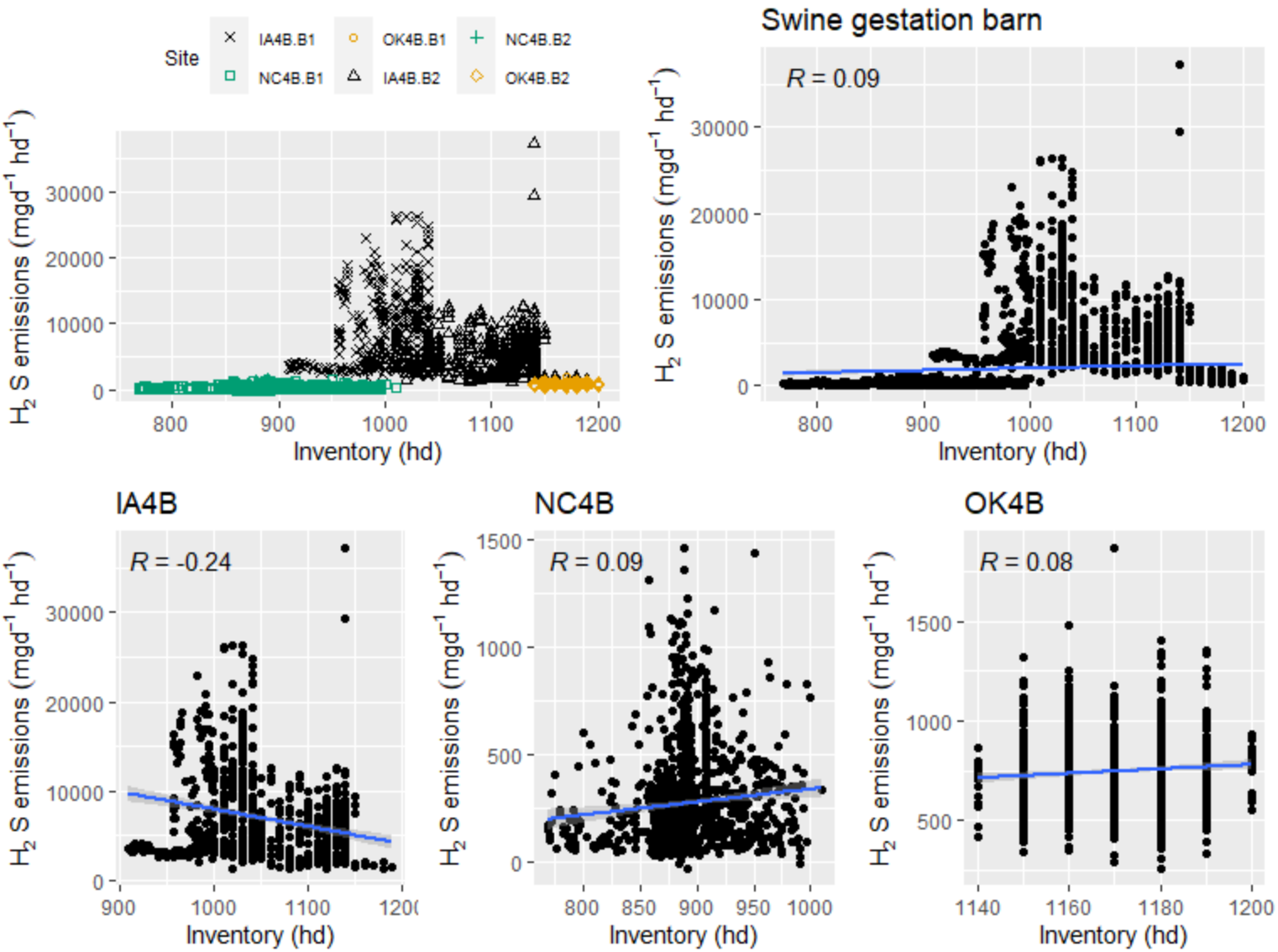


**Figure F.2-14. Scatter plot of swine gestation barn $H_2S$ emissions (mg $d^{-1}hd^{-1}$) versus Inventory.**

F.2.1.2.2 Average animal weight

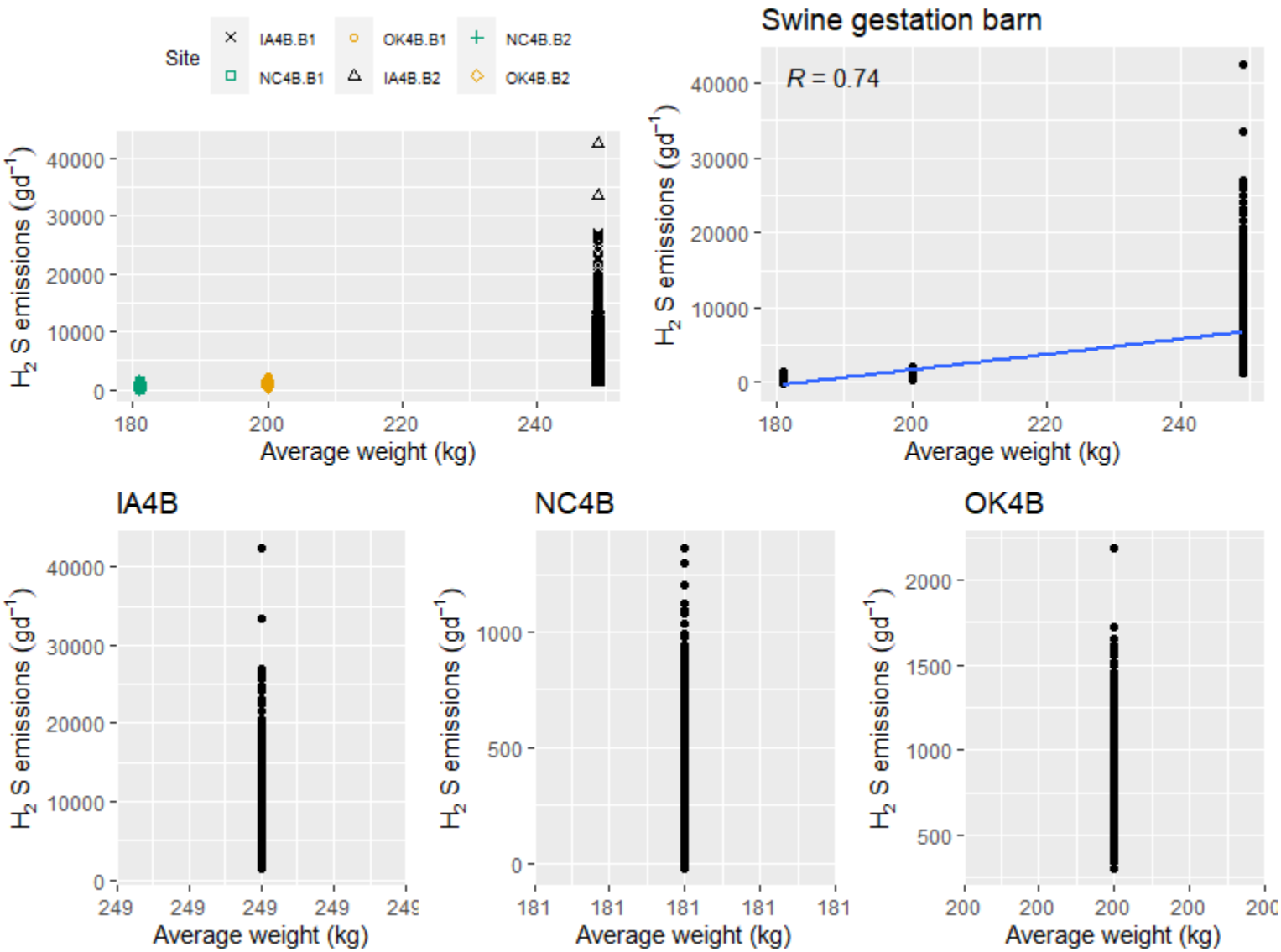


**Figure F.2-15. Scatter plot of swine gestation barn $H_2S$ emissions (g $d^{-1}$) versus average animal weight.**

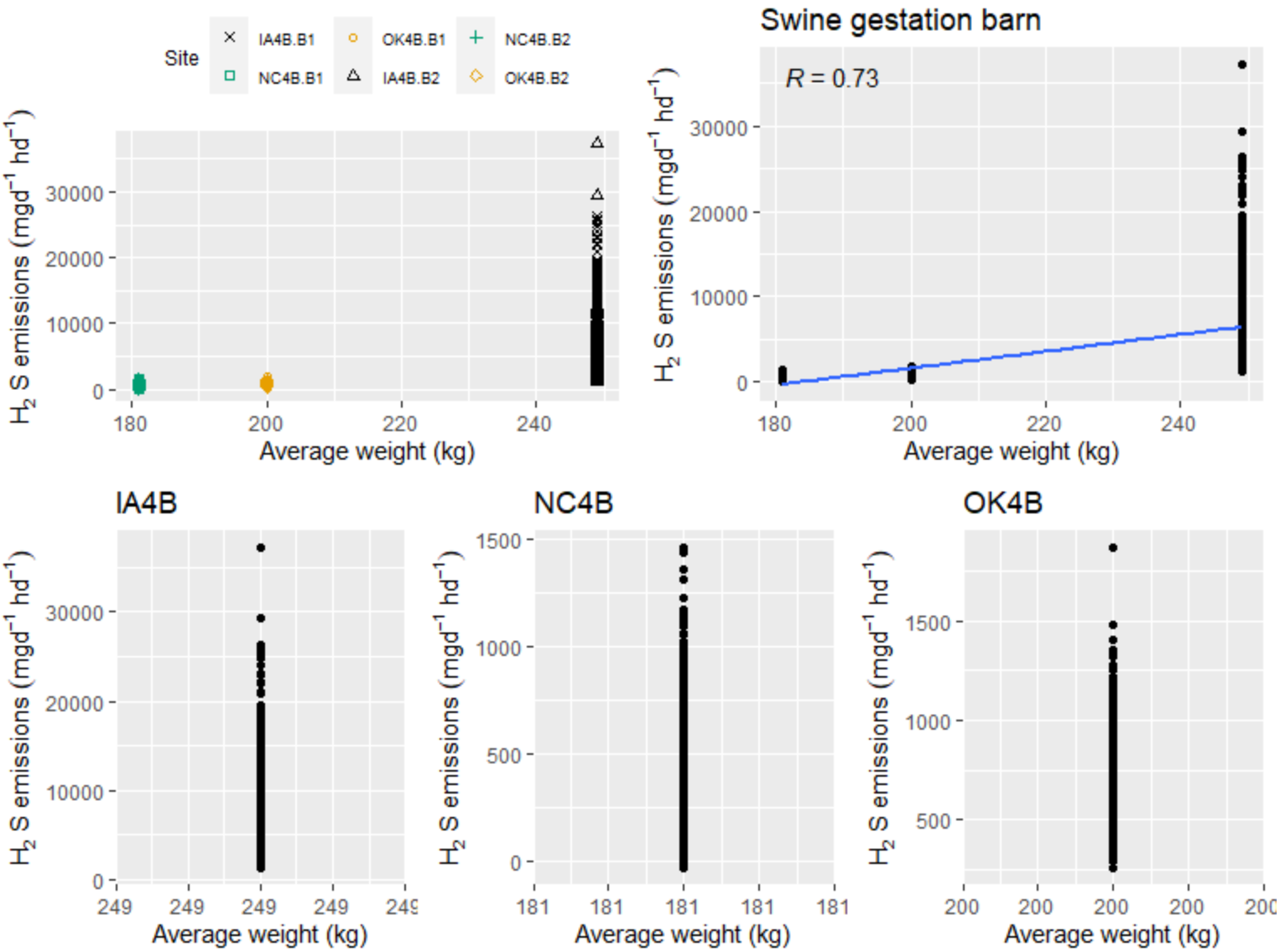


**Figure F.2-16. Scatter plot of swine gestation barn $H_2S$ emissions (mg $d^{-1}hd^{-1}$) versus average animal weight.**

F.2.1.2.3 Live animal weight

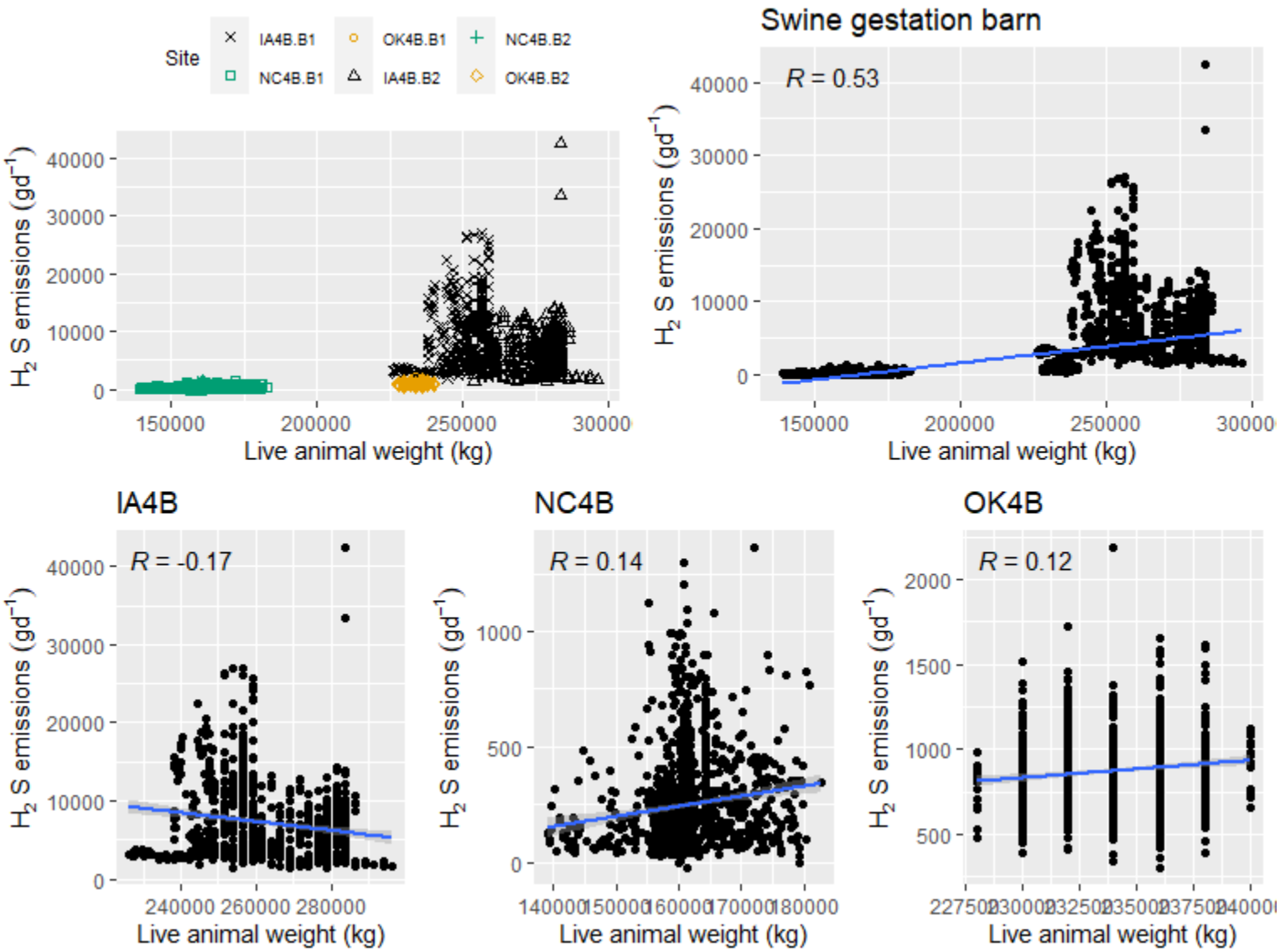


**Figure F.2-17. Scatter plot of swine gestation barn $H_2S$ emissions (g $d^{-1}$)versus live animal weight.**

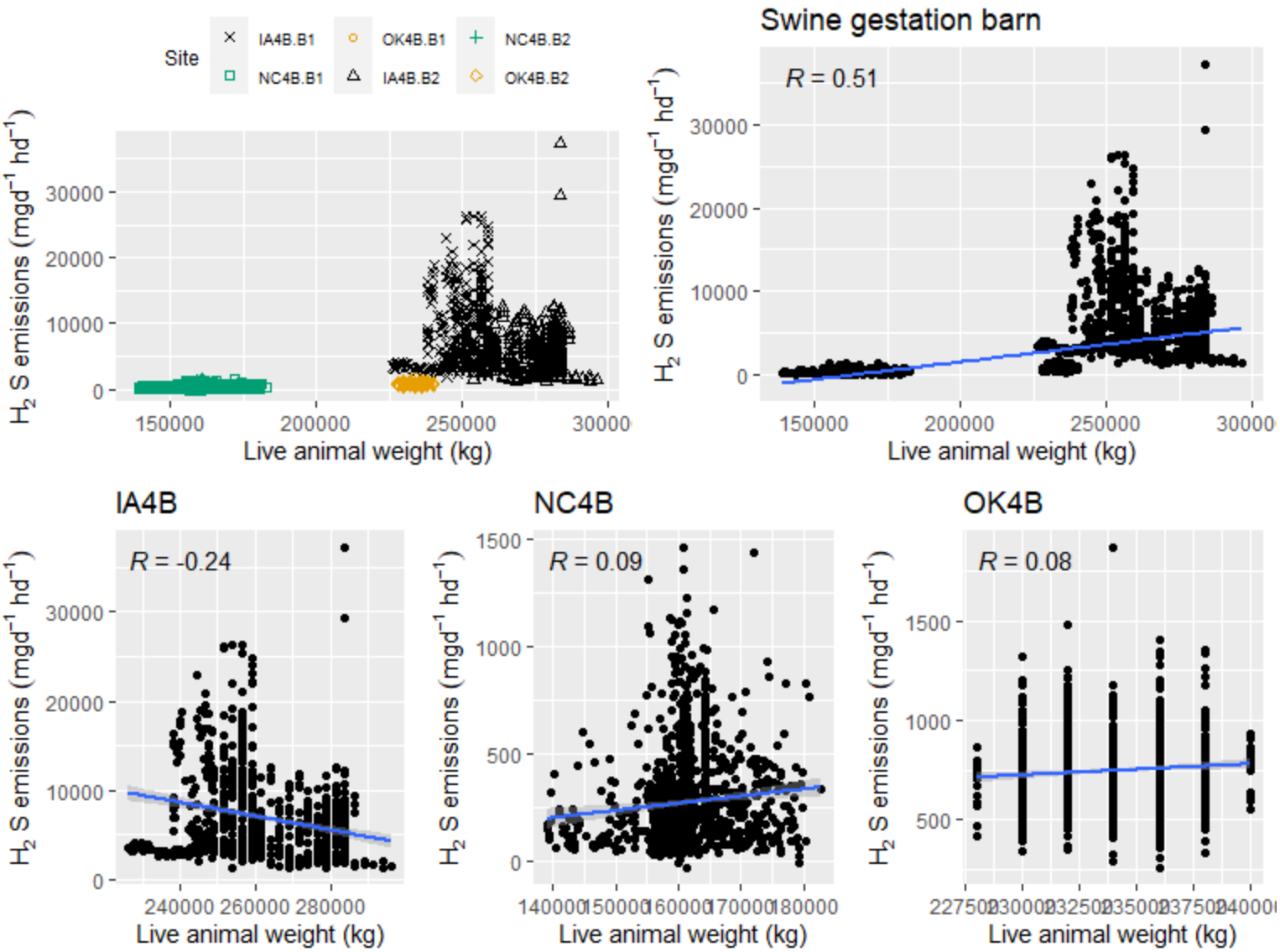


**Figure F.2-18. Scatter plot of swine gestation barn $H_2S$ emissions (mg $d^{-1}hd^{-1}$) versus live animal weight.**

F.2.1.2.4 Exhaust temperature

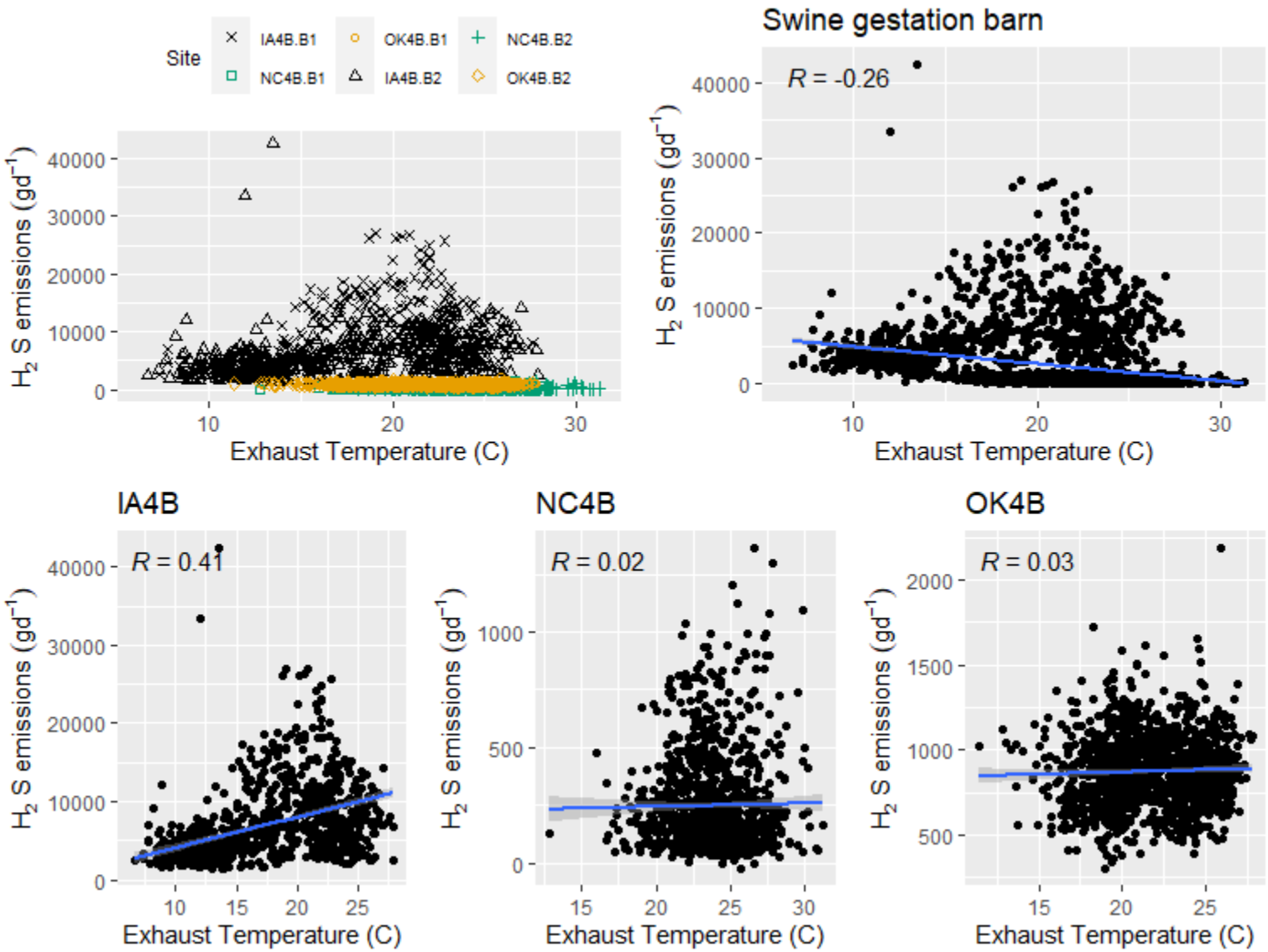


**Figure F.2-19. Scatter plot of swine gestation barn $H_2S$ emissions (g $d^{-1}$) versus exhaust temperature.**

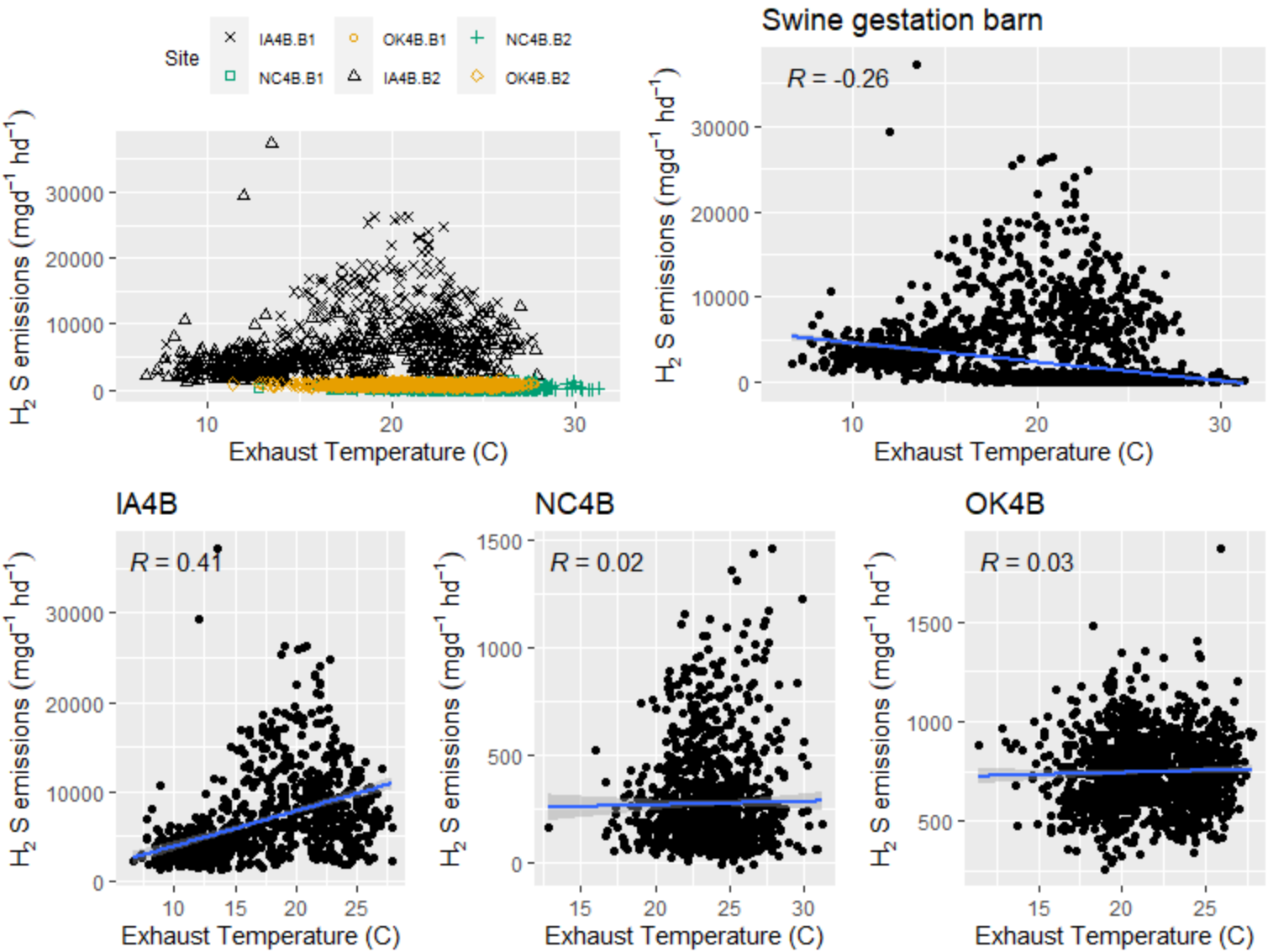


**Figure F.2-20. Scatter plot of swine gestation barn $H_2S$ emissions (mg $d^{-1}hd^{-1}$) versus exhaust temperature.**

F.2.1.2.5 Exhaust relative humidity

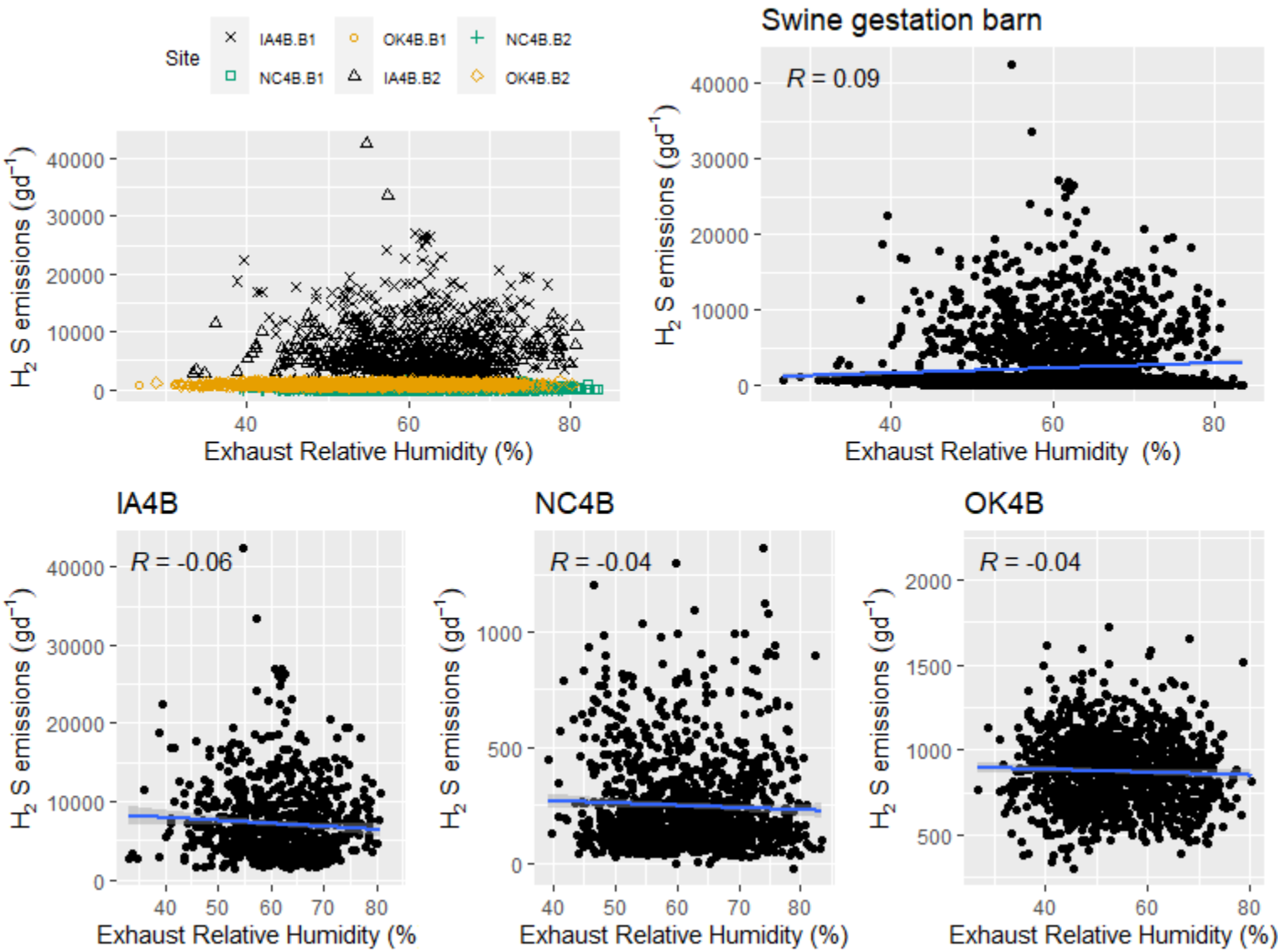


**Figure F.2-21. Scatter plot of swine gestation barn $H_2S$ emissions (g $d^{-1}$) versus exhaust relative humidity.**

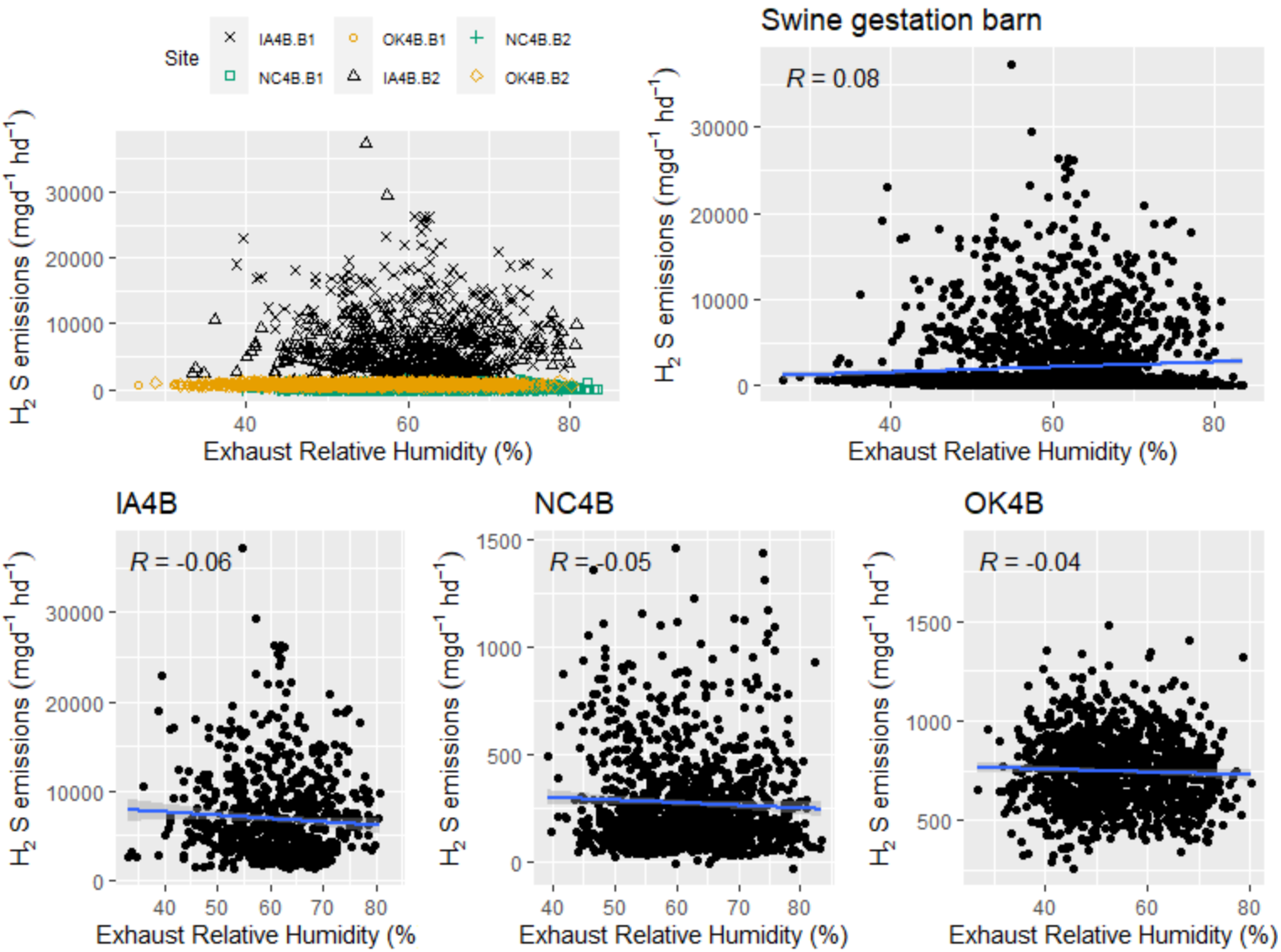


**Figure F.2-22. Scatter plot of swine gestation barn $H_2S$ emissions (mg $d^{-1}hd^{-1}$) versus exhaust relative humidity.**

F.2.1.2.6 Airflow

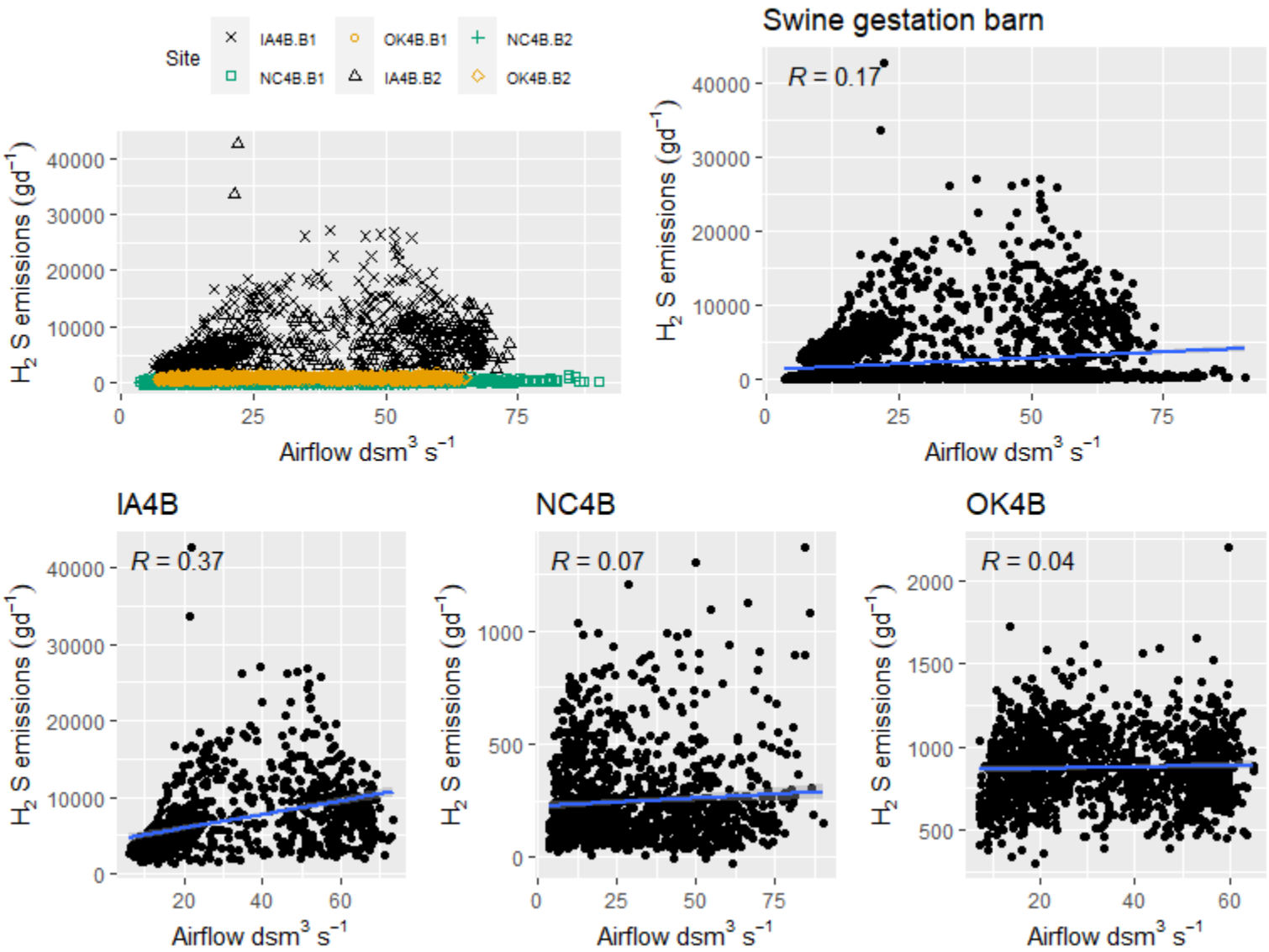


**Figure F.2-23. Scatter plot of swine gestation barn $H_2S$ emissions (g $d^{-1}$) versus airflow.**

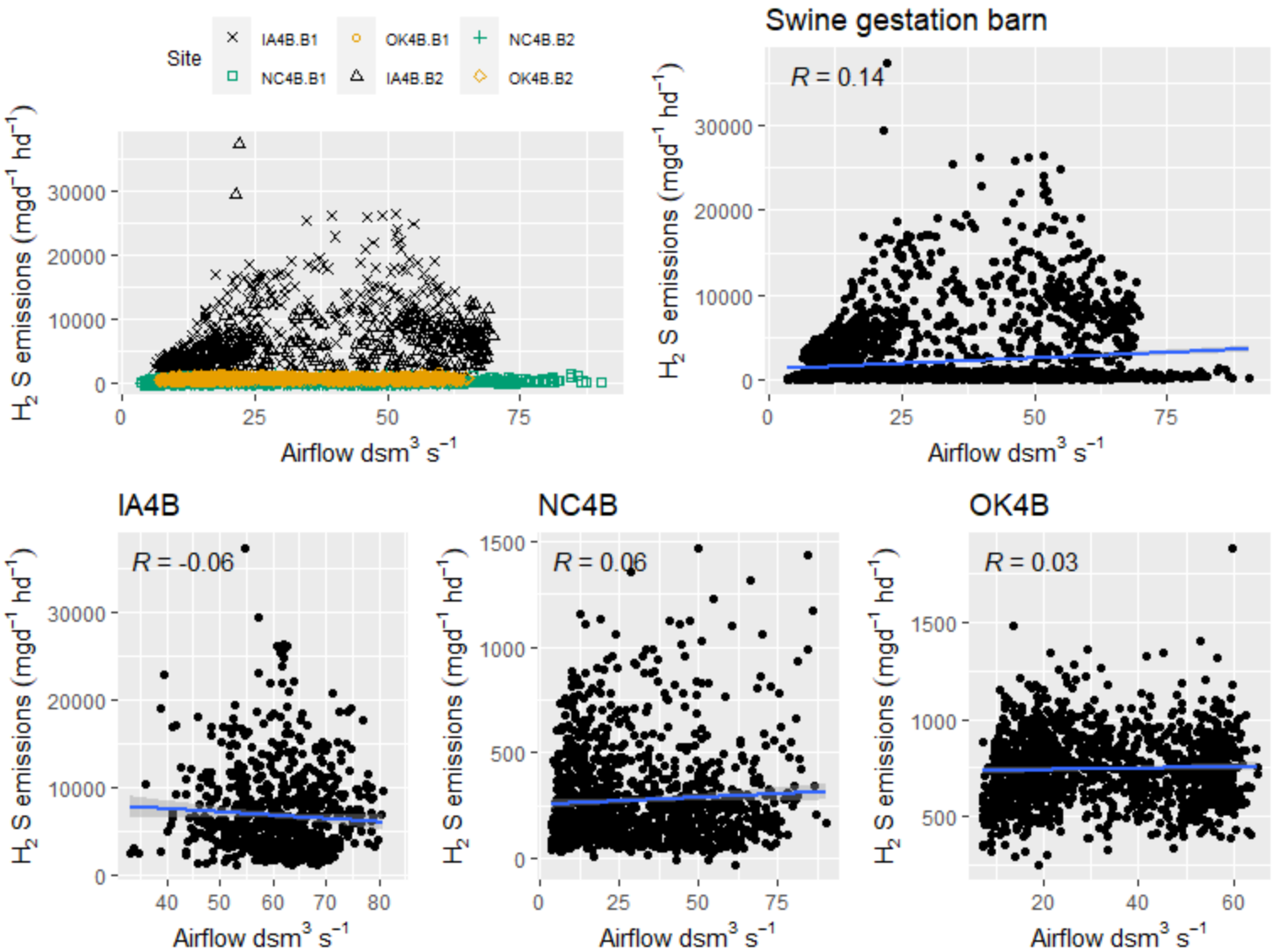


**Figure F.2-24. Scatter plot of swine gestation barn $H_2S$ emissions (mg $d^{-1}hd^{-1}$) versus airflow.**

### *F.2.1.3 Particulate Matter ($PM_{10}$)*

F.2.1.3.1 Inventory

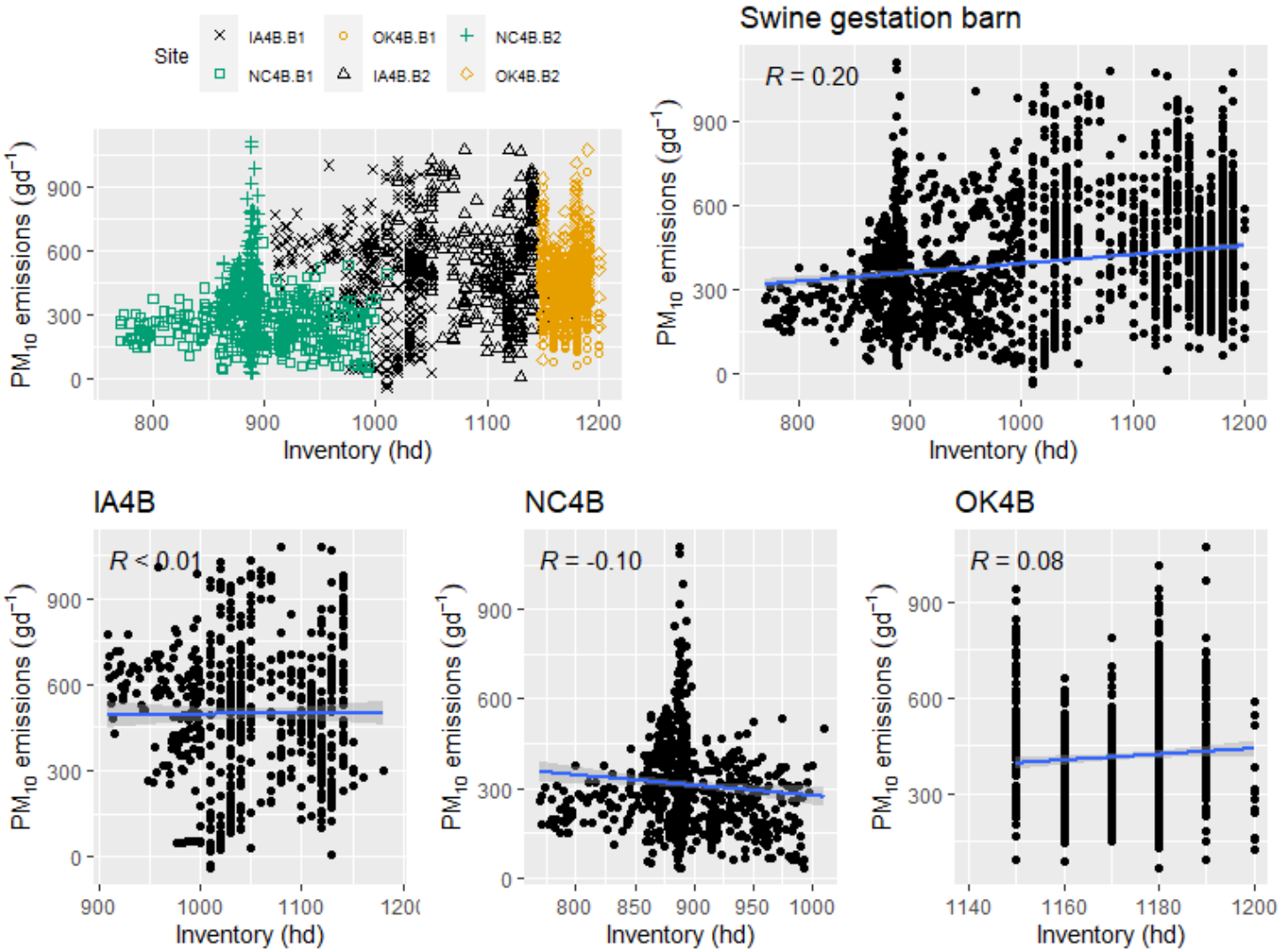


**Figure F.2-25. Scatter plot of swine gestation barn $PM_{10}$ emissions (g $d^{-1}$) versus Inventory.**

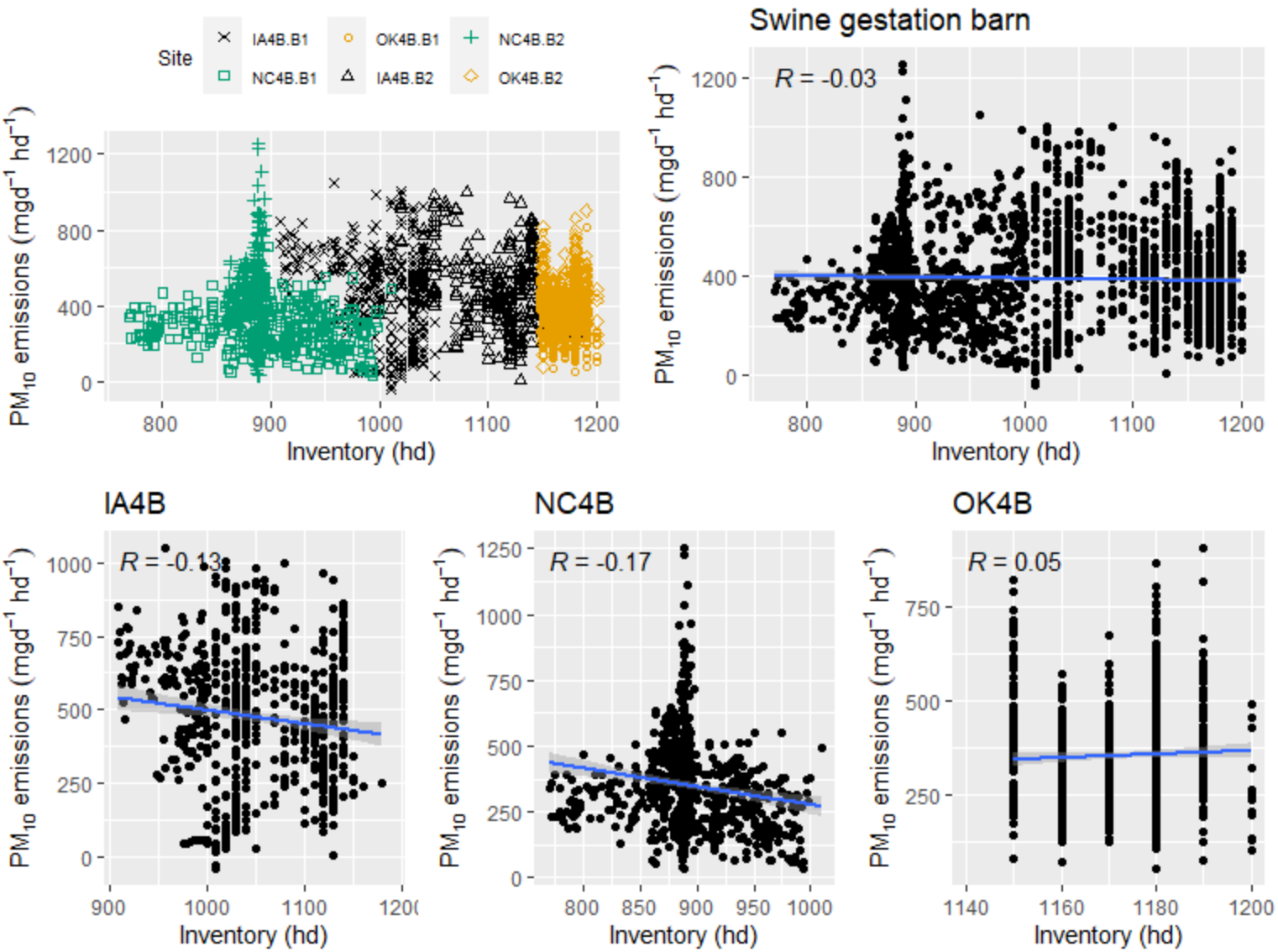


**Figure F.2-26. Scatter plot of swine gestation barn $PM_{10}$ emissions (mg $d^{-1}hd^{-1}$) versus Inventory.**

F.2.1.3.2 Average animal weight

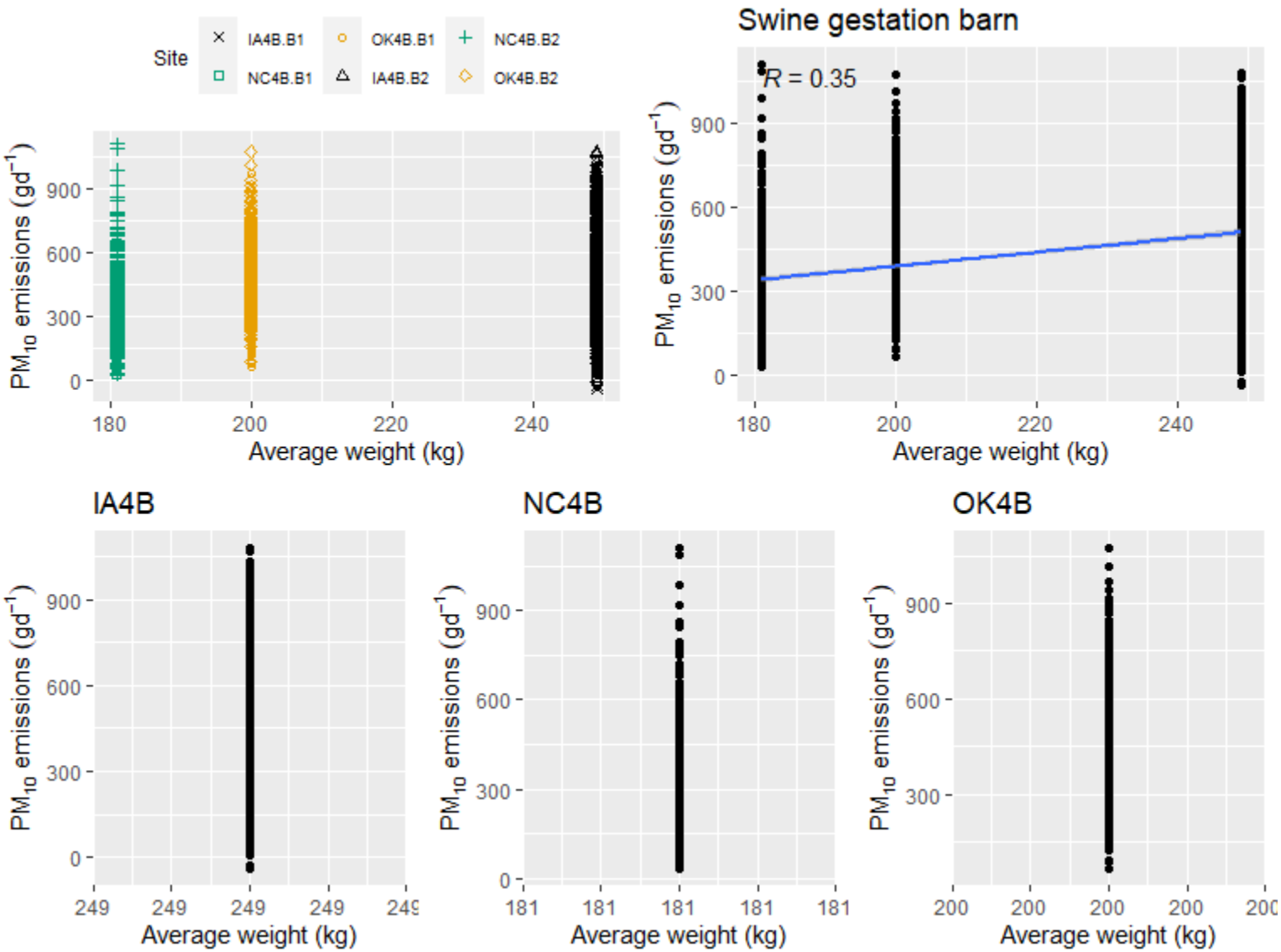


**Figure F.2-27. Scatter plot of swine gestation barn $PM_{10}$ emissions (g $d^{-1}$) versus average animal weight.**

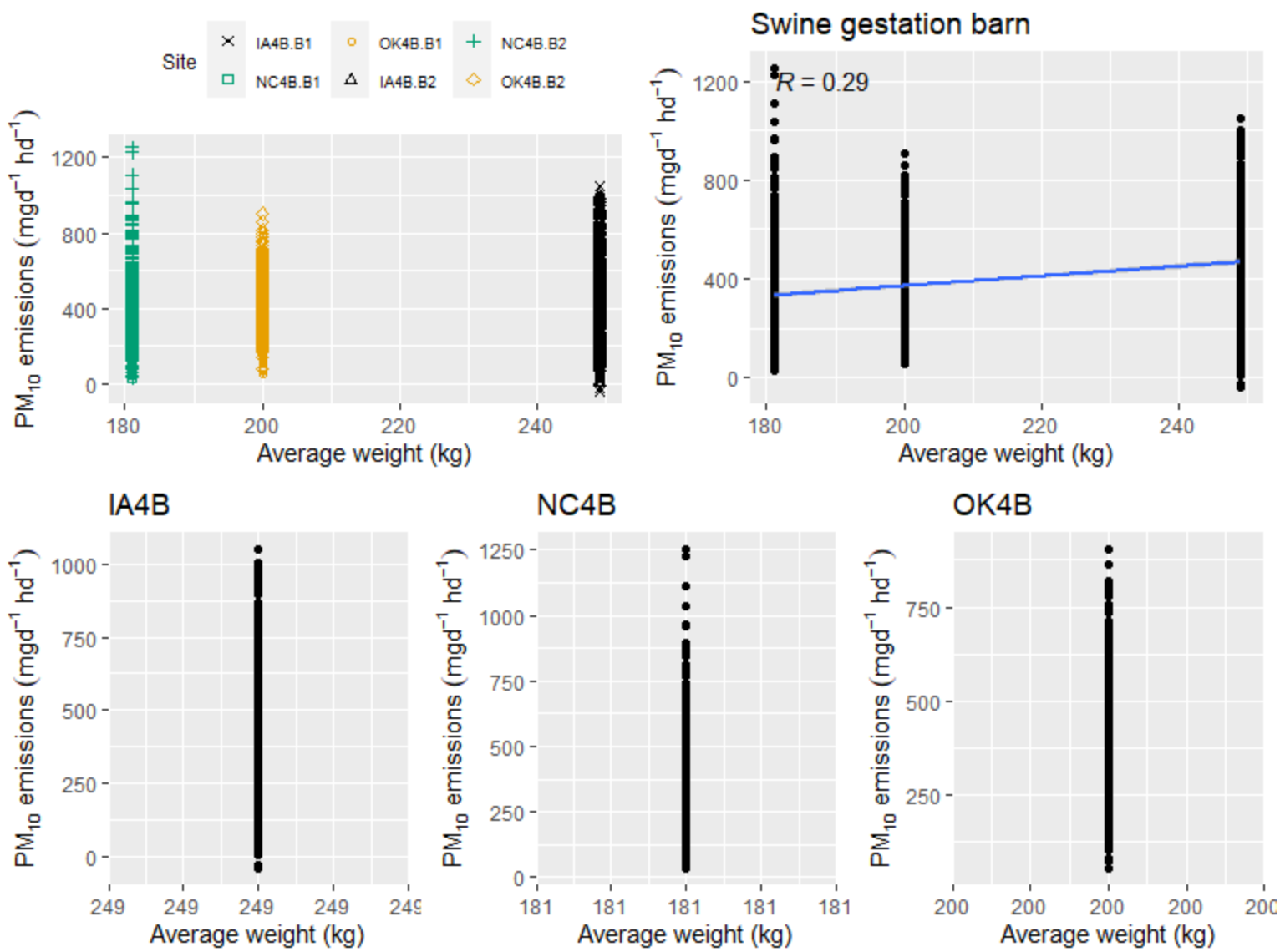


**Figure F.2-28. Scatter plot of swine gestation barn $PM_{10}$ emissions (mg $d^{-1}hd^{-1}$) versus average animal weight.**

F.2.1.3.3 Live animal weight

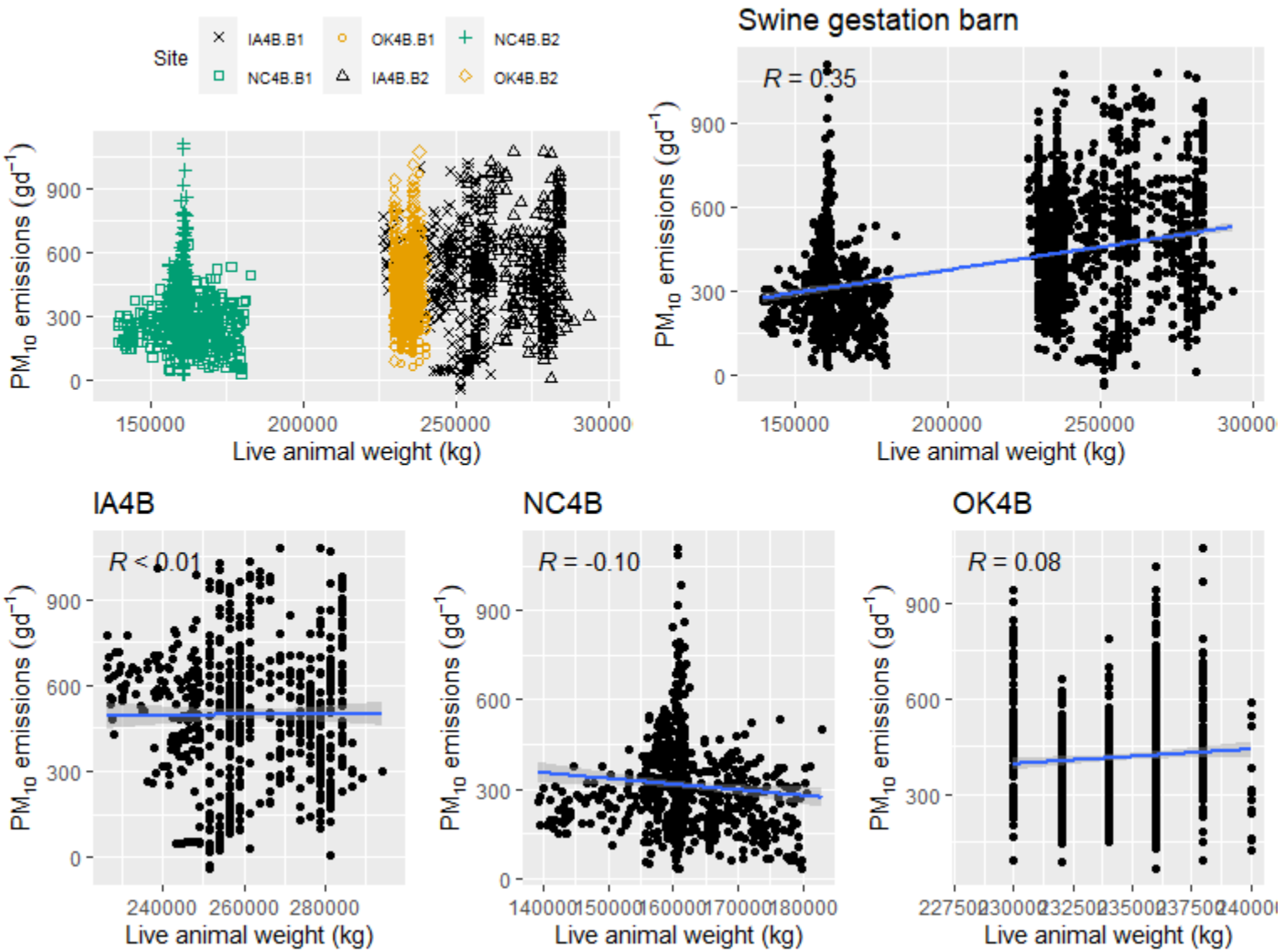


**Figure F.2-29. Scatter plot of swine gestation barn $PM_{10}$ emissions (g $d^{-1}$)versus live animal weight.**

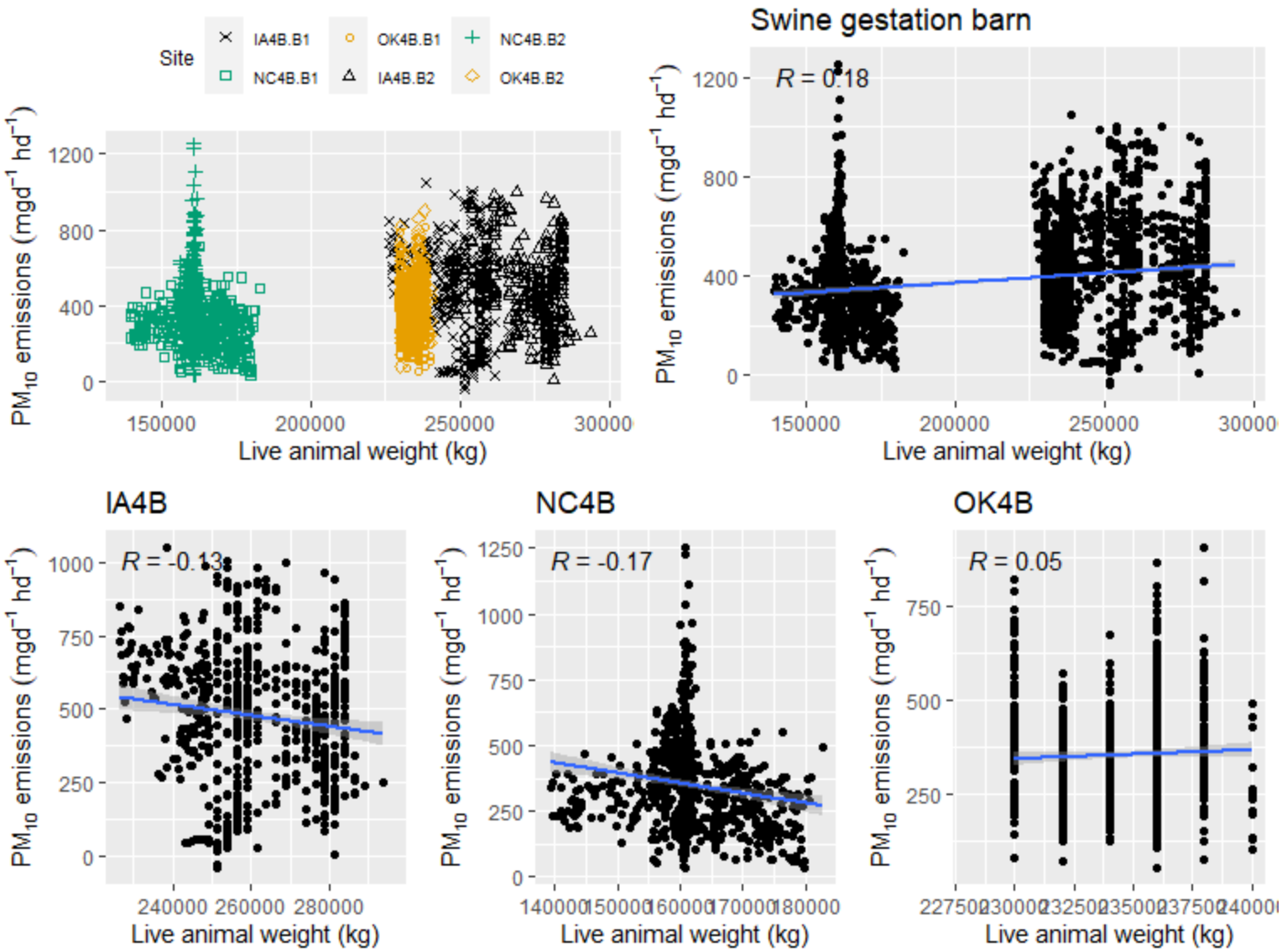


**Figure F.2-30. Scatter plot of swine gestation barn $PM_{10}$ emissions (mg $d^{-1}hd^{-1}$) versus live animal weight.**

F.2.1.3.4 Exhaust temperature

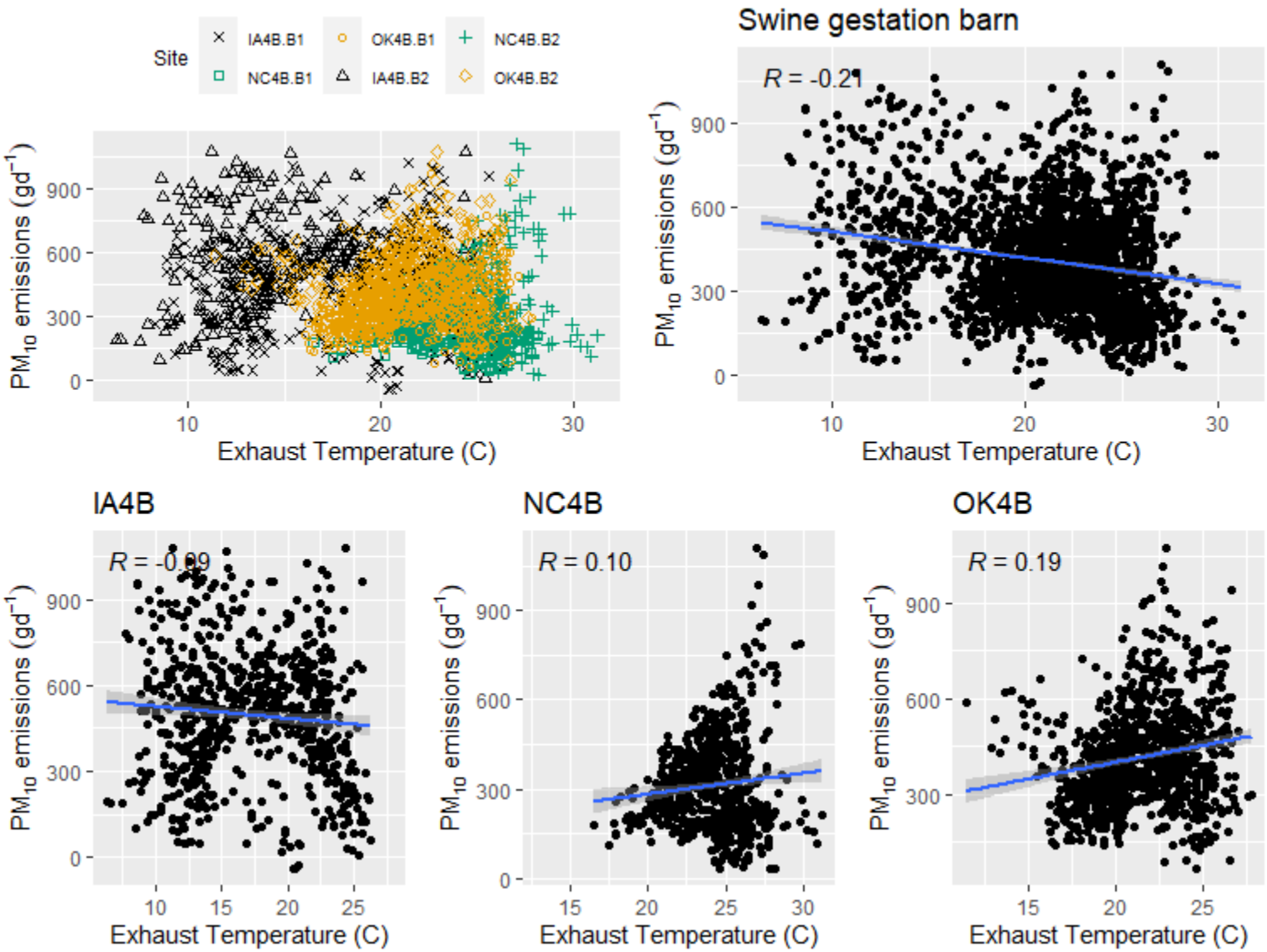


**Figure F.2-31. Scatter plot of swine gestation barn $PM_{10}$ emissions (g $d^{-1}$) versus exhaust temperature.**

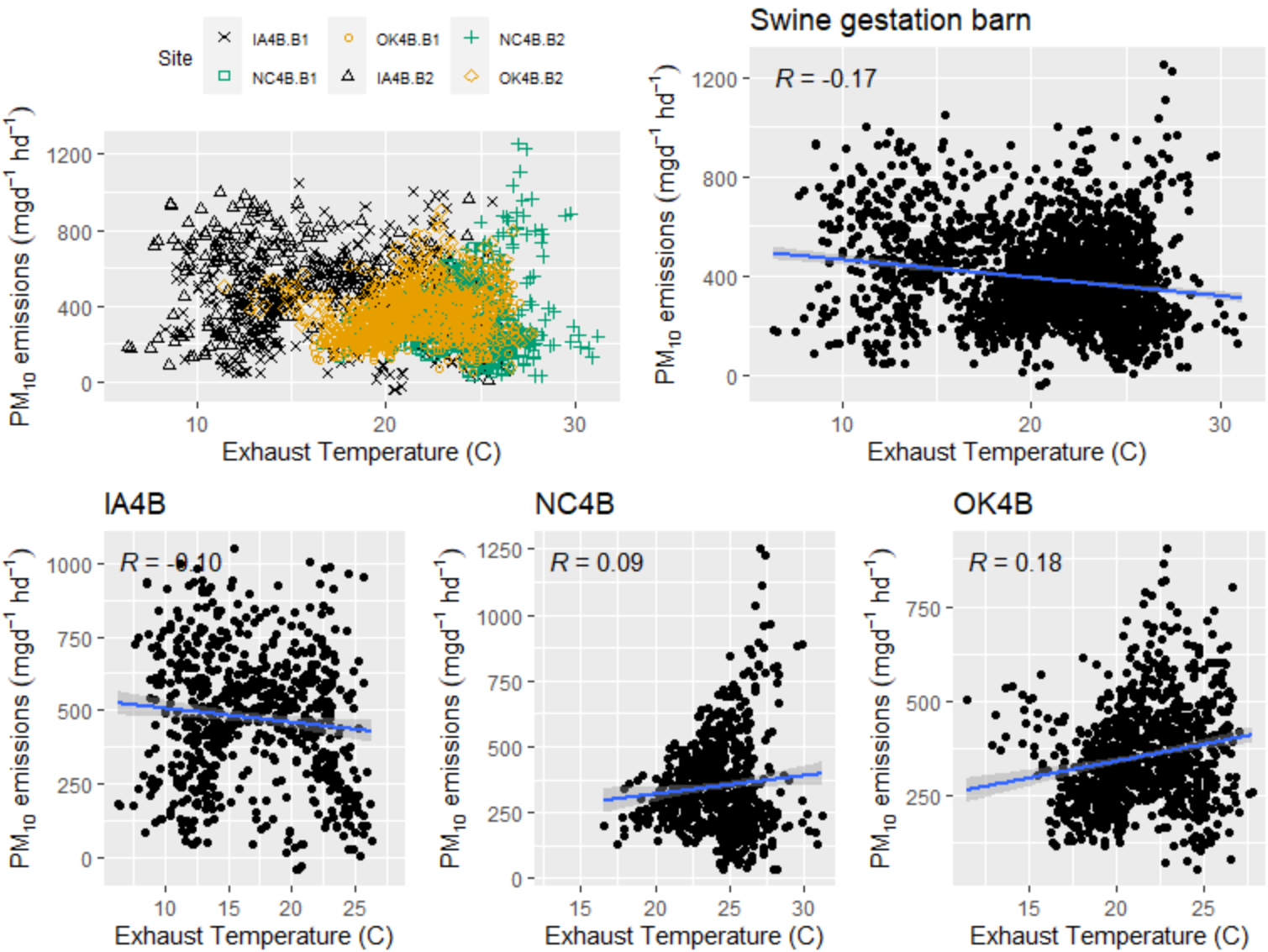


**Figure F.2-32. Scatter plot of swine gestation barn $PM_{10}$ emissions (mg $d^{-1}hd^{-1}$) versus exhaust temperature.**

F.2.1.3.5 Exhaust relative humidity

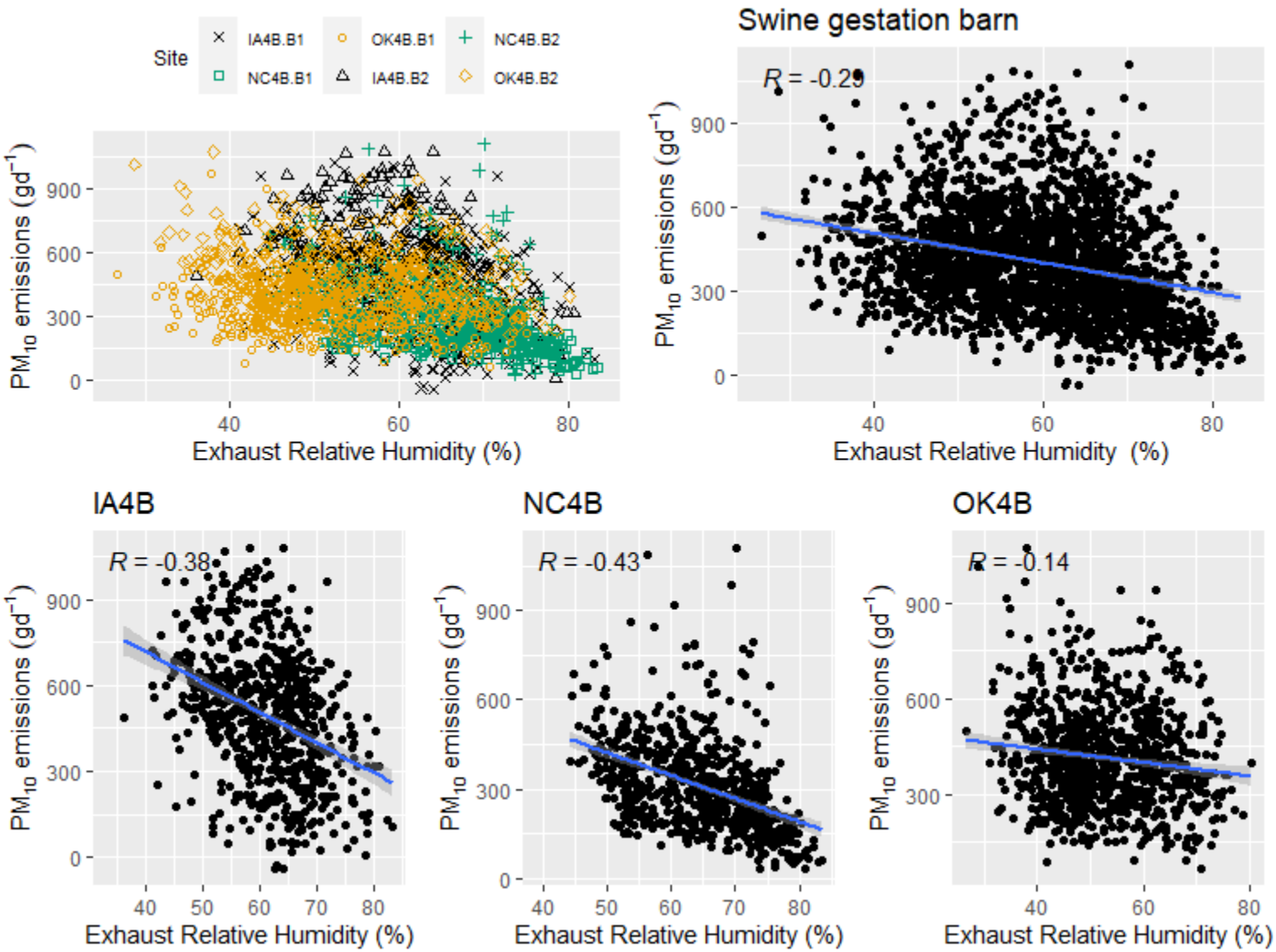


**Figure F.2-33. Scatter plot of swine gestation barn $PM_{10}$ emissions (g $d^{-1}$) versus exhaust relative humidity.**

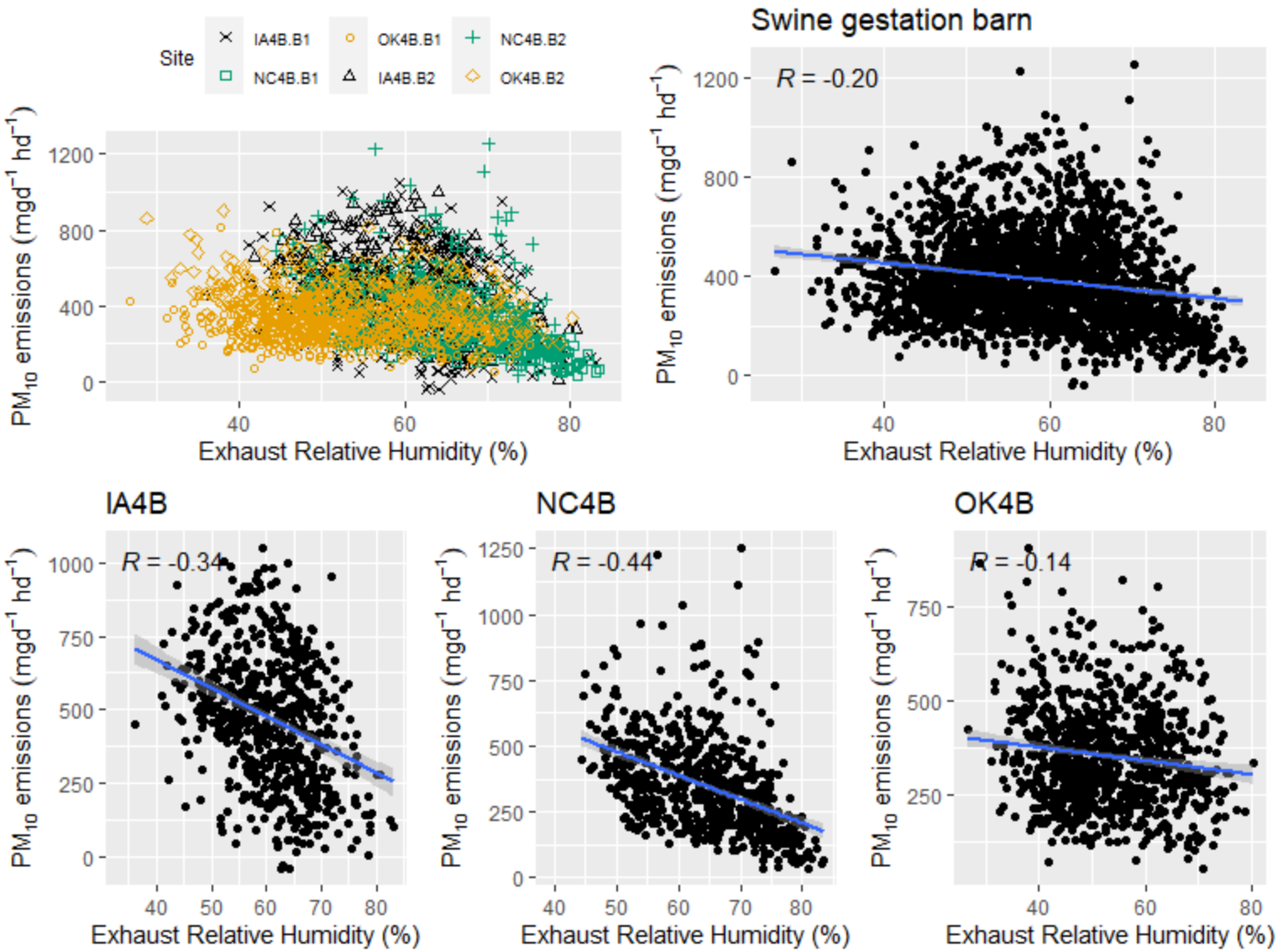


**Figure F.2-34. Scatter plot of swine gestation barn $PM_{10}$ emissions (mg $d^{-1}hd^{-1}$) versus exhaust relative humidity.**

F.2.1.3.6 Airflow

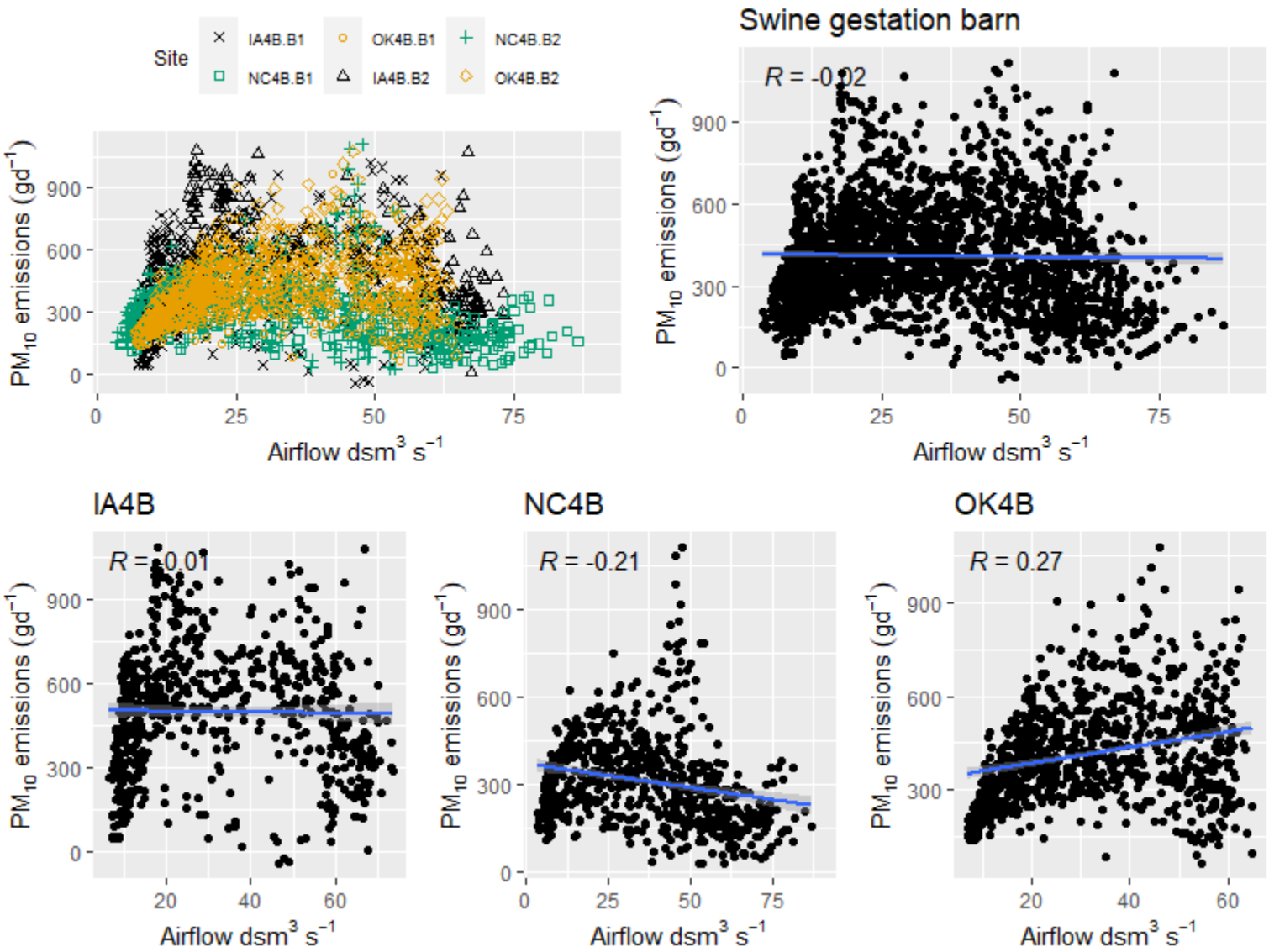


**Figure F.2-35. Scatter plot of swine gestation barn $PM_{10}$ emissions (g $d^{-1}$) versus airflow.**

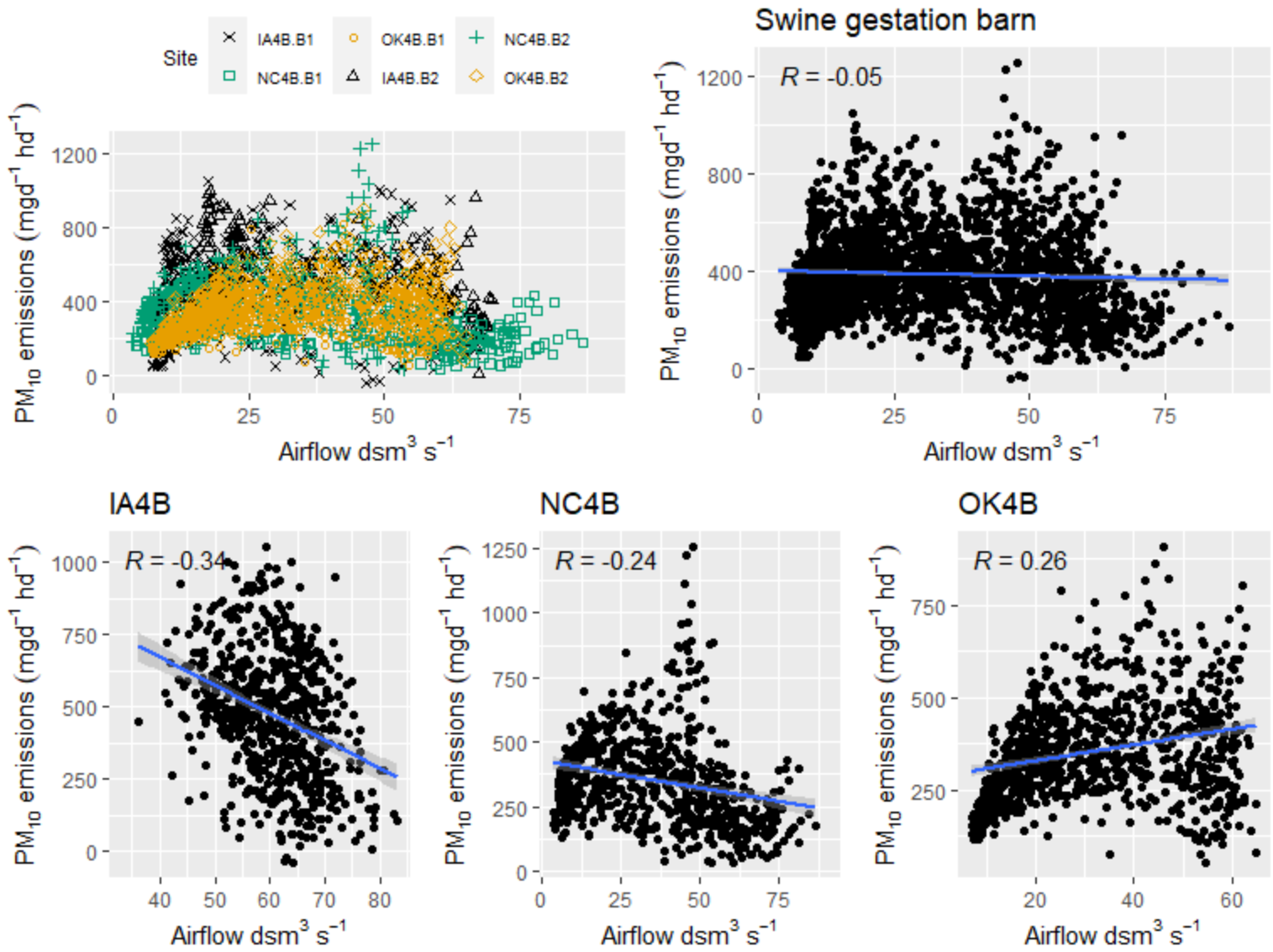


**Figure F.2-36. Scatter plot of swine gestation barn $PM_{10}$ emissions (mg $d^{-1}hd^{-1}$) versus airflow.**

### *F.2.1.4 Fine Particulate Matter ($PM_{2.5}$)*

F.2.1.4.1 Inventory

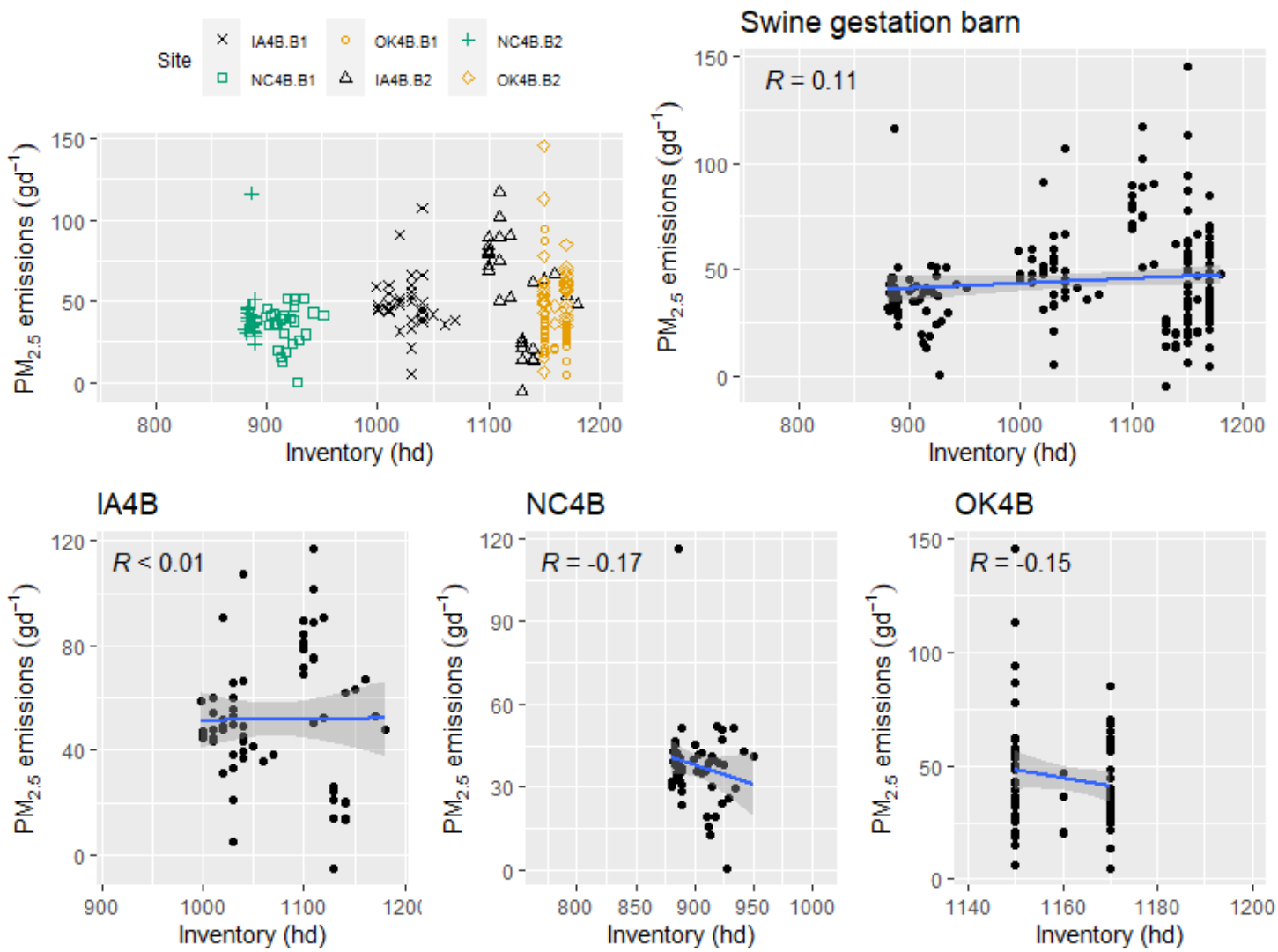


**Figure F.2-37. Scatter plot of swine gestation barn $PM_{2.5}$ emissions (g $d^{-1}$) versus Inventory.**

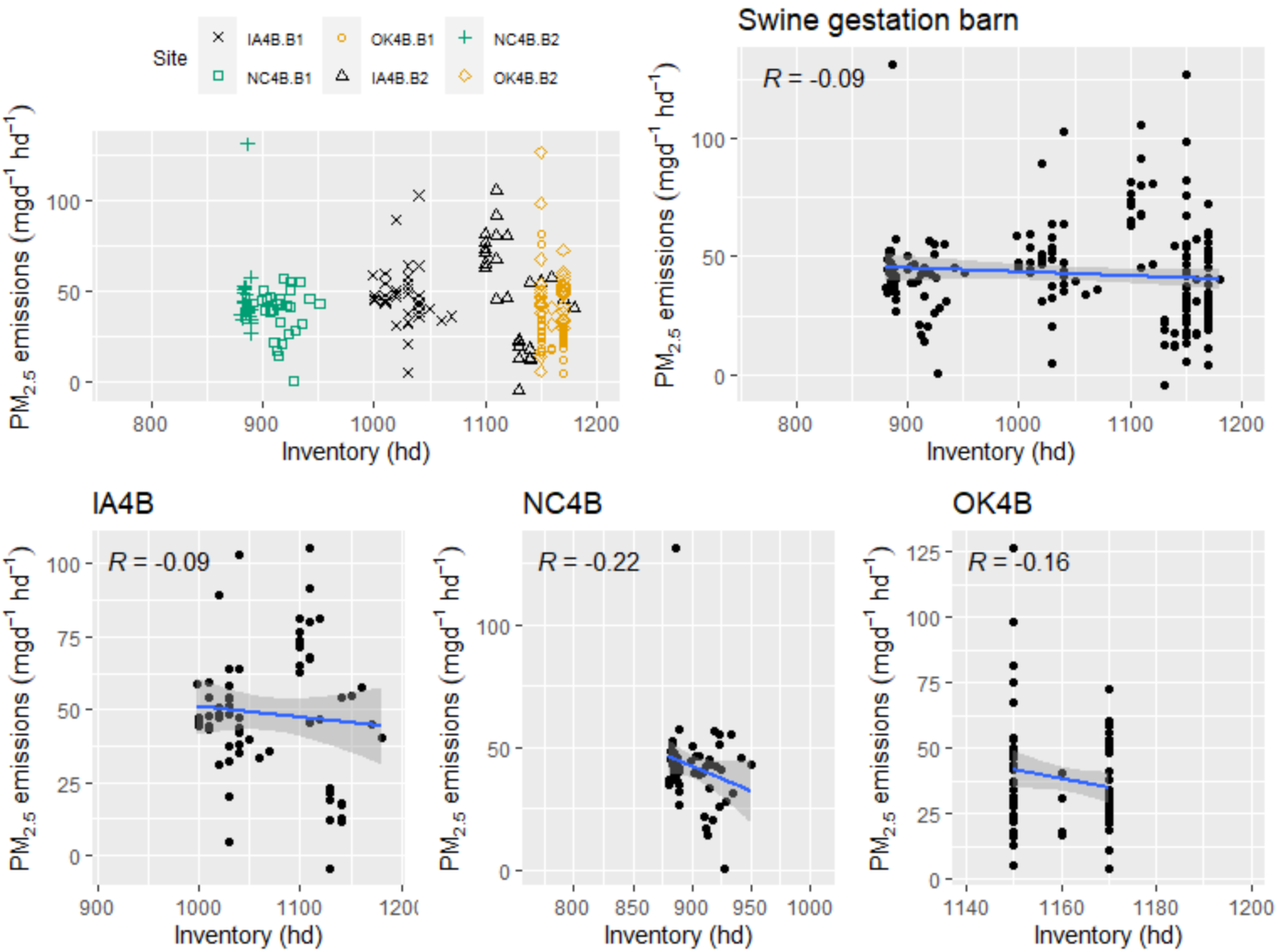


**Figure F.2-38. Scatter plot of swine gestation barn $PM_{2.5}$ emissions (mg $d^{-1}hd^{-1}$) versus Inventory.**

F.2.1.4.2 Average animal weight

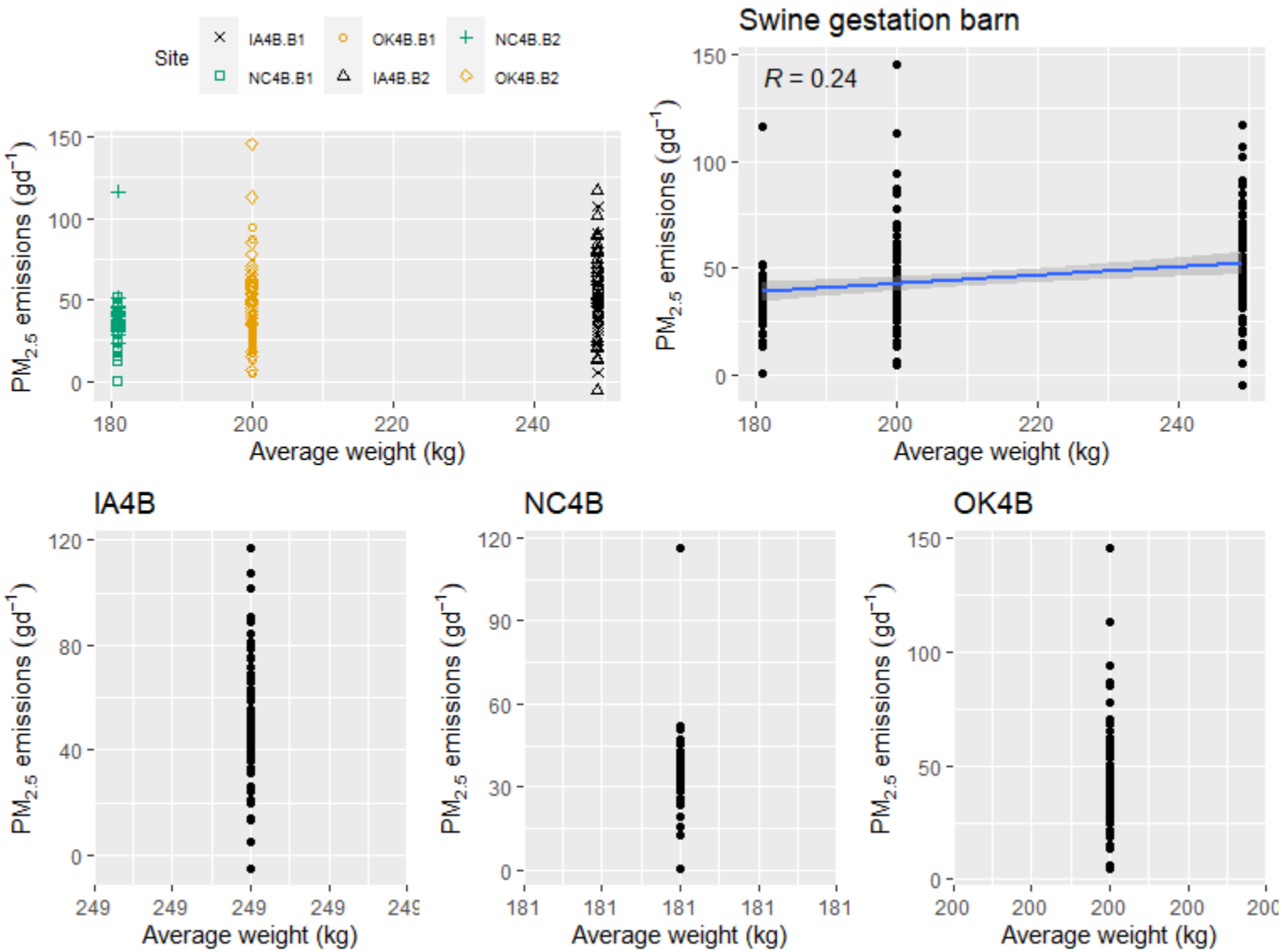


**Figure F.2-39. Scatter plot of swine gestation barn $PM_{2.5}$ emissions (g $d^{-1}$) versus average animal weight.**

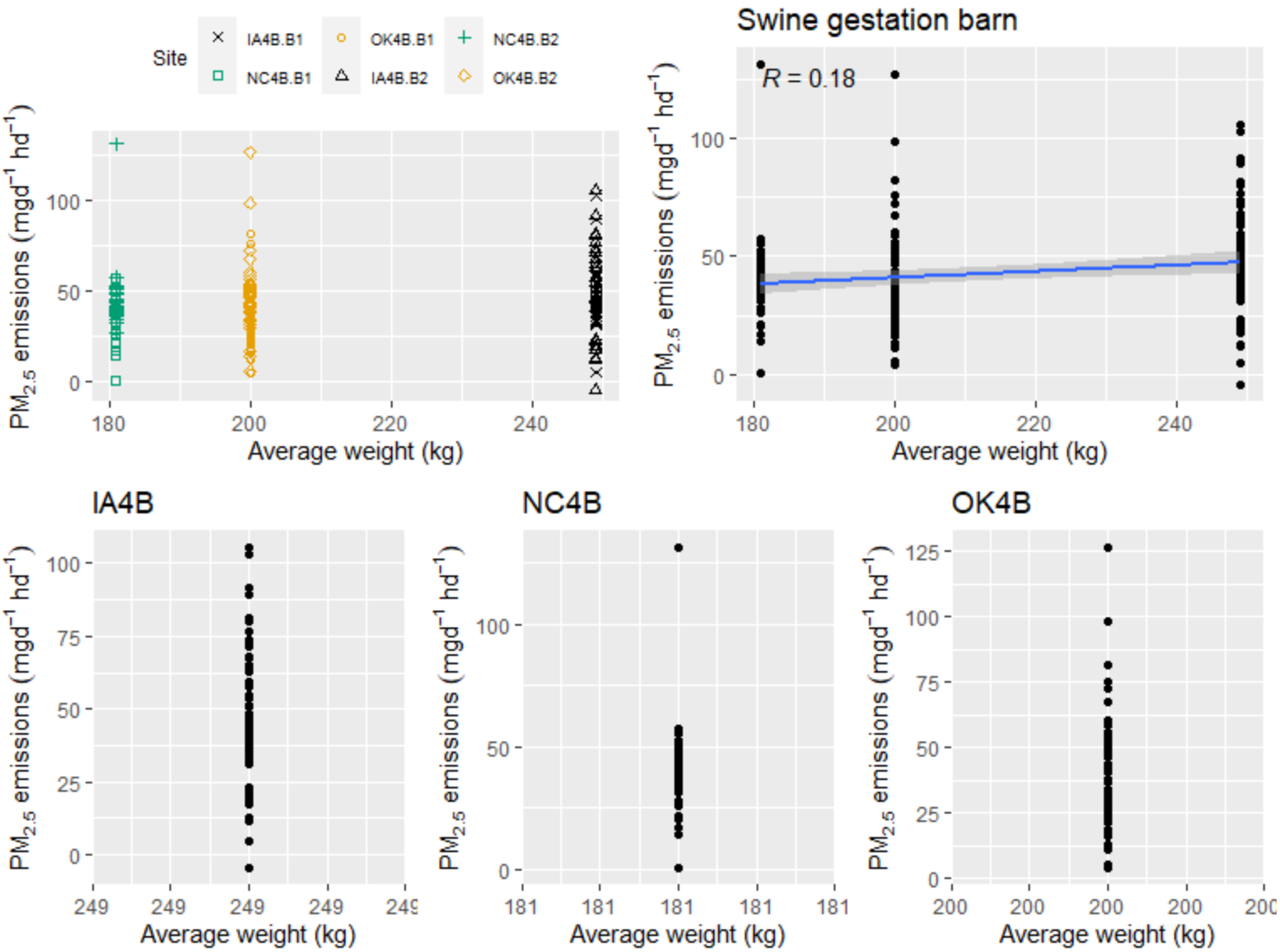


**Figure F.2-40. Scatter plot of swine gestation barn $PM_{2.5}$ emissions (mg $d^{-1}hd^{-1}$) versus average animal weight.**

F.2.1.4.3 Live animal weight

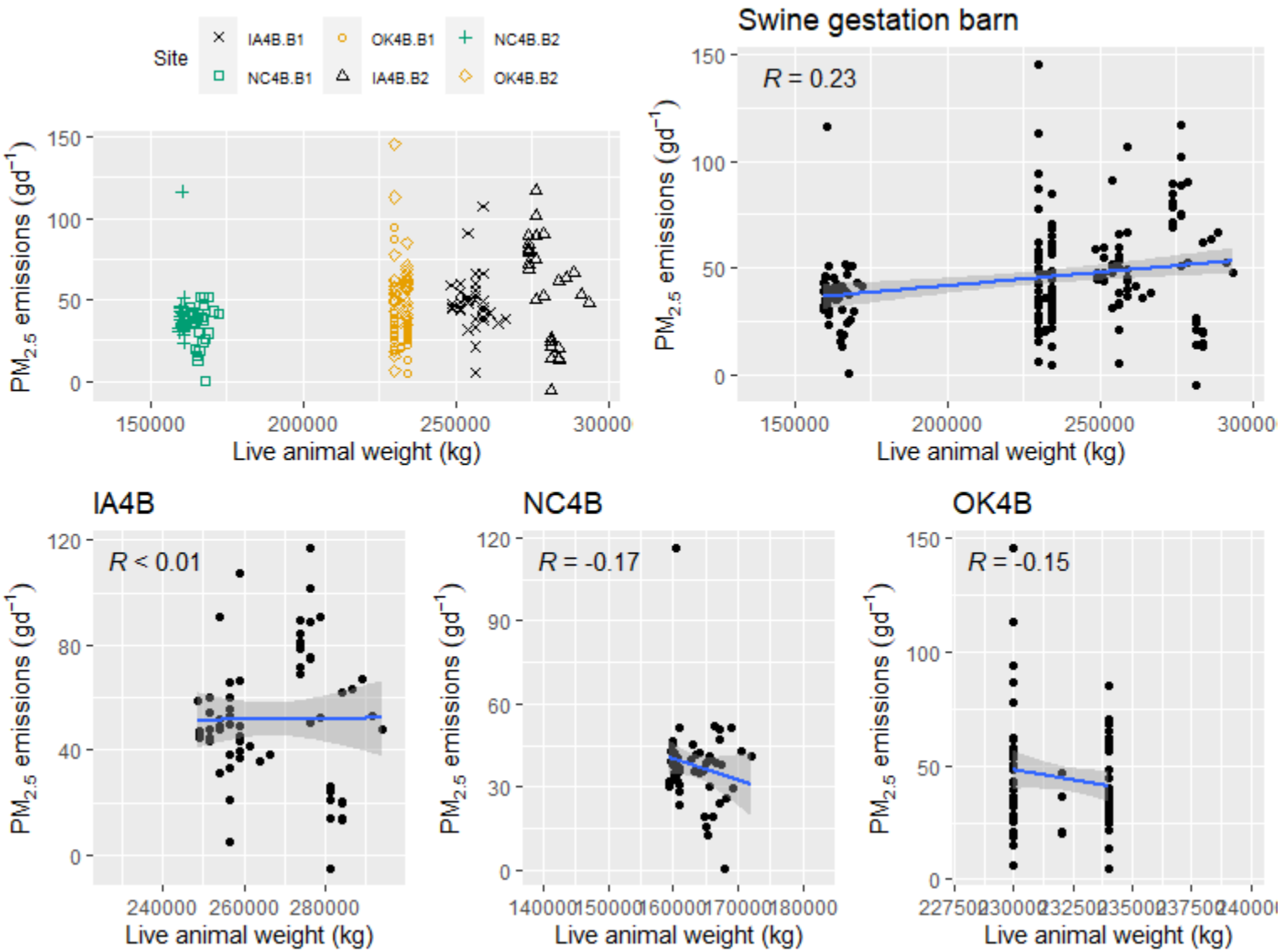


**Figure F.2-41. Scatter plot of swine gestation barn $PM_{2.5}$ emissions (g $d^{-1}$)versus live animal weight.**

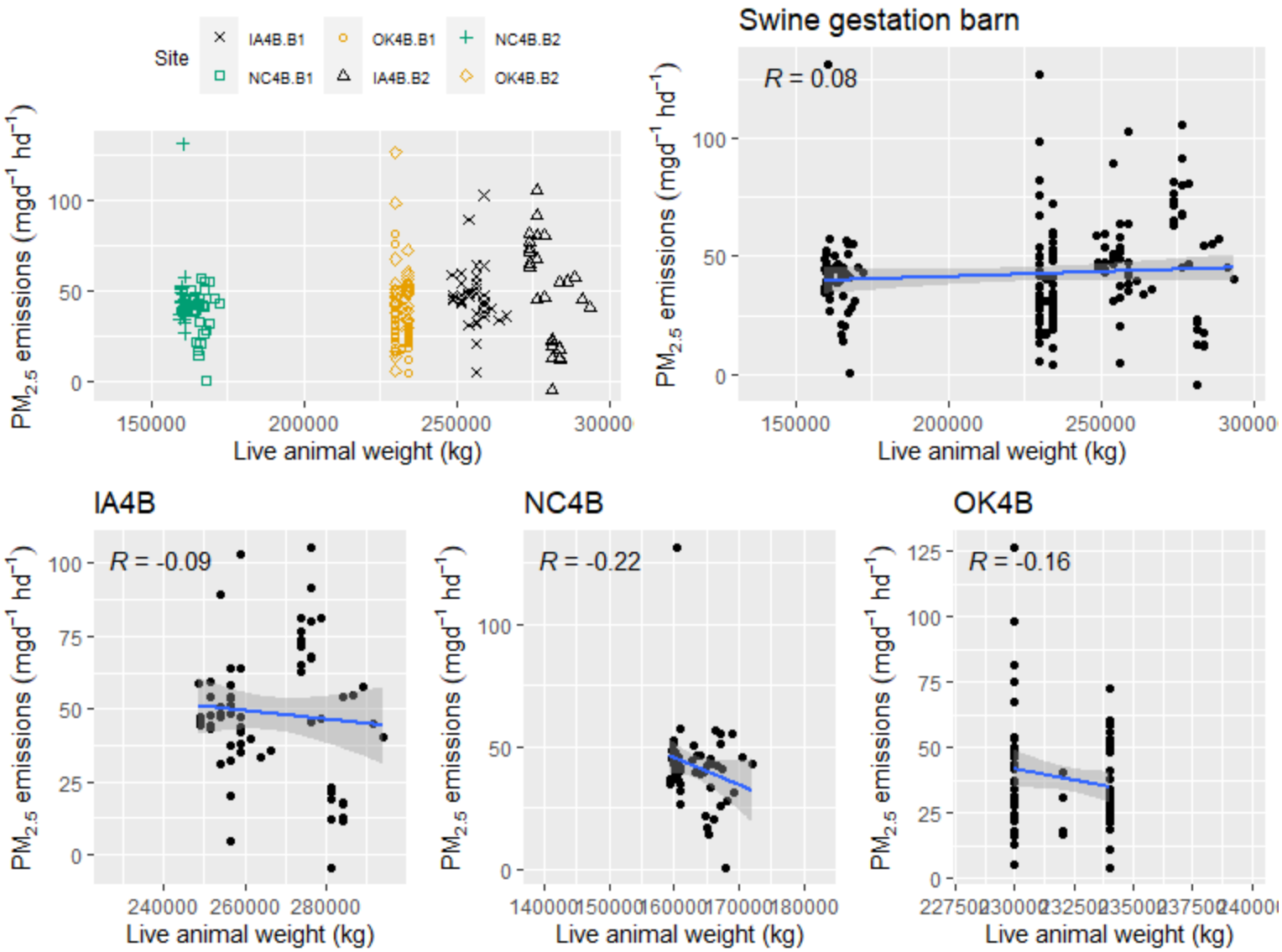


**Figure F.2-42. Scatter plot of swine gestation barn $PM_{2.5}$ emissions (mg $d^{-1}hd^{-1}$) versus live animal weight.**

F.2.1.4.4 Exhaust temperature

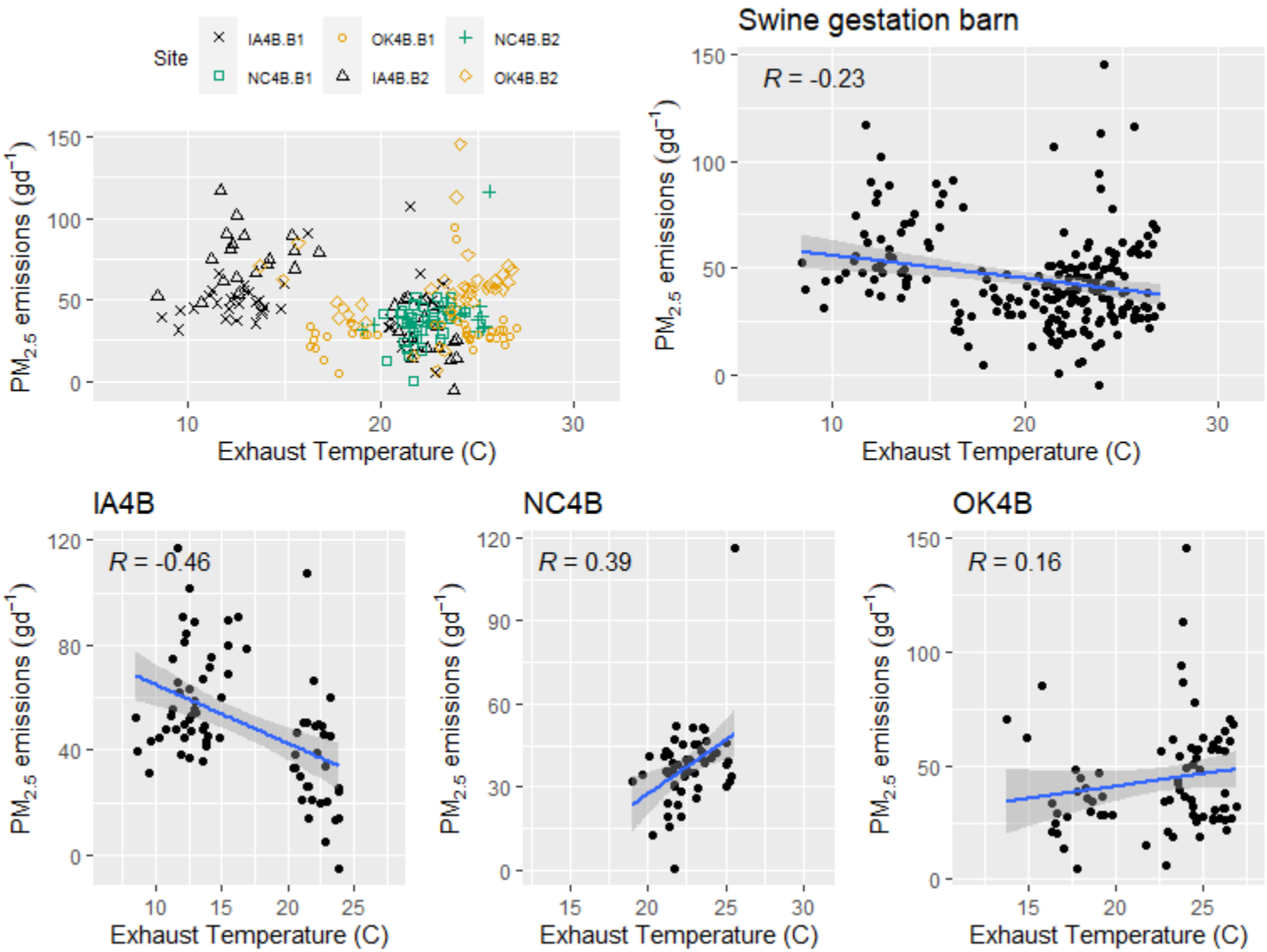


**Figure F.2-43. Scatter plot of swine gestation barn $PM_{2.5}$ emissions (g $d^{-1}$) versus exhaust temperature.**

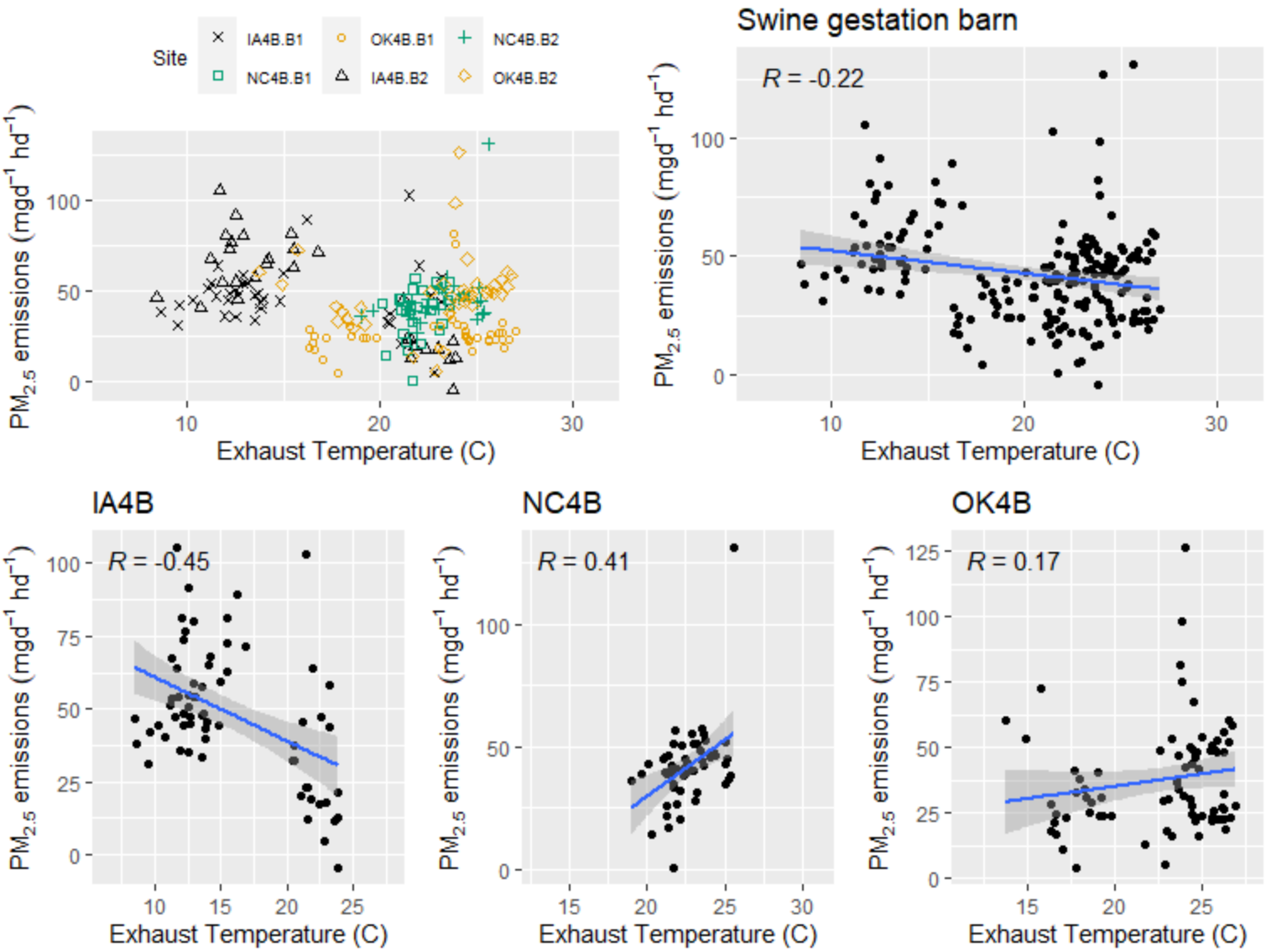


**Figure F.2-44. Scatter plot of swine gestation barn $PM_{2.5}$ emissions (mg $d^{-1}hd^{-1}$) versus exhaust temperature.**

F.2.1.4.5 Exhaust relative humidity

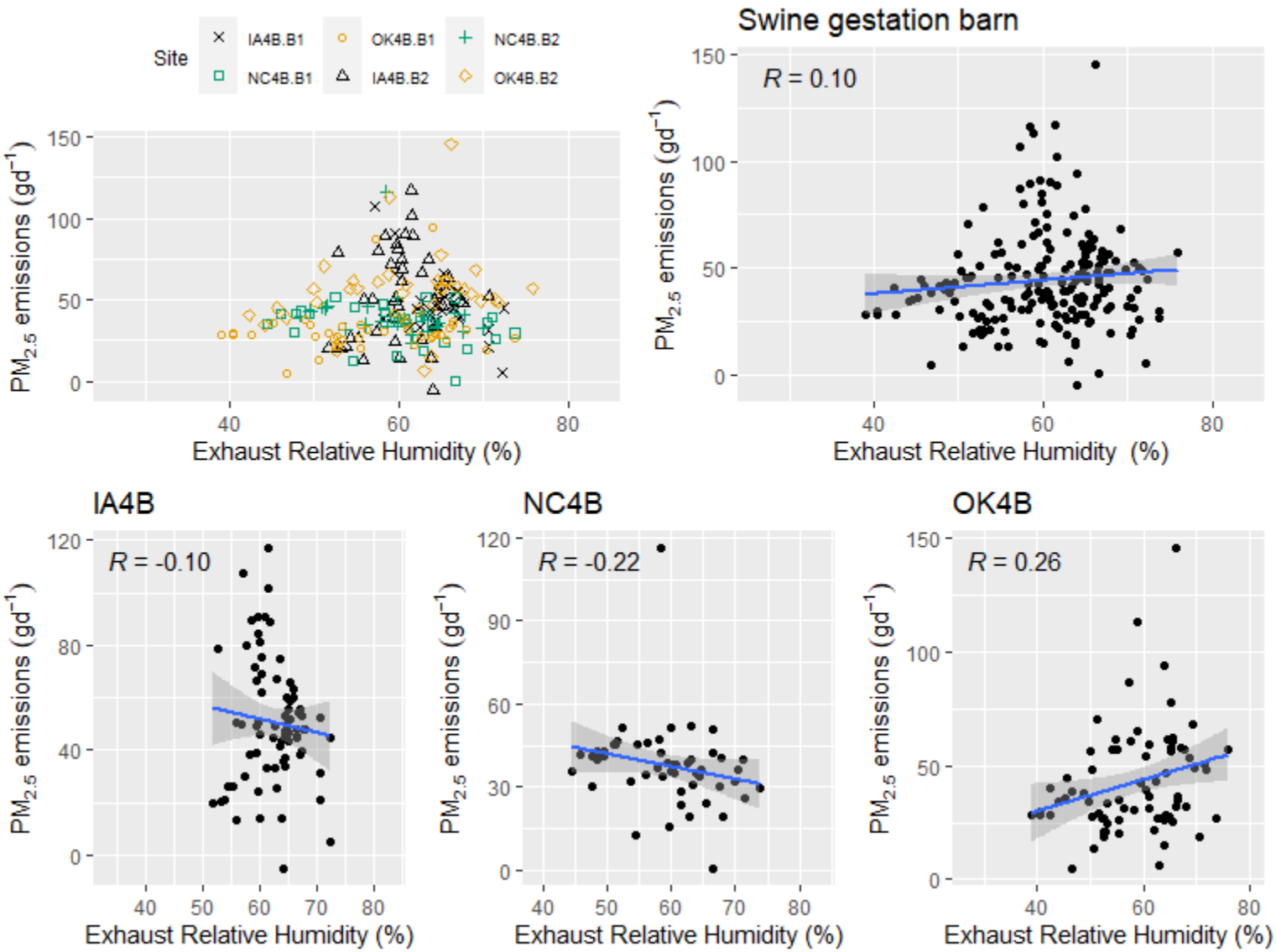


**Figure F.2-45. Scatter plot of swine gestation barn $PM_{2.5}$ emissions (g $d^{-1}$) versus exhaust relative humidity.**

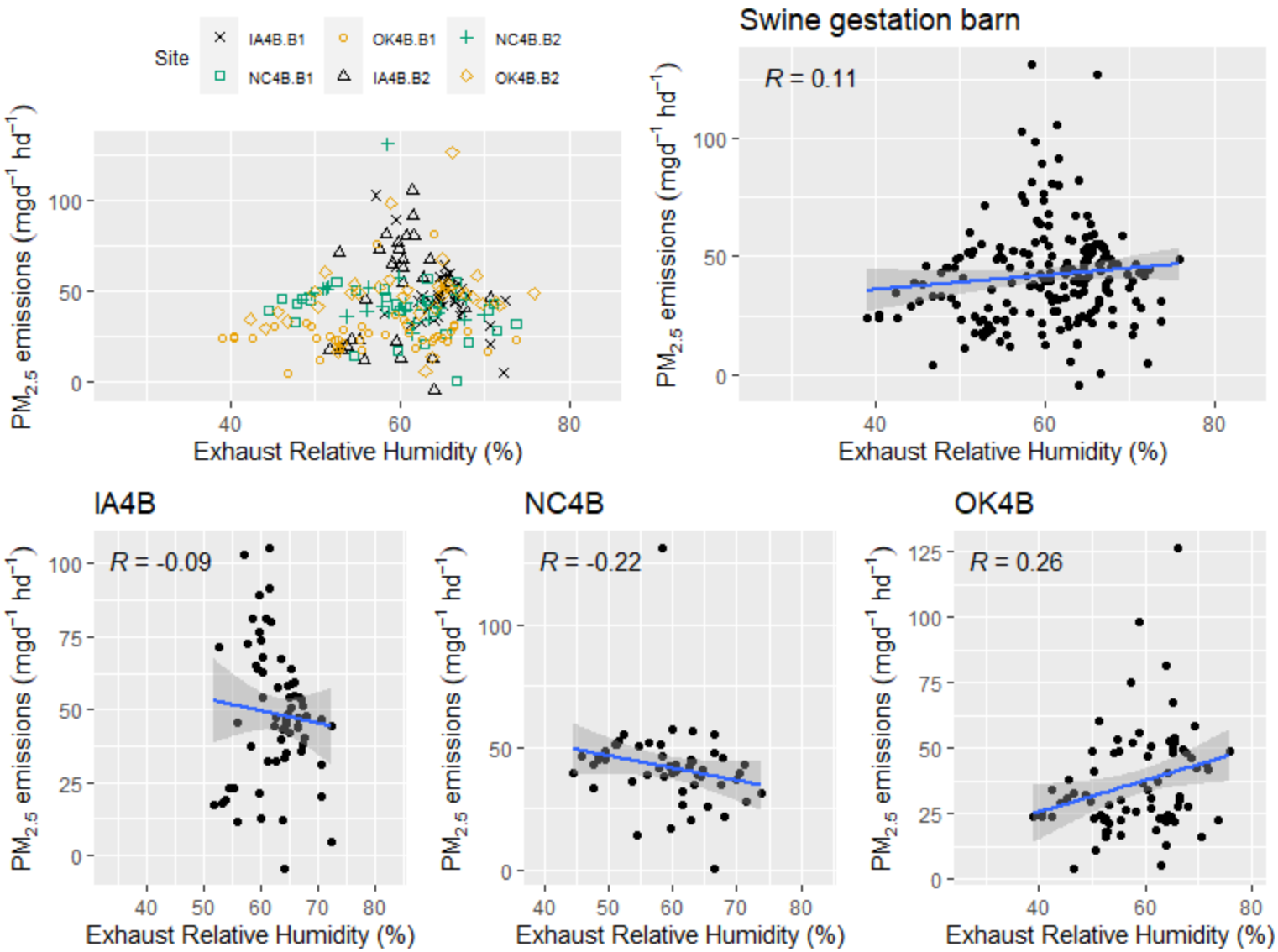


**Figure F.2-46. Scatter plot of swine gestation barn $PM_{2.5}$ emissions (mg $d^{-1}hd^{-1}$) versus exhaust relative humidity.**

F.2.1.4.6 Airflow

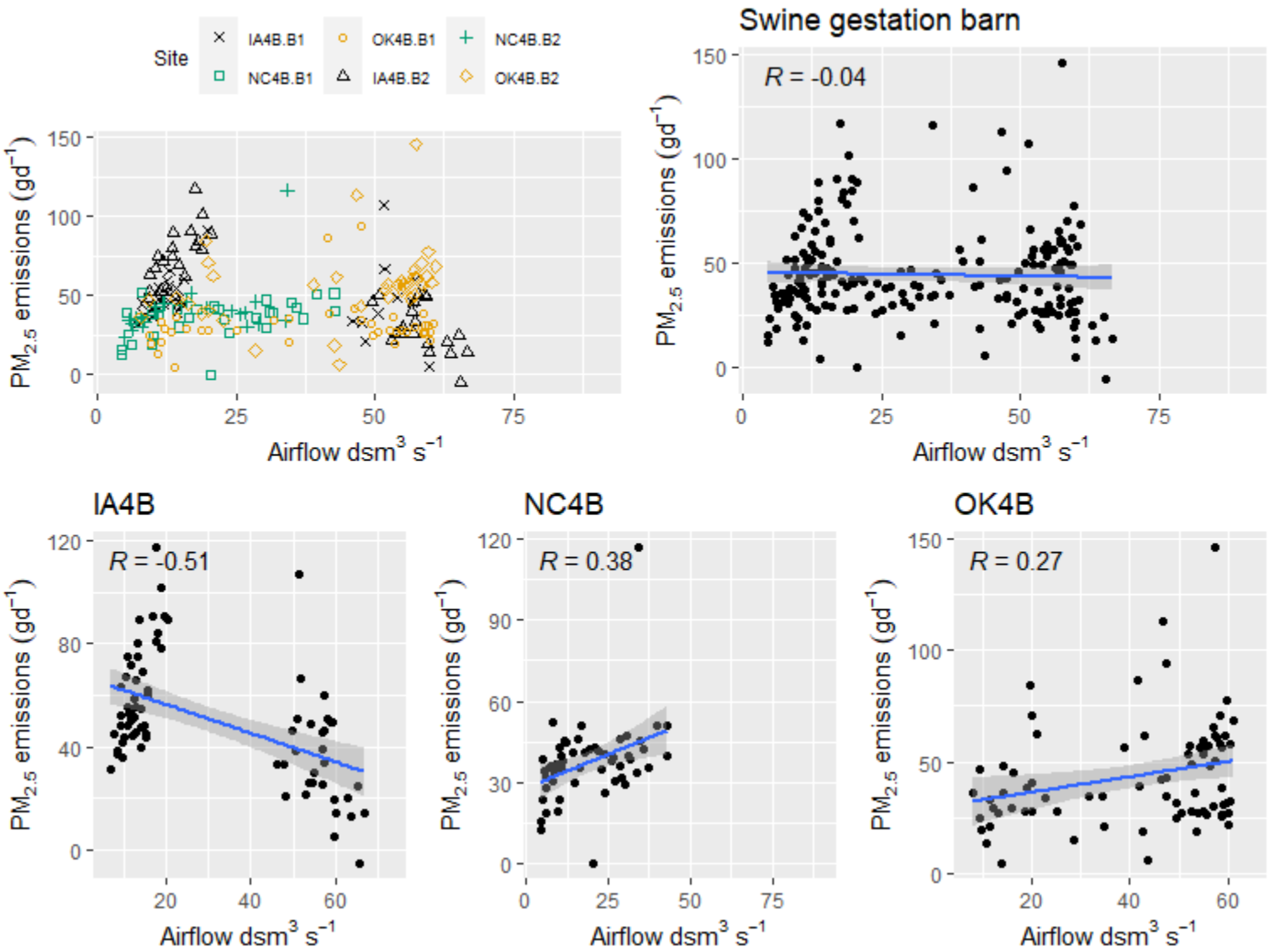


**Figure F.2-47. Scatter plot of swine gestation barn $PM_{2.5}$ emissions (g $d^{-1}$) versus airflow.**

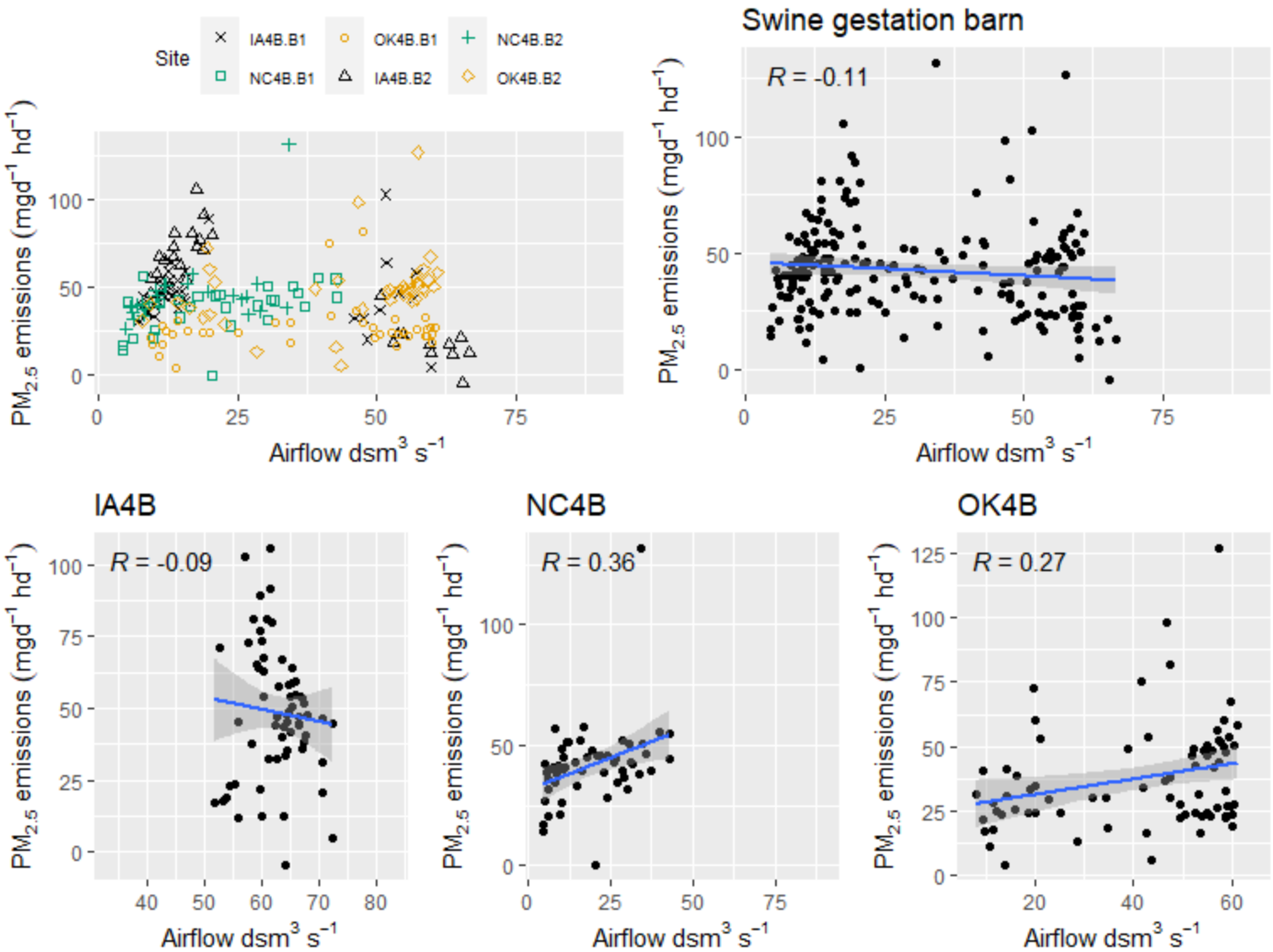


**Figure F.2-48. Scatter plot of swine gestation barn $PM_{2.5}$ emissions (mg $d^{-1}hd^{-1}$) versus airflow.**

### *F.2.1.5 Total Suspended Particulates (TSP)*

F.2.1.5.1 Inventory

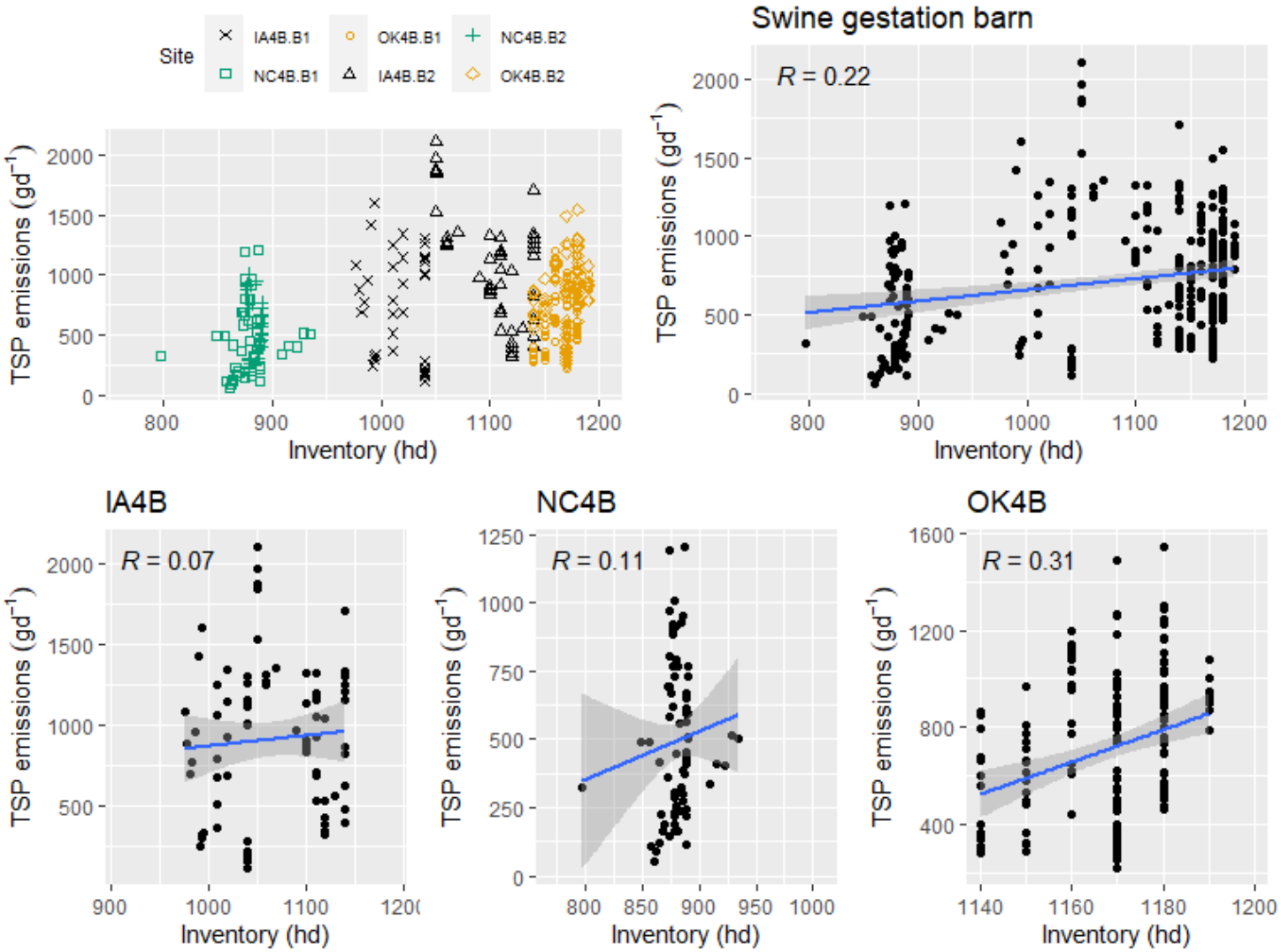


**Figure F.2-49. Scatter plot of swine gestation barn TSP emissions (g d$^{-1}$) versus Inventory.**

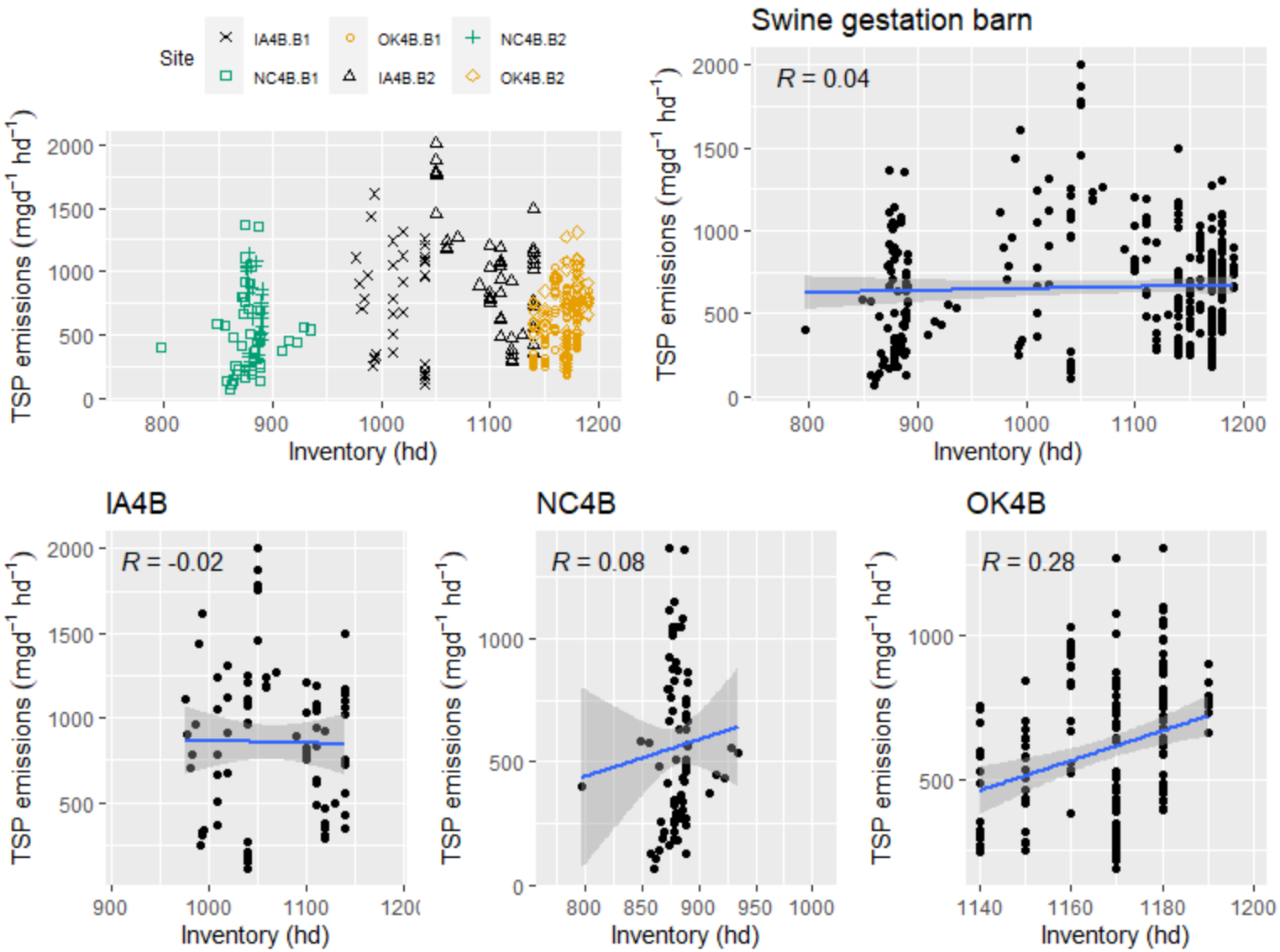


**Figure F.2-50. Scatter plot of swine gestation barn TSP emissions (mg d$^{-1}$hd$^{-1}$) versus Inventory.**

F.2.1.5.2 Average animal weight

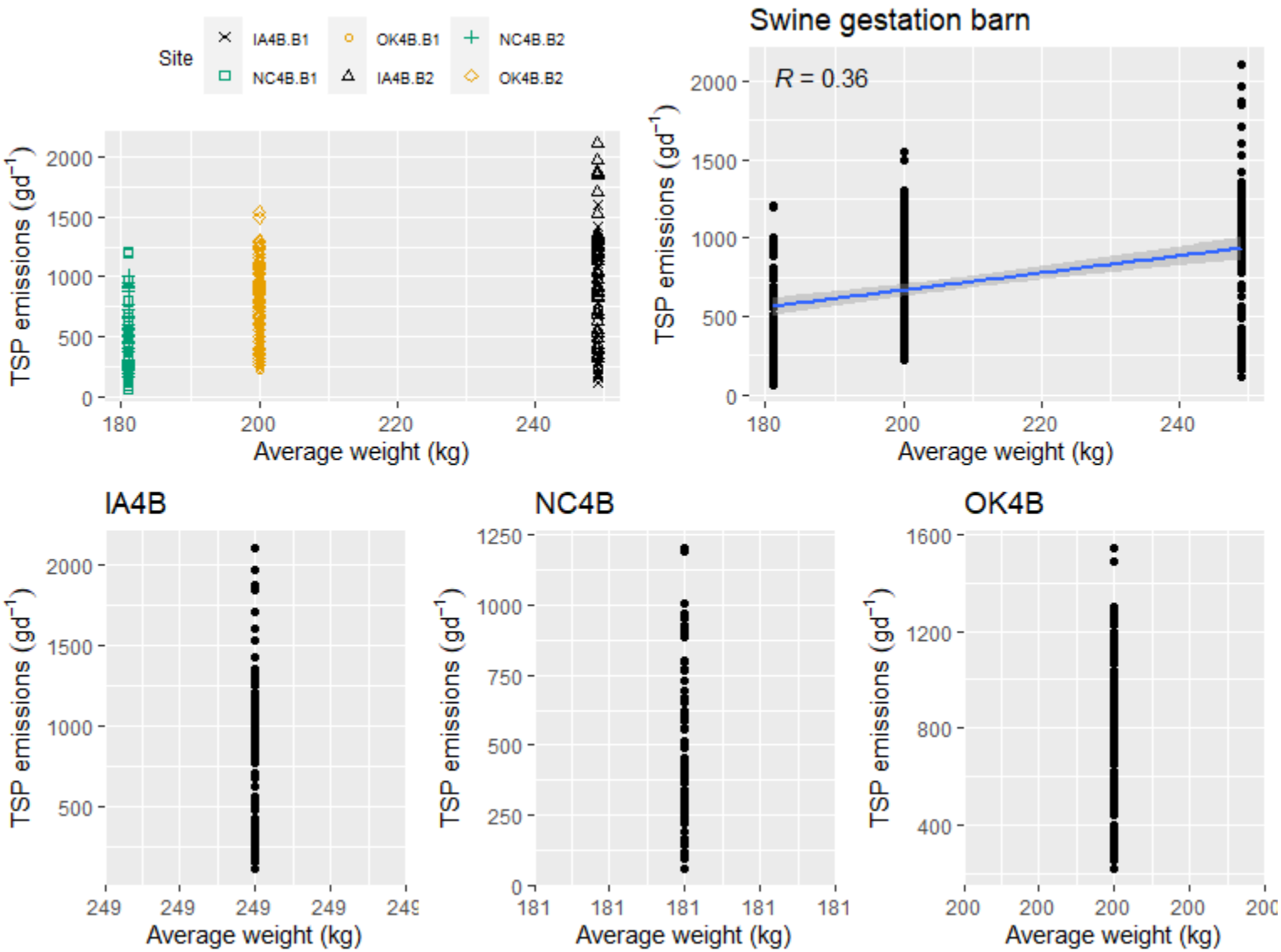


**Figure F.2-51. Scatter plot of swine gestation barn TSP emissions (g d$^{-1}$) versus average animal weight.**

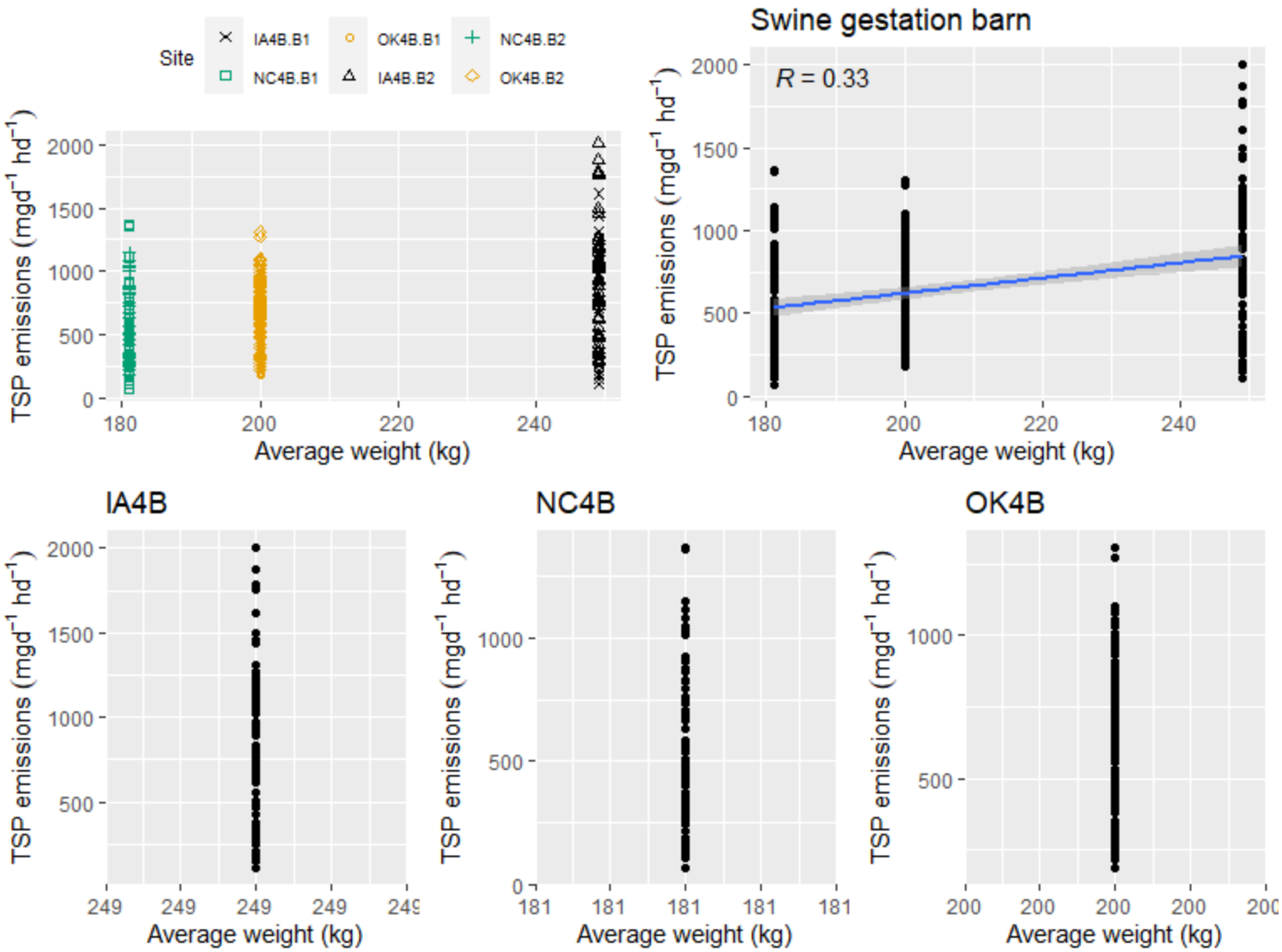


**Figure F.2-52. Scatter plot of swine gestation barn TSP emissions (mg d$^{-1}$hd$^{-1}$) versus average animal weight.**

F.2.1.5.3 Live animal weight

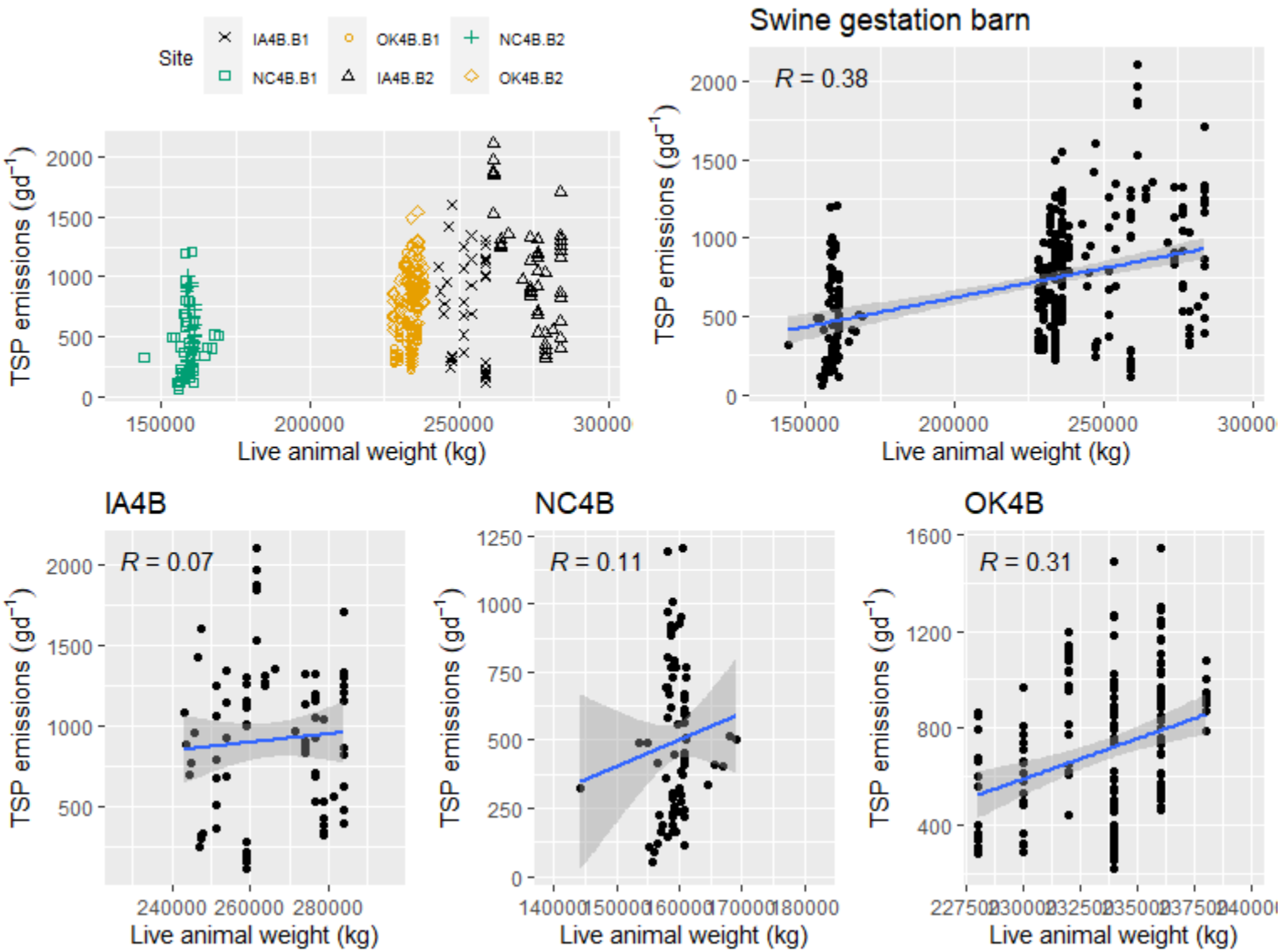


**Figure F.2-53. Scatter plot of swine gestation barn TSP emissions (g d$^{-1}$)versus live animal weight.**

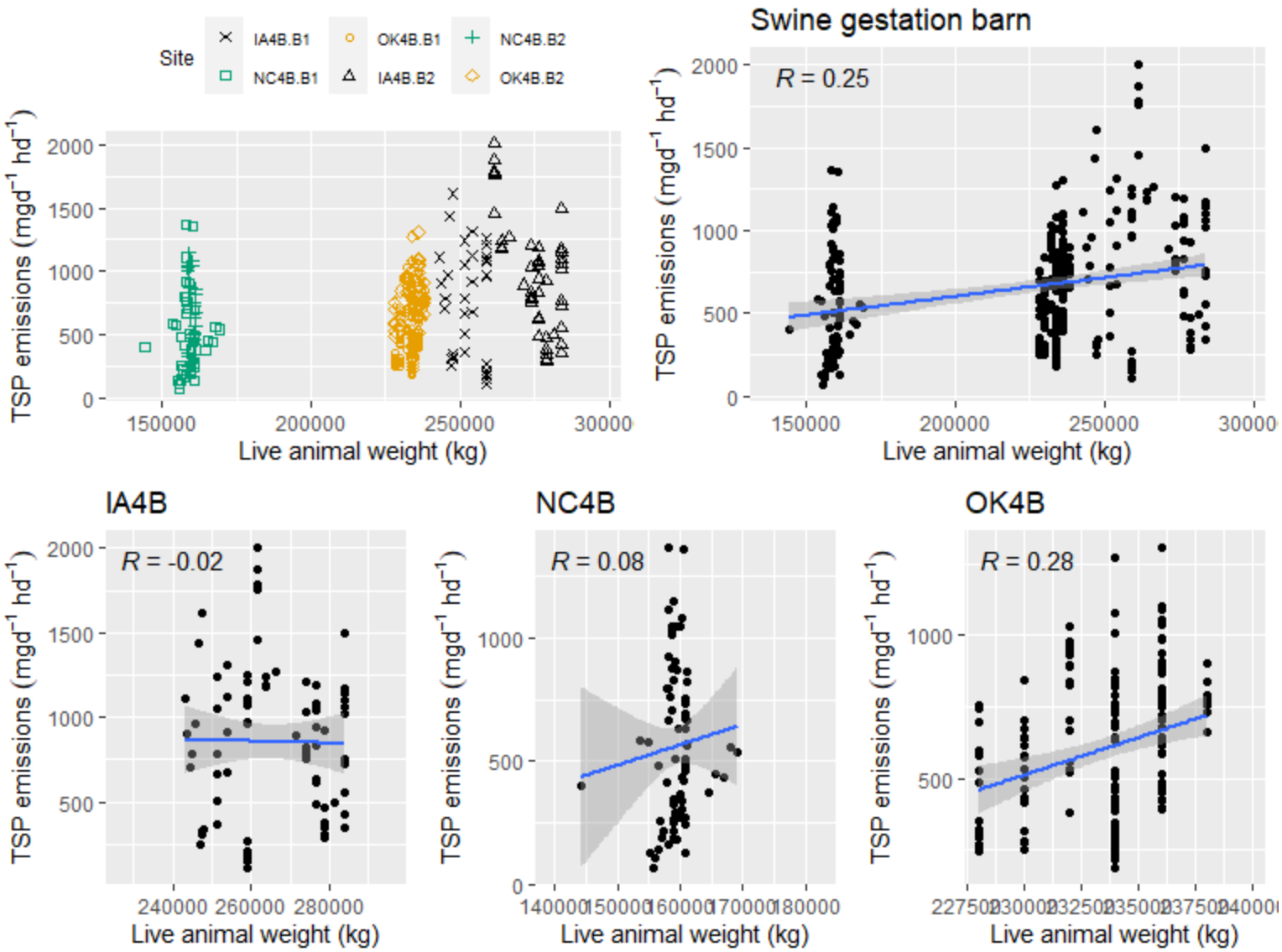


**Figure F.2-54. Scatter plot of swine gestation barn TSP emissions (mg d$^{-1}$hd$^{-1}$) versus live animal weight.**

F.2.1.5.4 Exhaust temperature

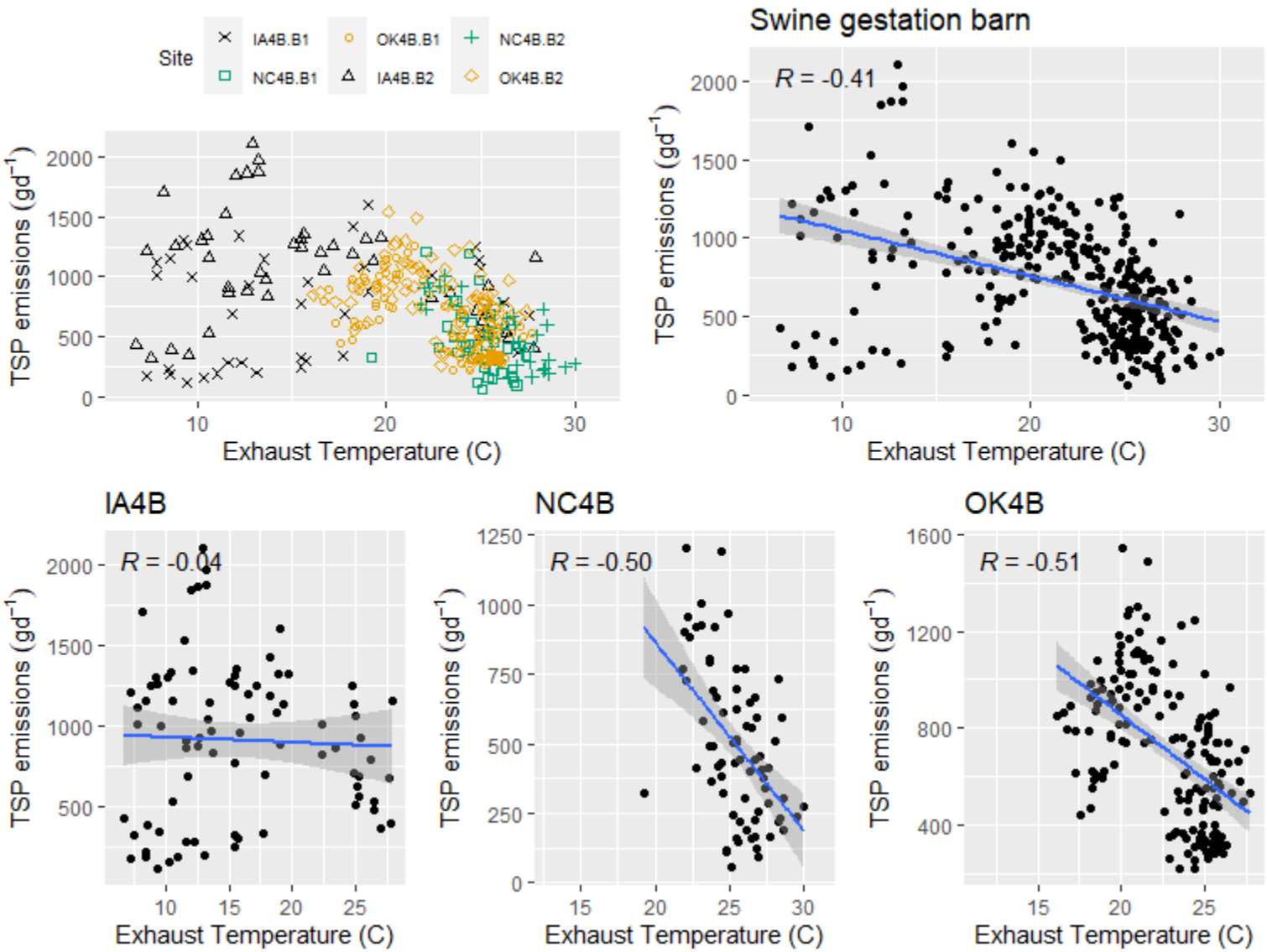


**Figure F.2-55. Scatter plot of swine gestation barn TSP emissions (g d$^{-1}$) versus exhaust temperature.**

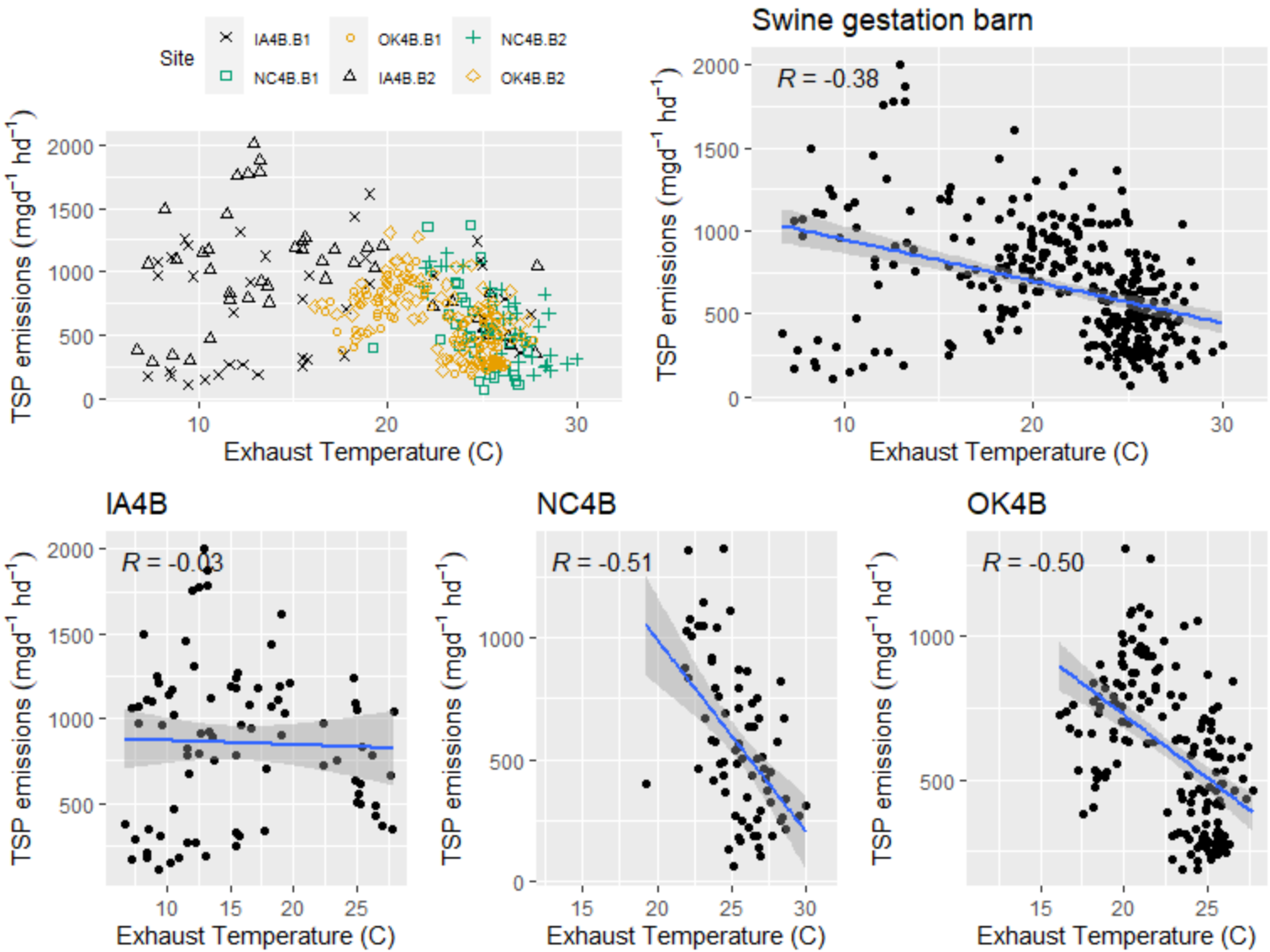


**Figure F.2-56. Scatter plot of swine gestation barn TSP emissions (mg d$^{-1}$hd$^{-1}$) versus exhaust temperature.**

F.2.1.5.5 Exhaust relative humidity

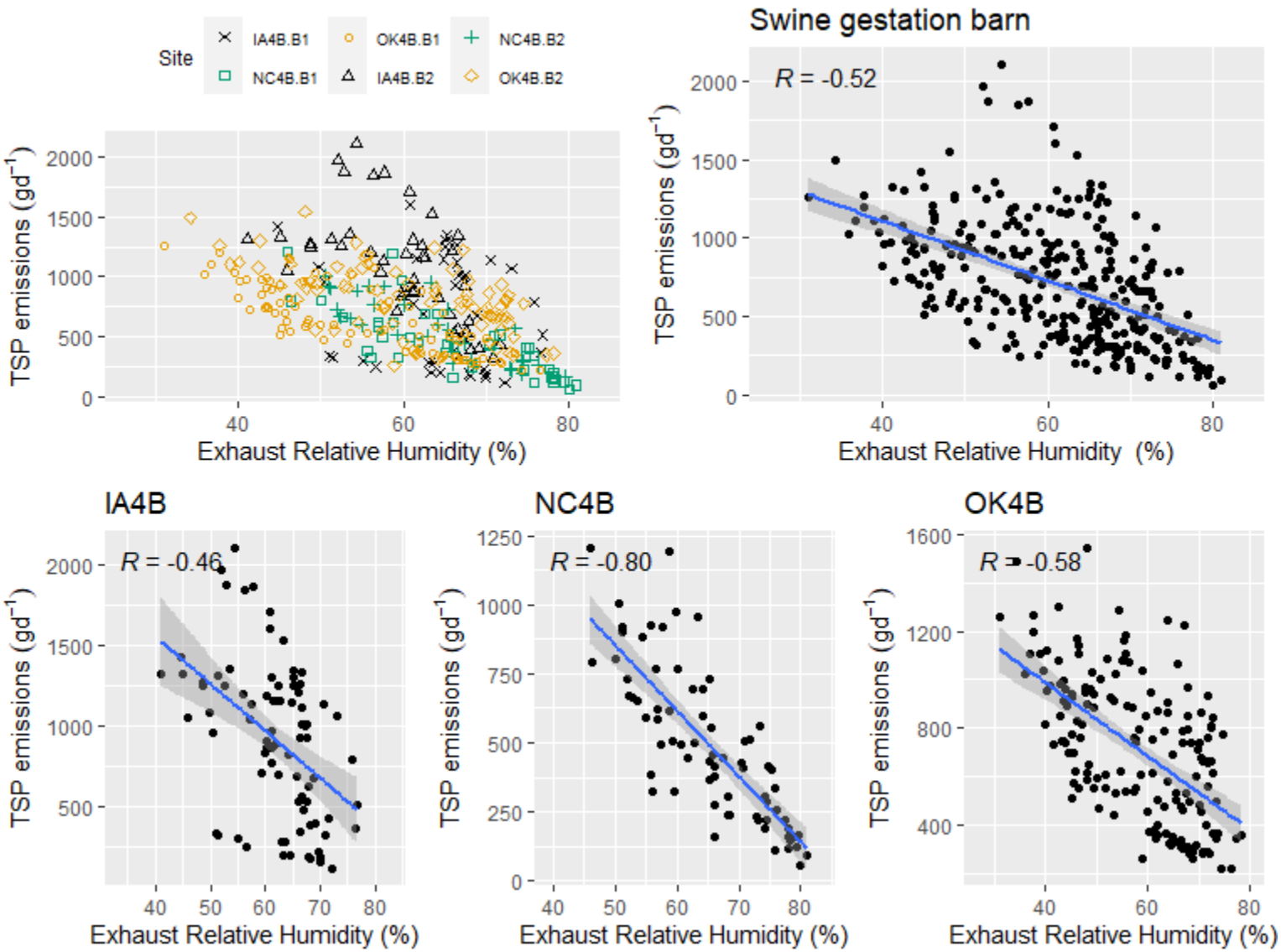


**Figure F.2-57. Scatter plot of swine gestation barn TSP emissions (g d$^{-1}$) versus exhaust relative humidity.**

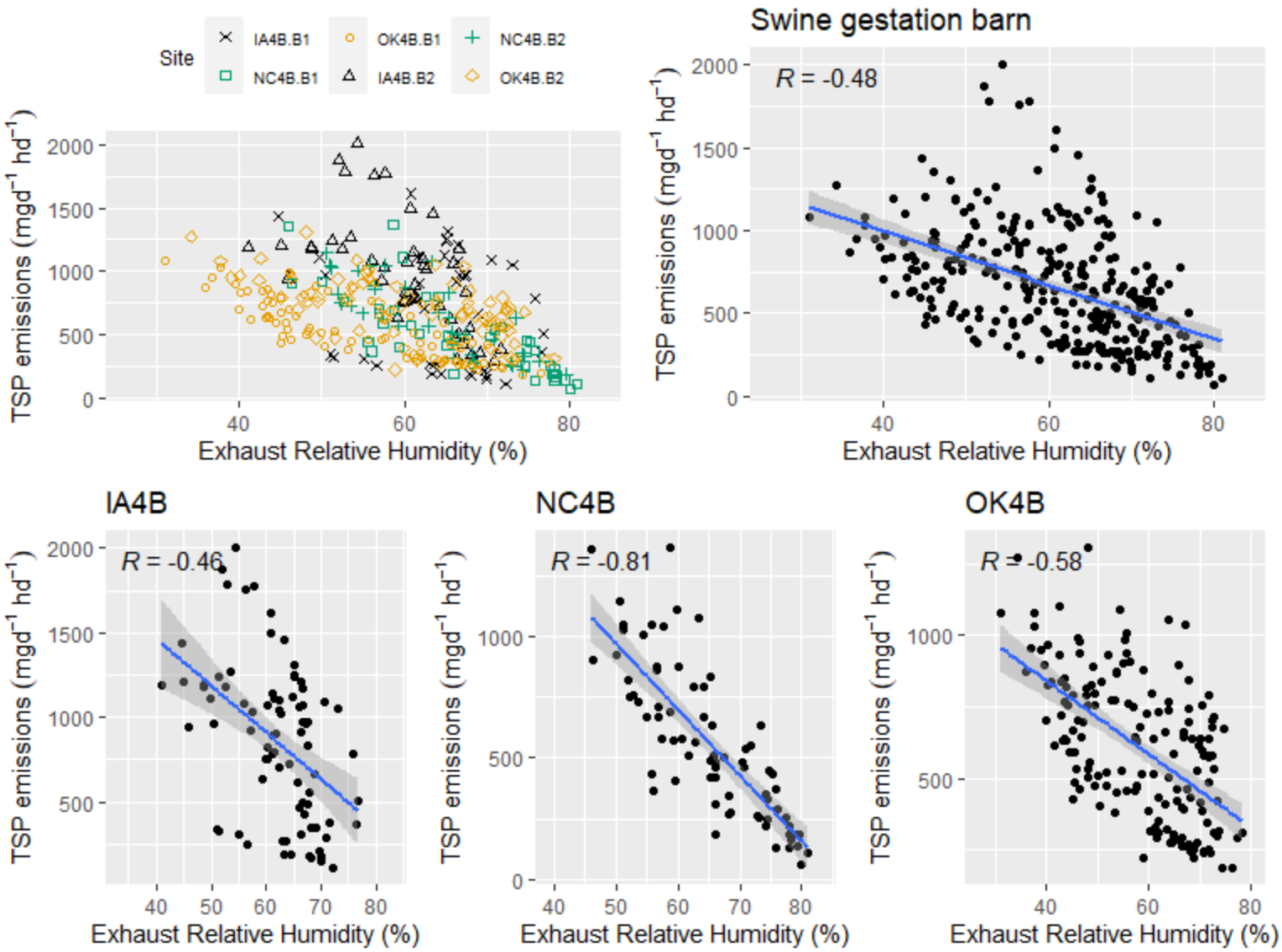


**Figure F.2-58. Scatter plot of swine gestation barn TSP emissions (mg $d^{-1}hd^{-1}$) versus exhaust relative humidity.**

F.2.1.5.6 Airflow

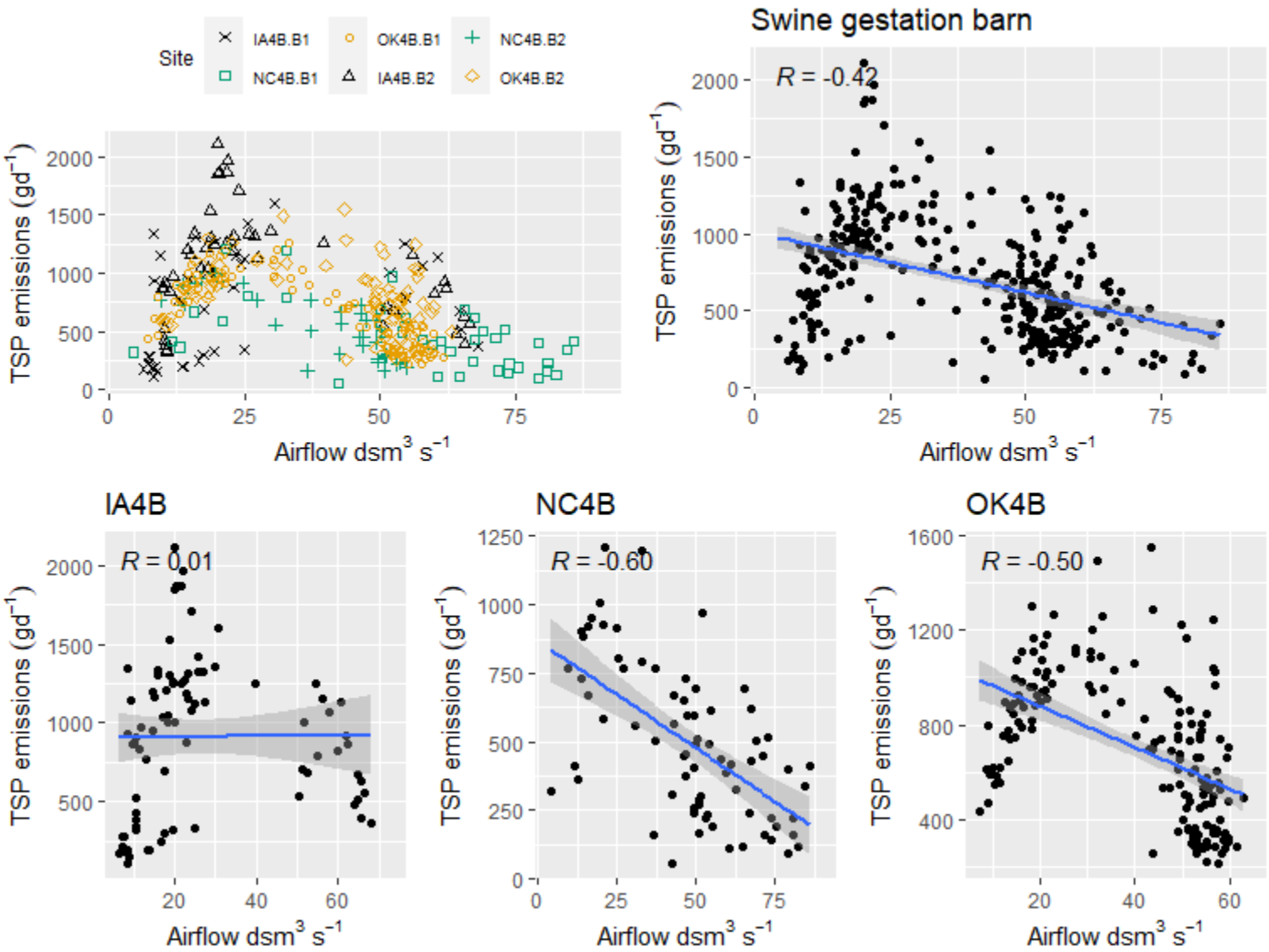


**Figure F.2-59. Scatter plot of swine gestation barn TSP emissions (g d$^{-1}$) versus airflow.**

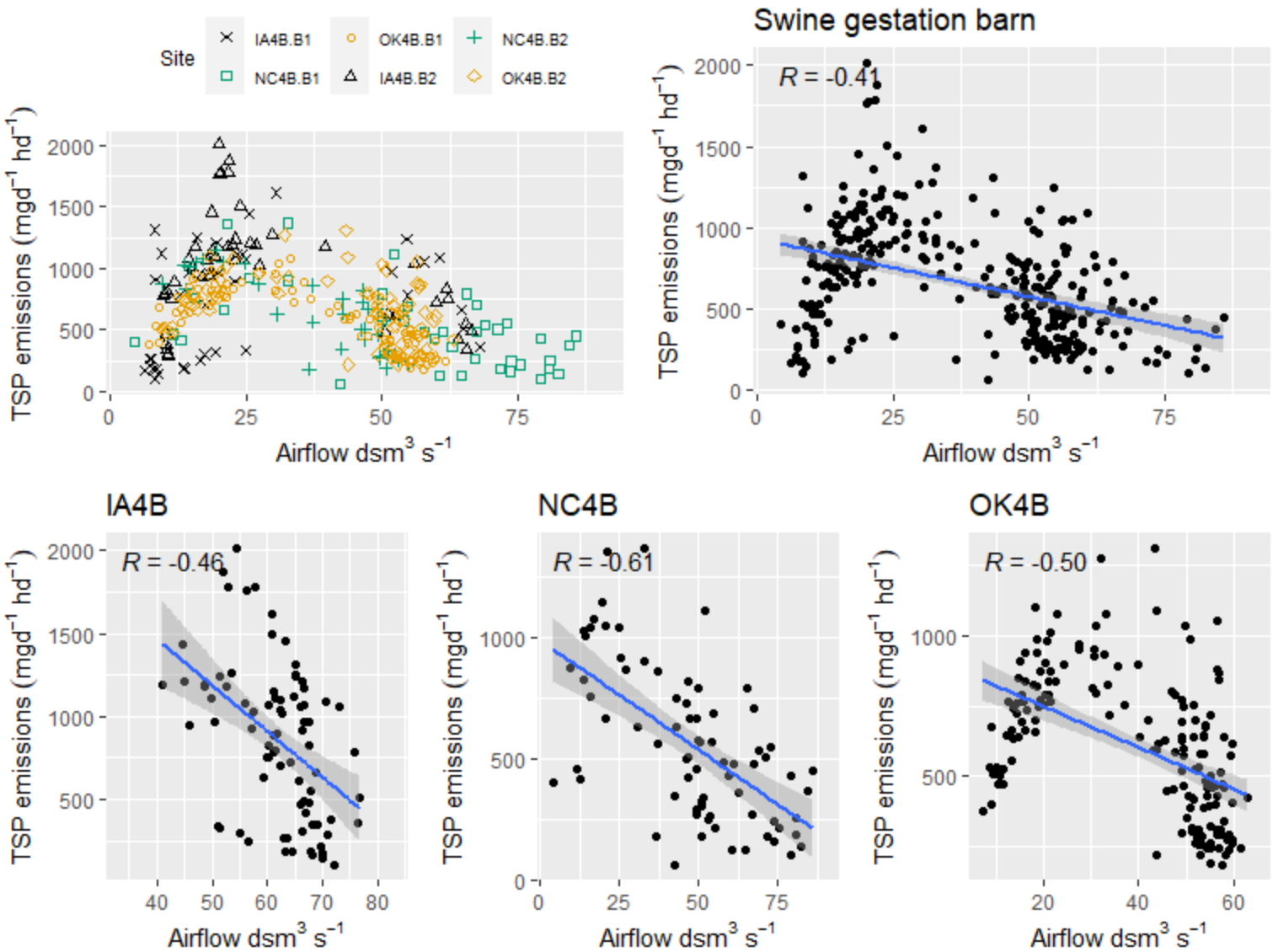


**Figure F.2-60. Scatter plot of swine gestation barn TSP emissions (mg d$^{-1}$hd$^{-1}$) versus airflow.**

### *F.2.2 Ambient*

**Table F.2.2. Summary of swine gestation barn $R^2$ values for ambient parameters.**

| Pollutant | Parameter | R | $R^2$ | Strength | Figure |
|---|---|---|---|---|---|
| $NH_3$ ($kgd^{-1}$) | Ambient Temperature (°C) | 0.09 | 0.01 | slight or weak | F.2-61 |
| $NH_3$ ($gd^{-1}hd^{-1}$) | Ambient Temperature (°C) | 0.08 | 0.01 | slight or weak | F.2-62 |
| $NH_3$ ($kgd^{-1}$) | Ambient Relative humidity (%) | **0.13** | **0.02** | **slight or weak** | F.2-63 |
| $NH_3$ ($gd^{-1}hd^{-1}$) | Ambient Relative humidity (%) | 0.14 | 0.02 | slight or weak | F.2-64 |
| $NH_3$ ($kgd^{-1}$) | Barometric Pressure (kPa) | -0.02 | 0 | slight or weak | F.2-65 |
| $NH_3$ ($gd^{-1}hd^{-1}$) | Barometric Pressure (kPa) | 0.03 | 0 | slight or weak | F.2-66 |
| $H_2S$ ($gd^{-1}$) | Ambient Temperature (°C) | -0.06 | 0 | slight or weak | F.2-67 |
| $H_2S$ ($mgd^{-1}hd^{-1}$) | Ambient Temperature (°C) | -0.07 | 0.01 | slight or weak | F.2-68 |
| $H_2S$ ($gd^{-1}$) | Ambient Relative humidity (%) | 0.17 | 0.03 | slight or weak | F.2-69 |
| $H_2S$ ($mgd^{-1}hd^{-1}$) | Ambient Relative humidity (%) | 0.16 | 0.03 | slight or weak | F.2-70 |
| $H_2S$ ($gd^{-1}$) | Barometric Pressure (kPa) | 0.12 | 0.01 | slight or weak | F.2-71 |
| $H_2S$ ($mgd^{-1}hd^{-1}$) | Barometric Pressure (kPa) | 0.12 | 0.01 | slight or weak | F.2-72 |
| $PM_{10}$ ($gd^{-1}$) | Ambient Temperature (°C) | -0.06 | 0 | slight or weak | F.2-73 |
| $PM_{10}$ ($mgd^{-1}hd^{-1}$) | Ambient Temperature (°C) | -0.05 | 0 | slight or weak | F.2-74 |
| $PM_{10}$ ($gd^{-1}$) | Ambient Relative humidity (%) | -0.17 | 0.03 | slight or weak | F.2-75 |
| $PM_{10}$ ($mgd^{-1}hd^{-1}$) | Ambient Relative humidity (%) | -0.06 | 0 | slight or weak | F.2-76 |
| $PM_{10}$ ($gd^{-1}$) | Barometric Pressure (kPa) | -0.12 | 0.02 | slight or weak | F.2-77 |
| $PM_{10}$ ($mgd^{-1}hd^{-1}$) | Barometric Pressure (kPa) | 0.07 | 0 | slight or weak | F.2-78 |
| $PM_{2.5}$ ($gd^{-1}$) | Ambient Temperature (°C) | -0.11 | 0.01 | slight or weak | F.2-79 |
| $PM_{2.5}$ ($mgd^{-1}hd^{-1}$) | Ambient Temperature (°C) | -0.13 | 0.02 | slight or weak | F.2-80 |
| $PM_{2.5}$ ($gd^{-1}$) | Ambient Relative humidity (%) | 0.06 | 0 | slight or weak | F.2-81 |
| $PM_{2.5}$ ($mgd^{-1}hd^{-1}$) | Ambient Relative humidity (%) | 0.14 | 0.02 | slight or weak | F.2-82 |
| $PM_{2.5}$ ($gd^{-1}$) | Barometric Pressure (kPa) | -0.02 | 0 | slight or weak | F.2-83 |
| $PM_{2.5}$ ($mgd^{-1}hd^{-1}$) | Barometric Pressure (kPa) | 0.15 | 0.02 | slight or weak | F.2-84 |
| TSP ($gd^{-1}$) | Ambient Temperature (°C) | -0.35 | 0.12 | slight or weak | F.2-85 |
| TSP ($mgd^{-1}hd^{-1}$) | Ambient Temperature (°C) | -0.33 | 0.11 | slight or weak | F.2-86 |
| TSP ($gd^{-1}$) | Ambient Relative humidity (%) | -0.14 | 0.02 | slight or weak | F.2-87 |
| TSP ($mgd^{-1}hd^{-1}$) | Ambient Relative humidity (%) | -0.06 | 0 | slight or weak | F.2-88 |
| TSP ($gd^{-1}$) | Barometric Pressure (kPa) | -0.08 | 0.01 | slight or weak | F.2-89 |
| TSP ($mgd^{-1}hd^{-1}$) | Barometric Pressure (kPa) | 0.08 | 0.01 | slight or weak | F.2-90 |

### *F.2.2.1 Ammonia ($NH_3$)*

F.2.2.1.1 Ambient temperature

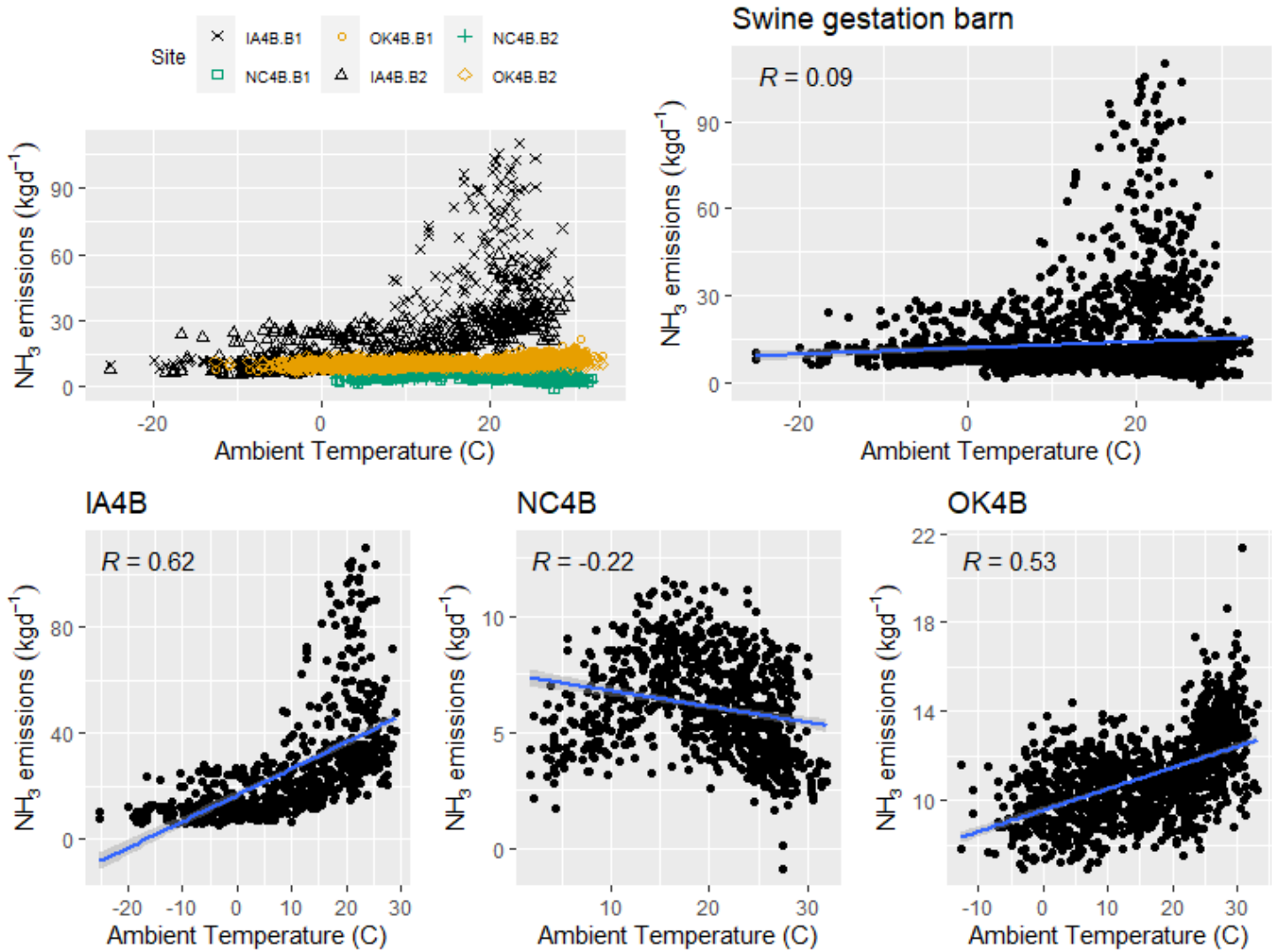


**Figure F.2-61. Scatter plot of swine gestation barn $NH_3$ emissions (kg $d^{-1}$) versus ambient temperature.**

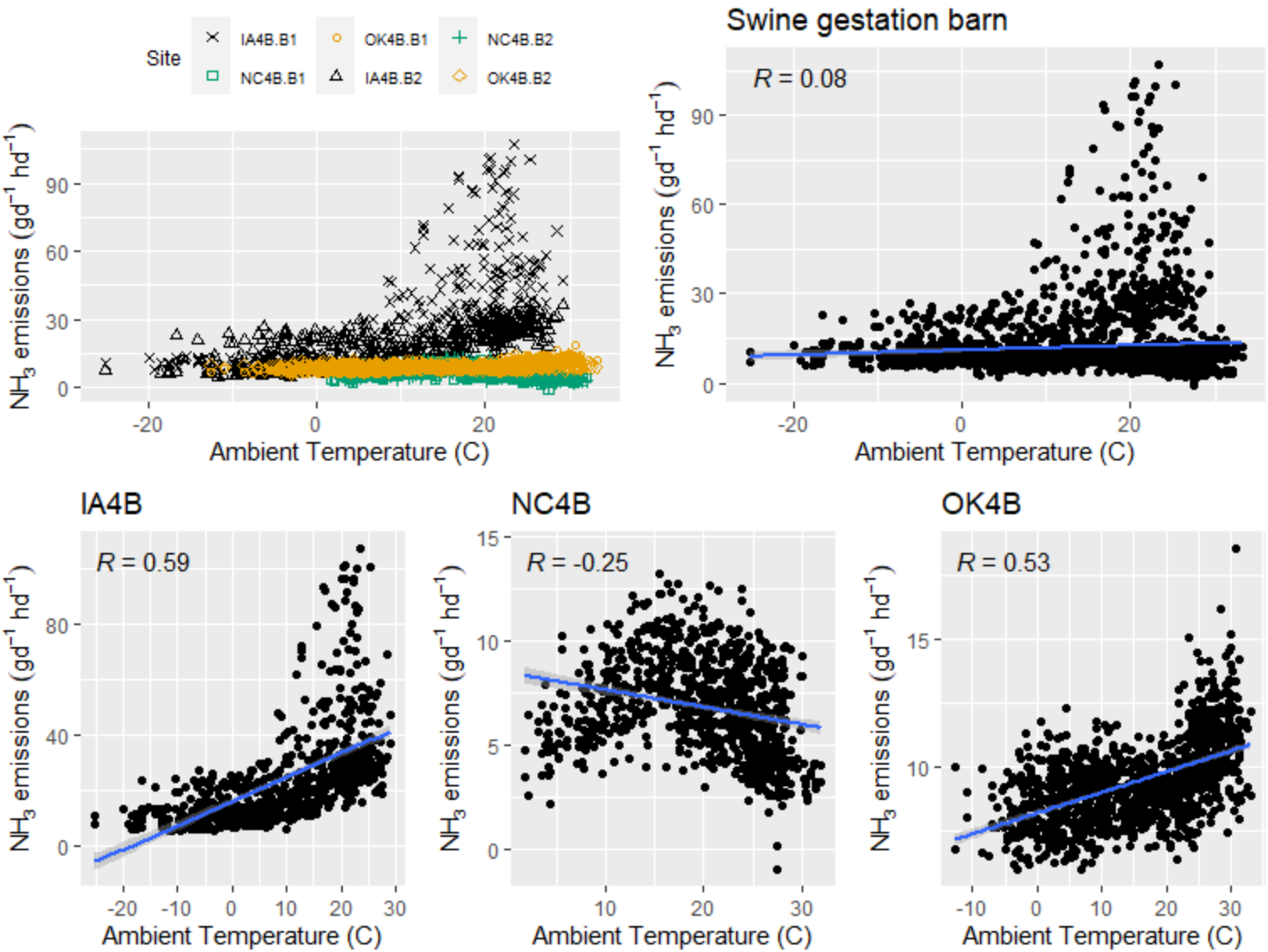


**Figure F.2-62. Scatter plot of swine gestation barn $NH_3$ emissions (g $d^{-1}hd^{-1}$) versus ambient temperature.**

F.2.2.1.2 Ambient relative humidity

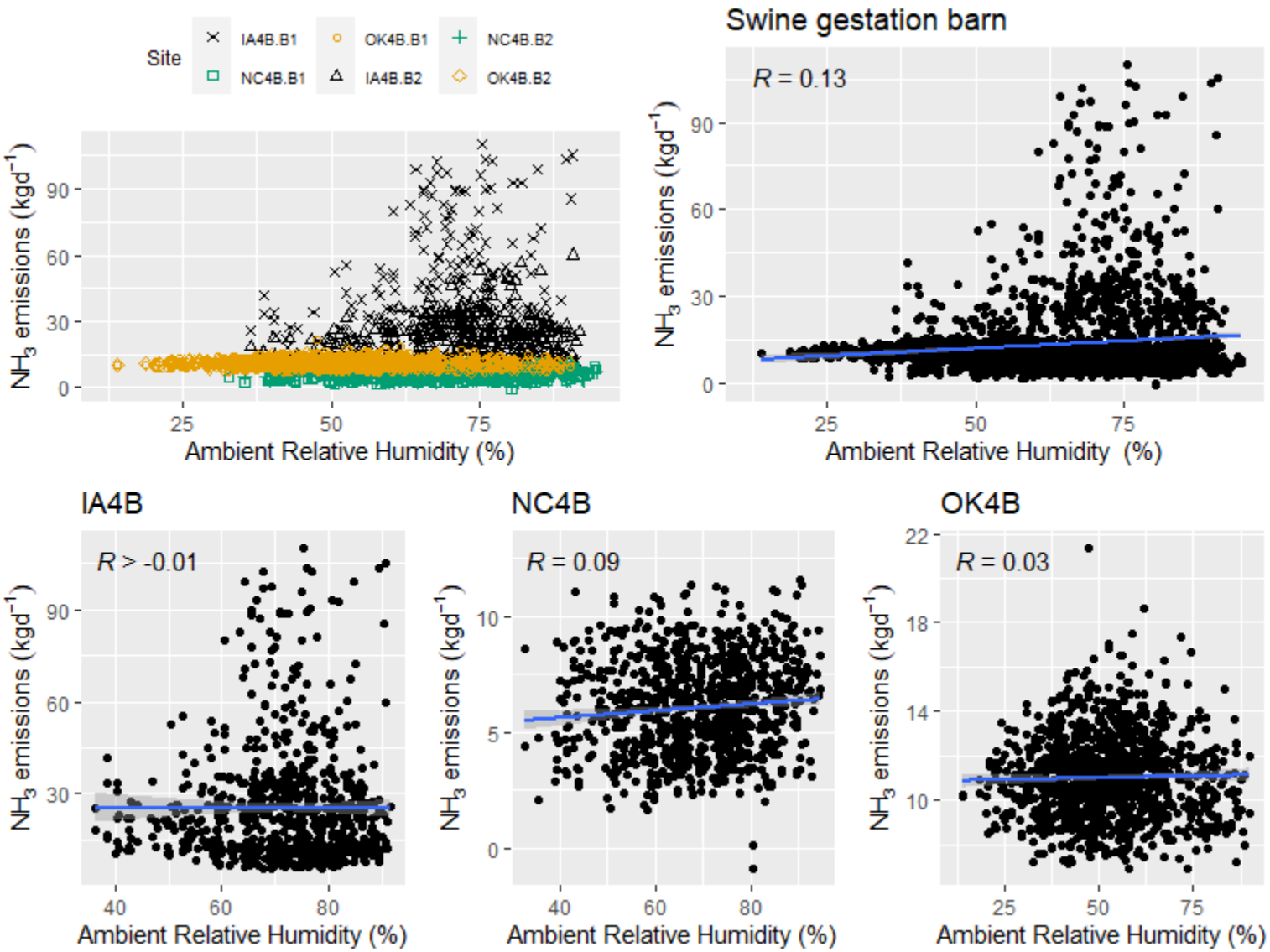


**Figure F.2-63. Scatter plot of swine gestation barn $NH_3$ emissions (kg $d^{-1}$) versus ambient relative humidity.**

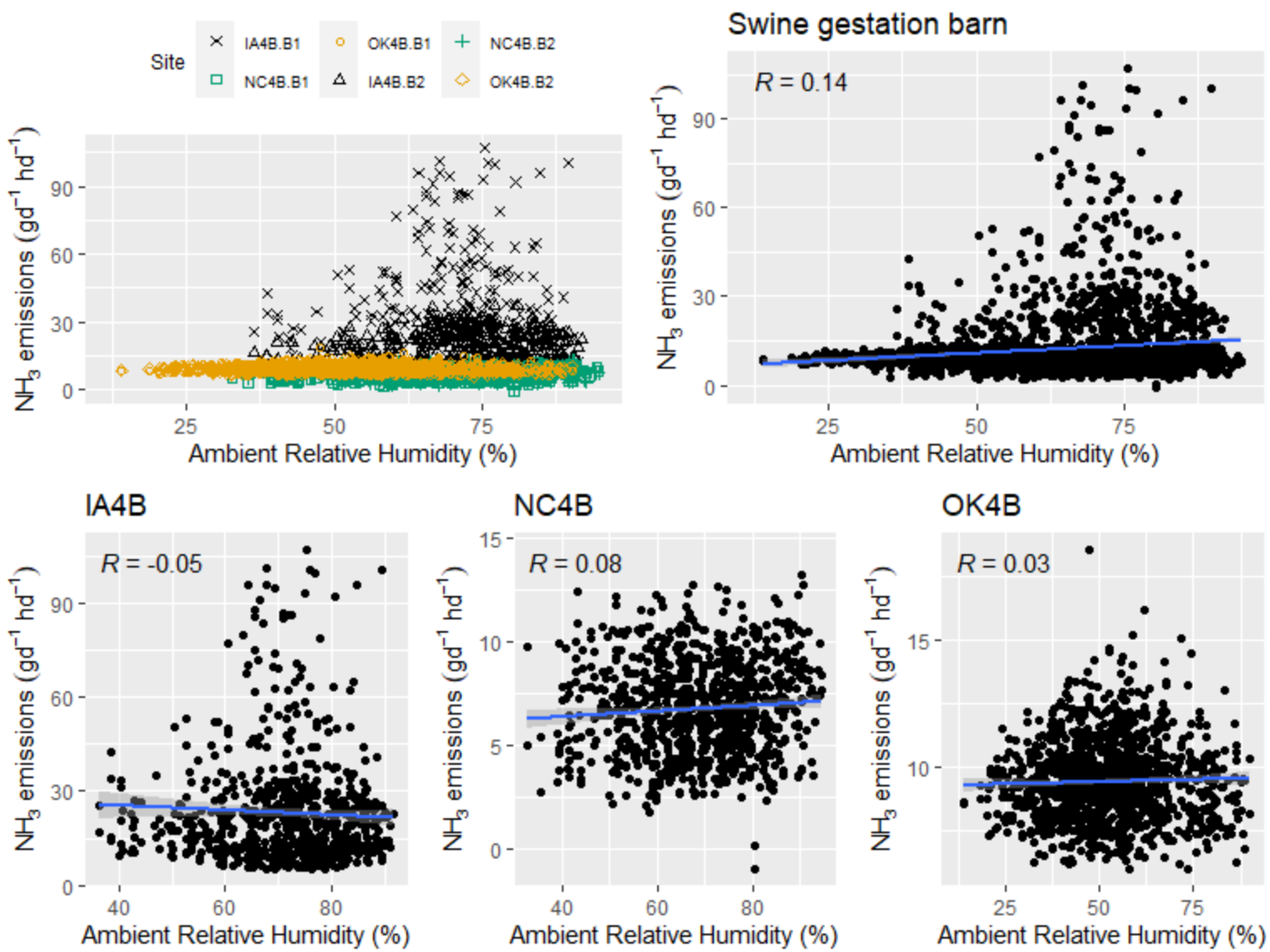


**Figure F.2-64. Scatter plot of swine gestation barn $NH_3$ emissions (g $d^{-1}hd^{-1}$) versus ambient relative humidity.**

F.2.2.1.3 Air pressure

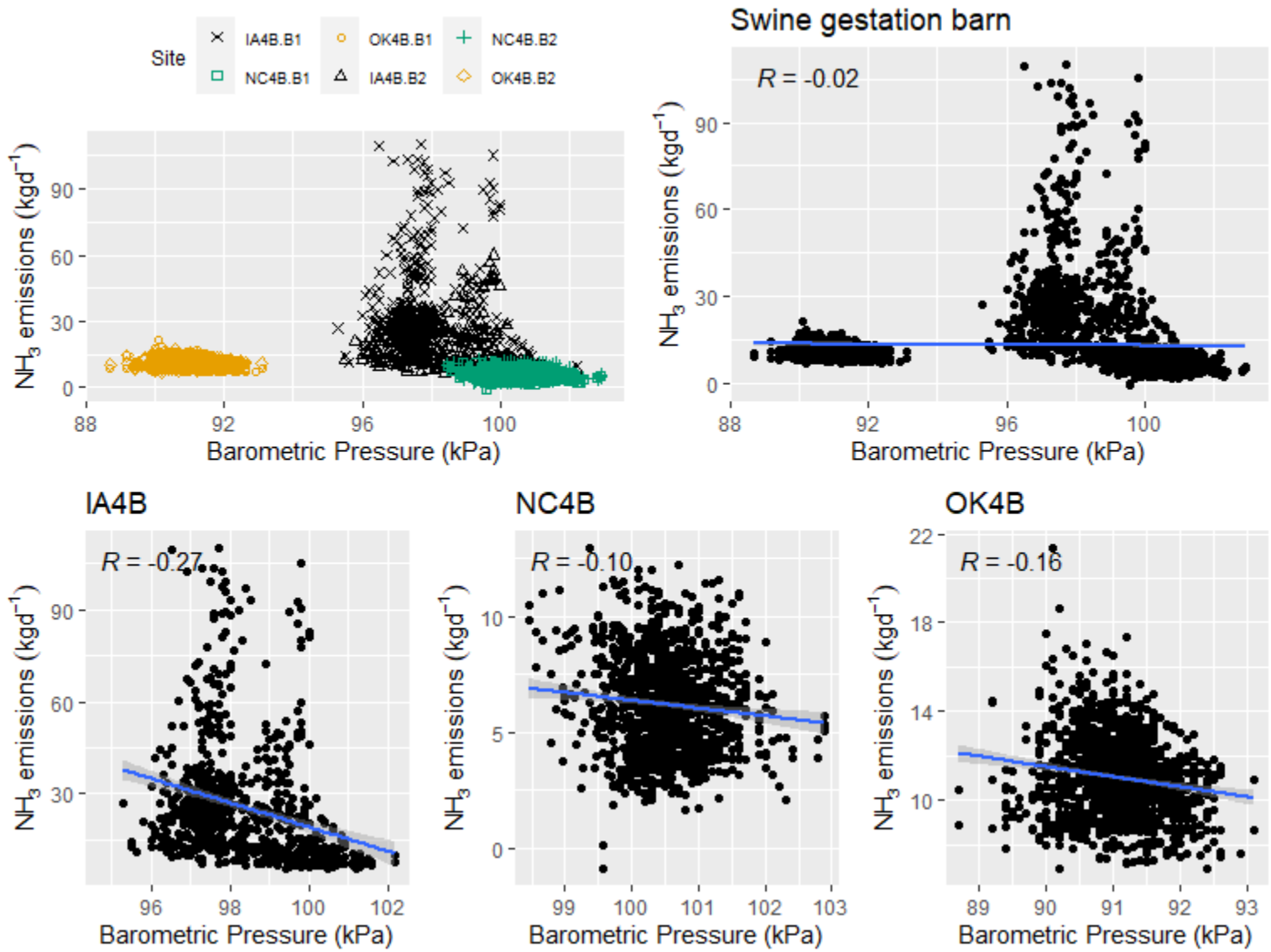


**Figure F.2-65. Scatter plot of swine gestation barn $NH_3$ emissions (kg $d^{-1}$) versus air pressure.**

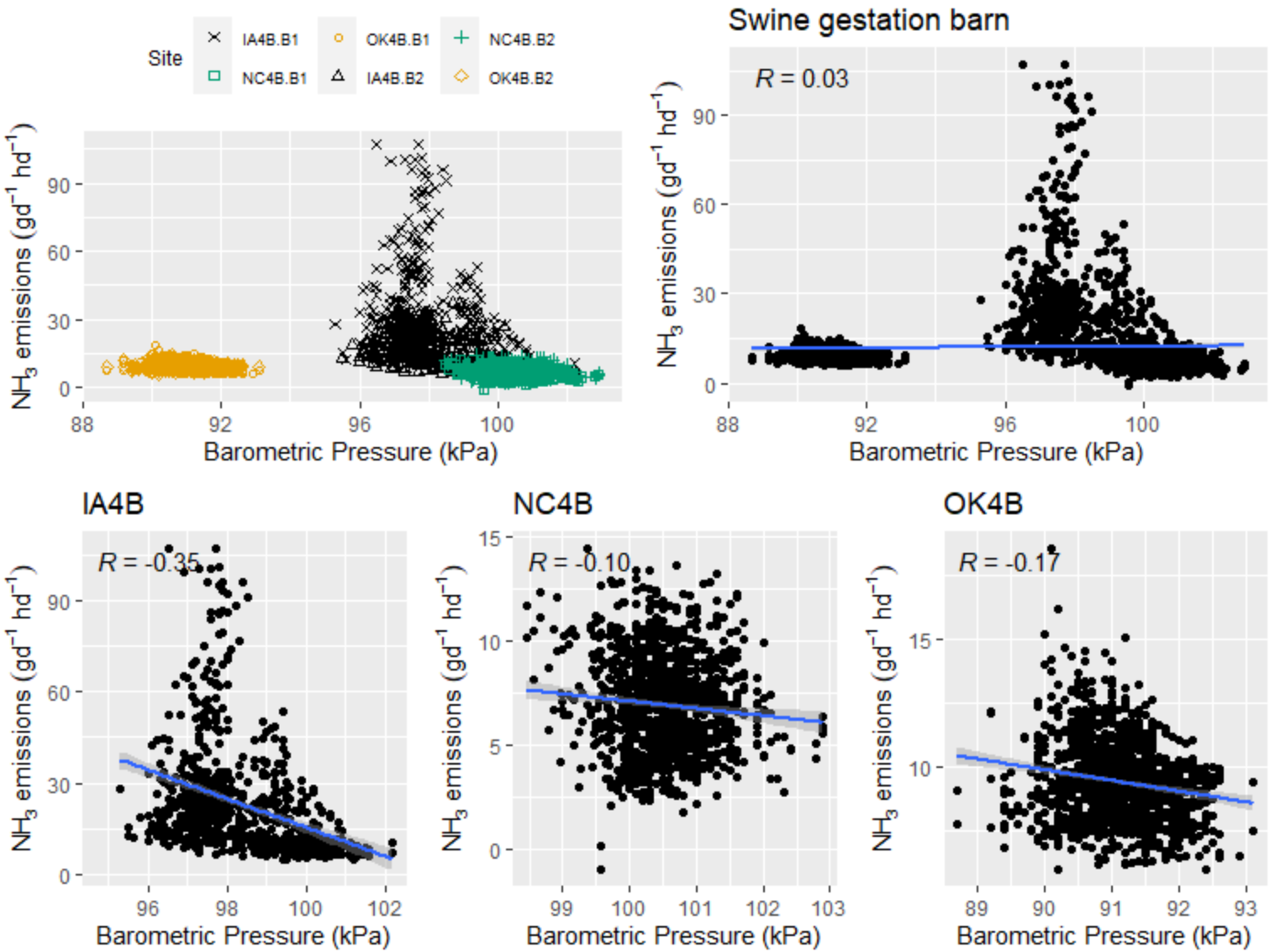


**Figure F.2-66. Scatter plot of swine gestation barn $NH_3$ emissions (g $d^{-1}hd^{-1}$) versus air pressure.**

### *F.2.2.2 Hydrogen Sulfide ($H_2S$)*

F.2.2.2.1 Ambient temperature

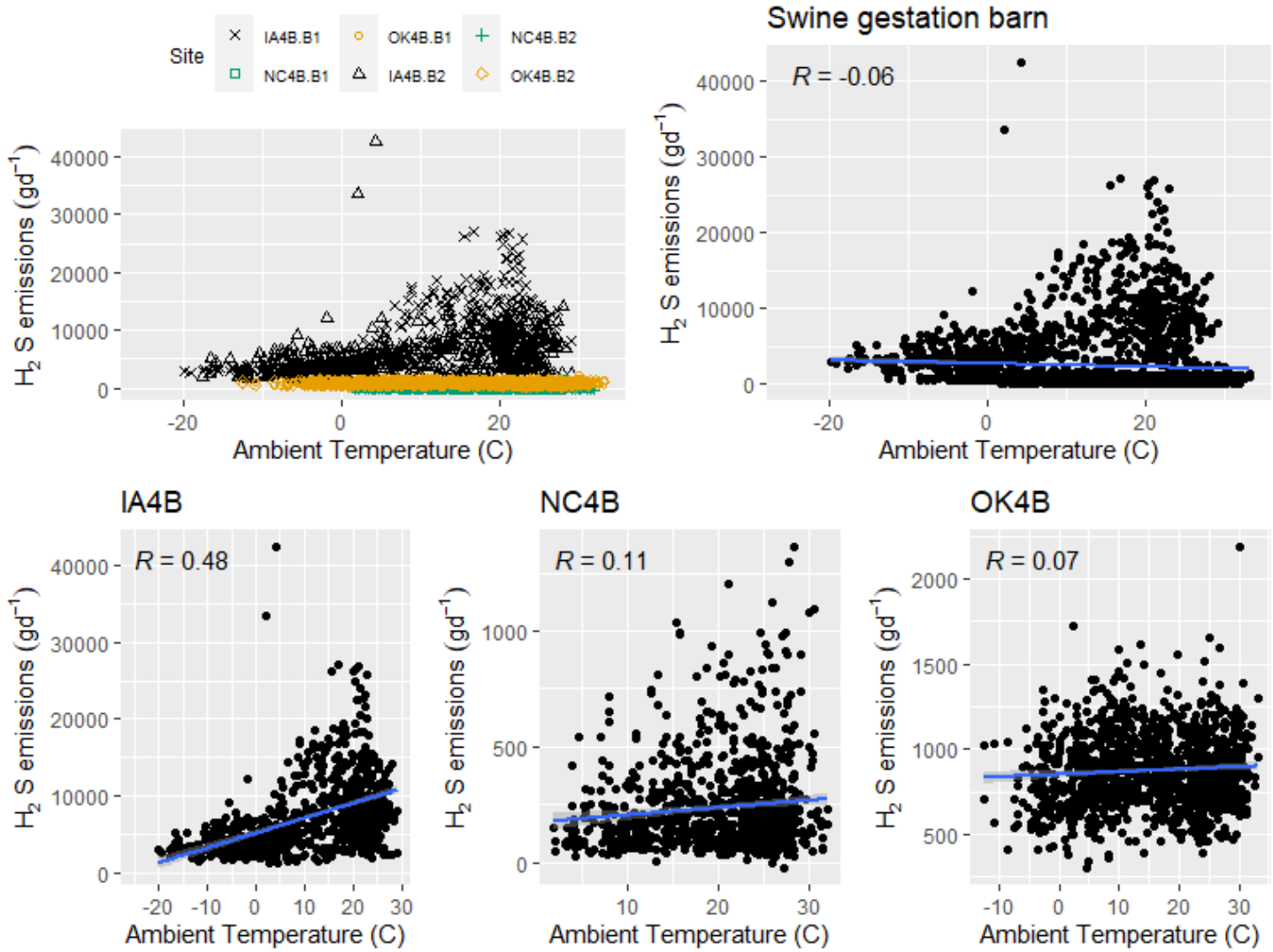


**Figure F.2-67. Scatter plot of swine gestation barn $H_2S$ emissions (g $d^{-1}$) versus ambient temperature.**

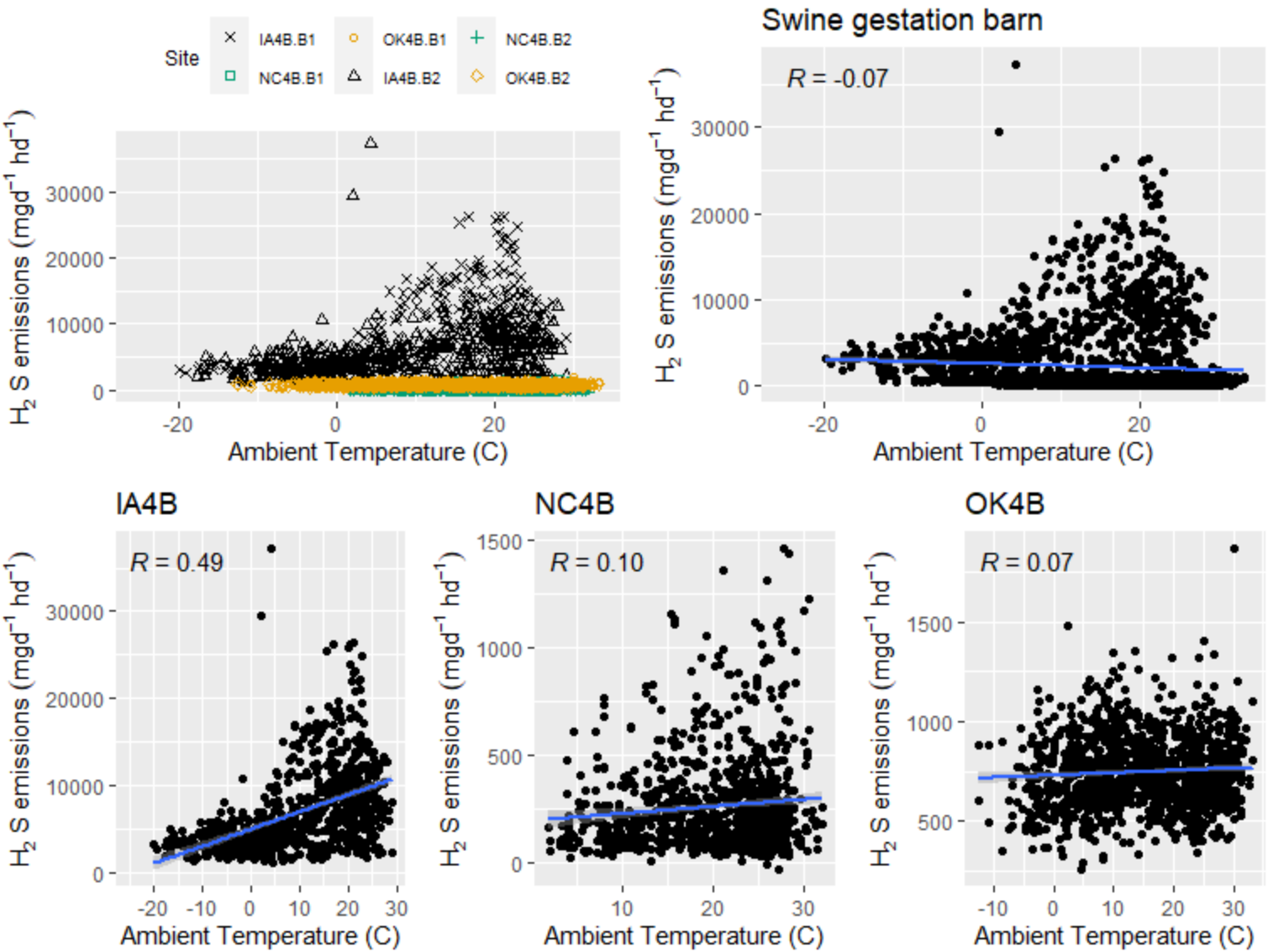


**Figure F.2-68. Scatter plot of swine gestation barn $H_2S$ emissions (mg $d^{-1}hd^{-1}$) versus ambient temperature.**

F.2.2.2.2 Ambient relative humidity

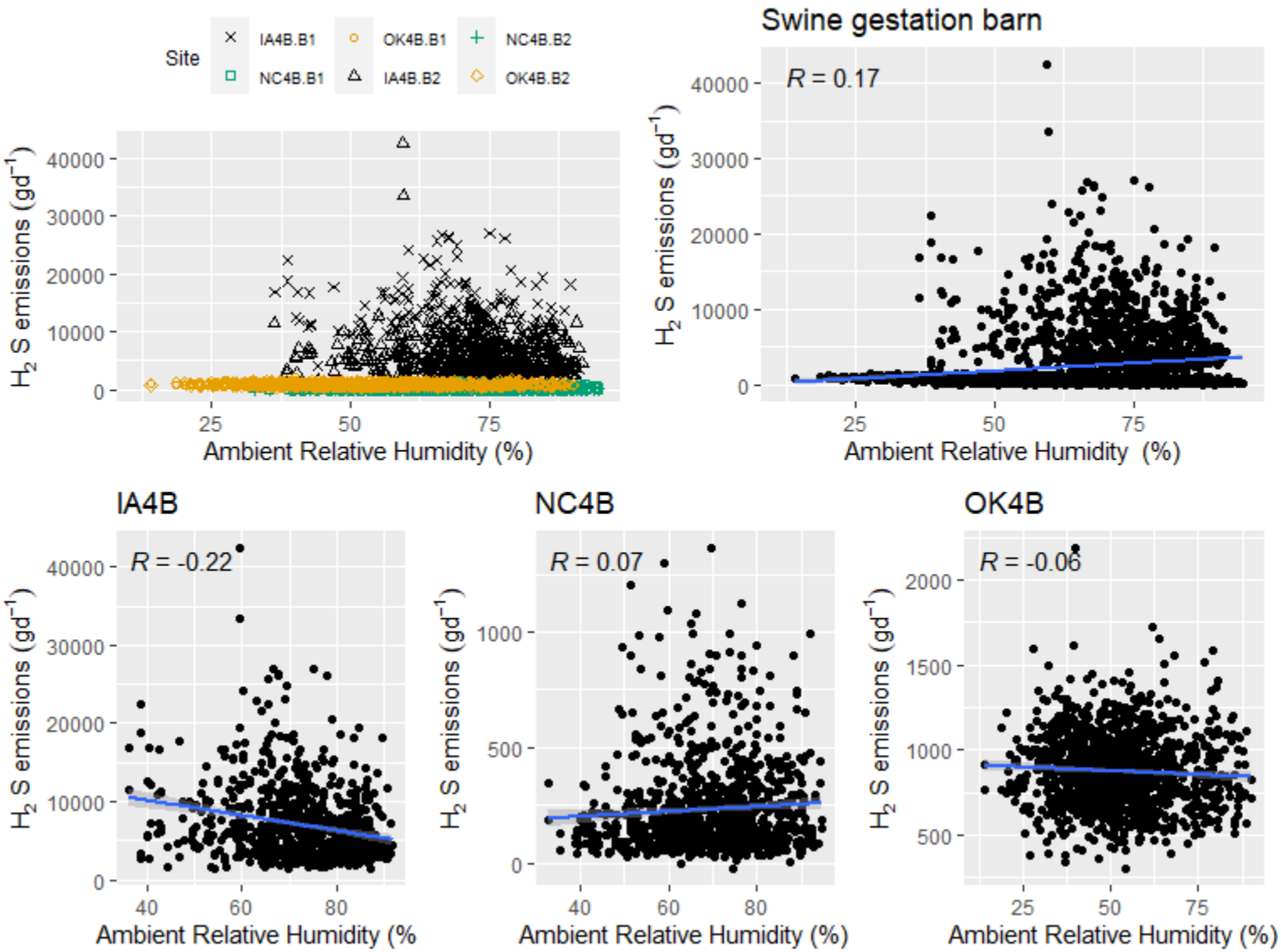


**Figure F.2-69. Scatter plot of swine gestation barn $H_2S$ emissions (g $d^{-1}$) versus ambient relative humidity.**

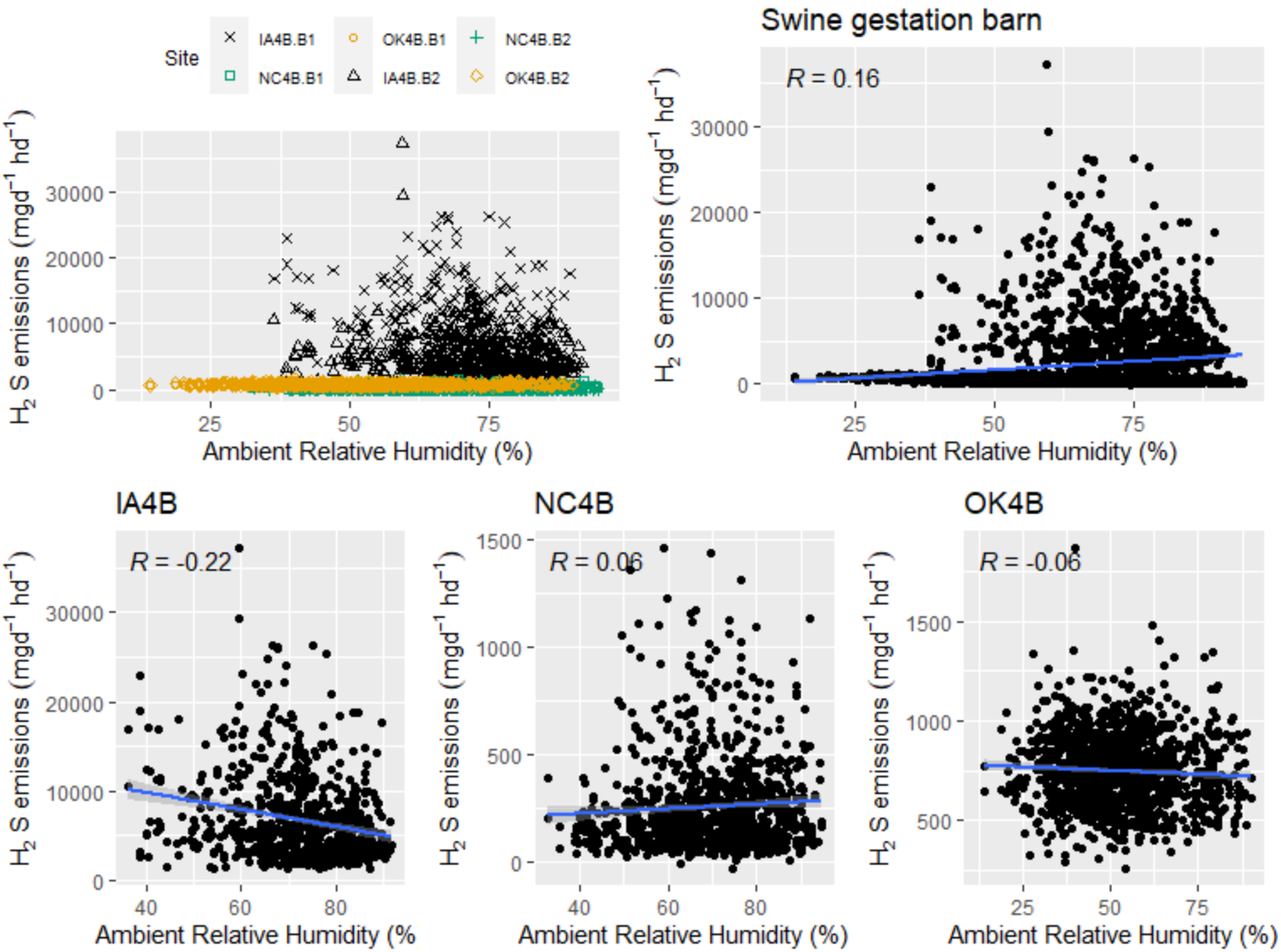


**Figure F.2-70. Scatter plot of swine gestation barn $H_2S$ emissions (mg $d^{-1}hd^{-1}$) versus ambient relative humidity.**

F.2.2.2.3 Air pressure

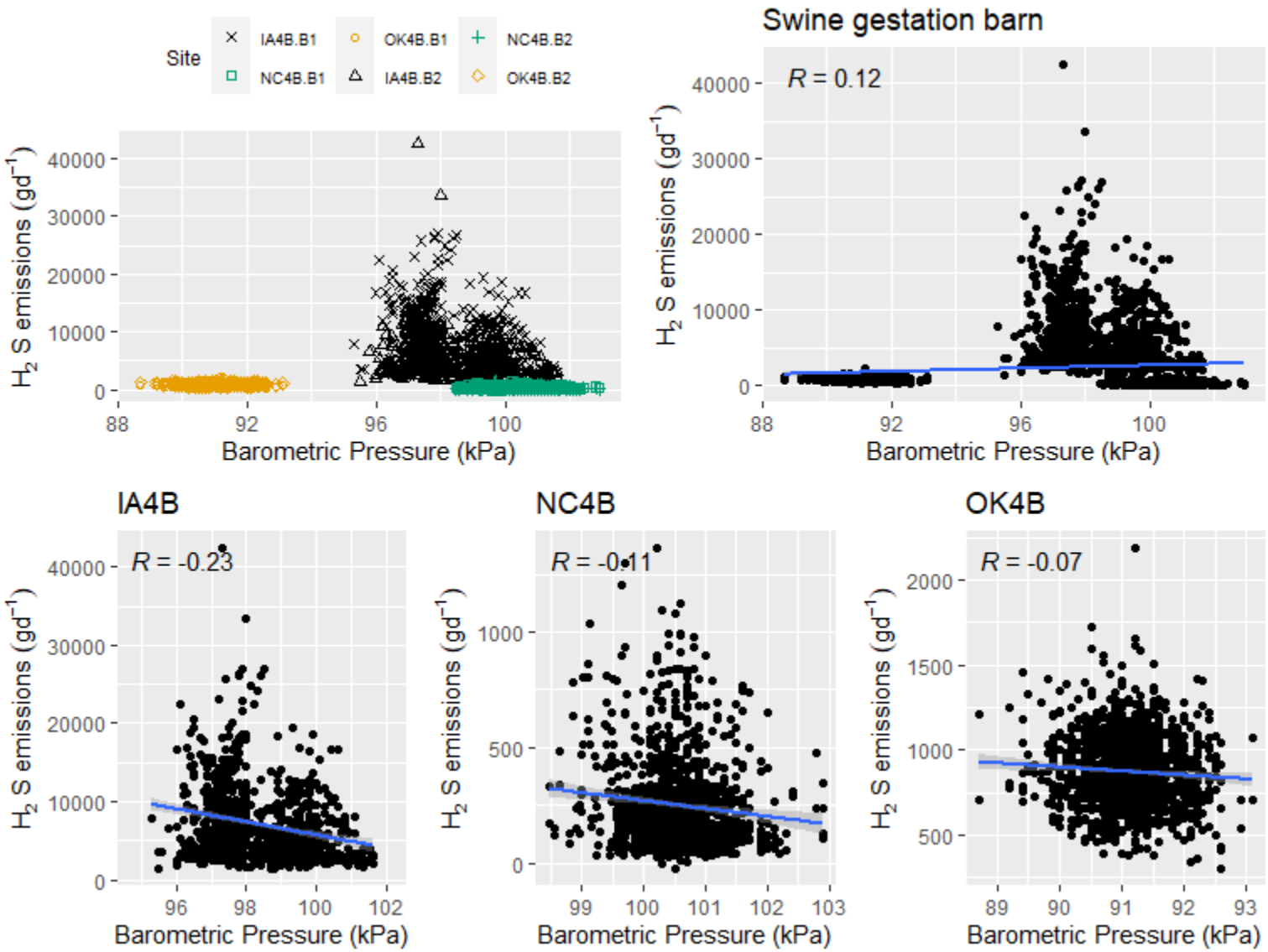


**Figure F.2-71. Scatter plot of swine gestation barn $H_2S$ emissions (g $d^{-1}$) versus air pressure.**

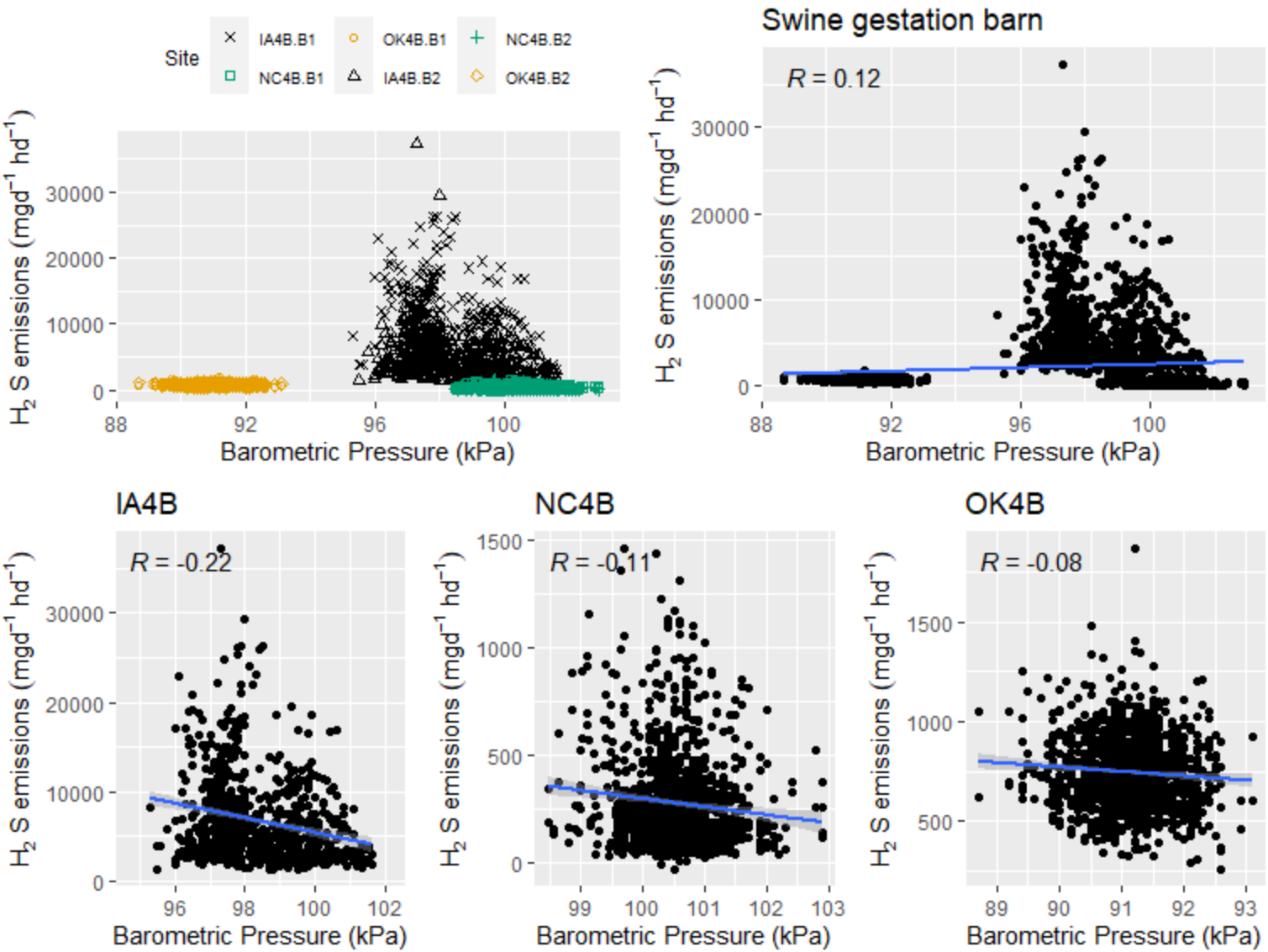


**Figure F.2-72. Scatter plot of swine gestation barn $H_2S$ emissions (mg $d^{-1}hd^{-1}$) versus air pressure.**

### *F.2.2.3 Particulate Matter ($PM_{10}$)*

F.2.2.3.1 Ambient temperature

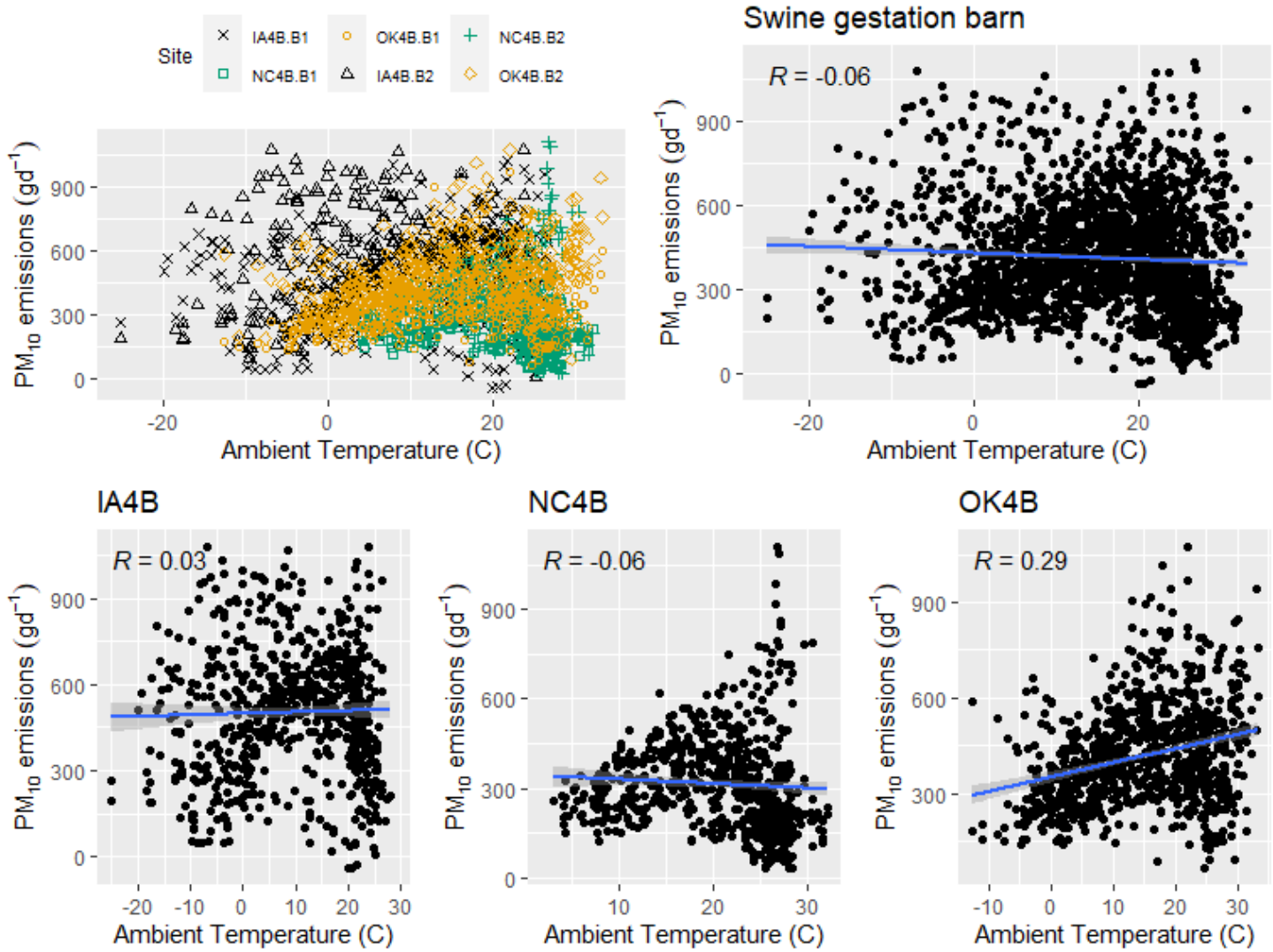


**Figure F.2-73. Scatter plot of swine gestation barn $PM_{10}$ emissions (g $d^{-1}$) versus ambient temperature.**

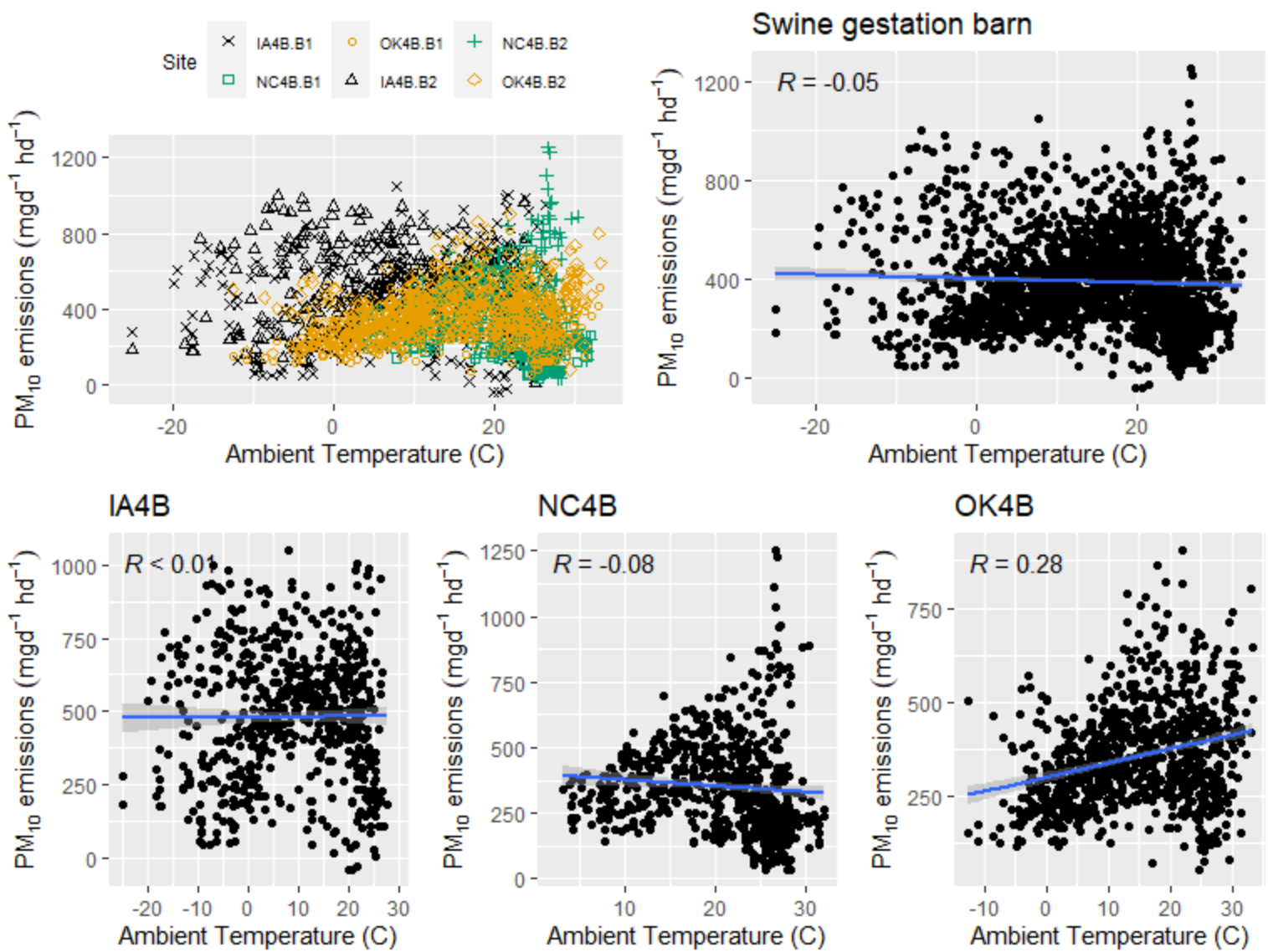


**Figure F.2-74. Scatter plot of swine gestation barn $PM_{10}$ emissions (mg $d^{-1}hd^{-1}$) versus ambient temperature.**

F.2.2.3.2 Ambient relative humidity

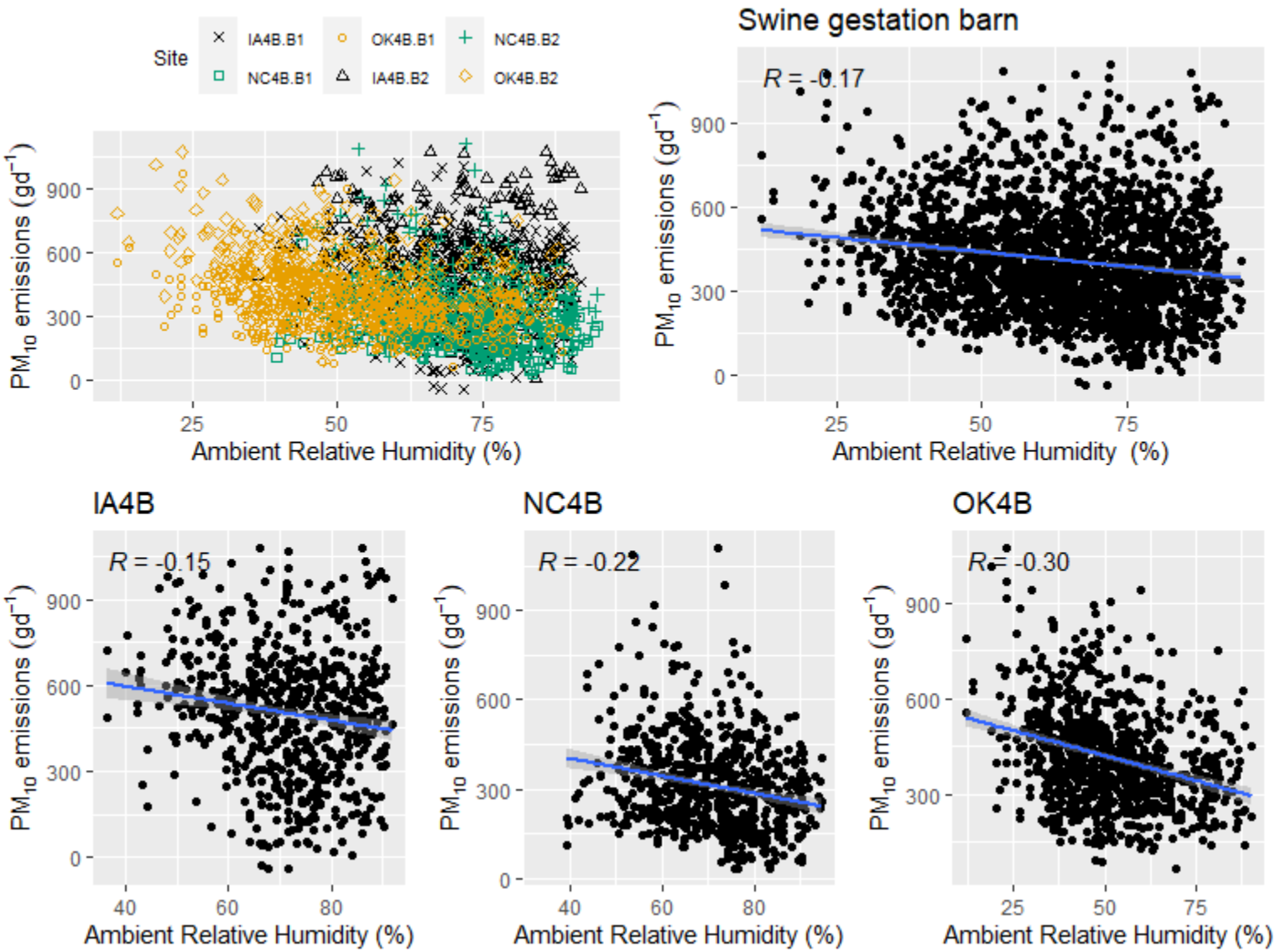


**Figure F.2-75. Scatter plot of swine gestation barn $PM_{10}$ emissions (g $d^{-1}$) versus ambient relative humidity.**

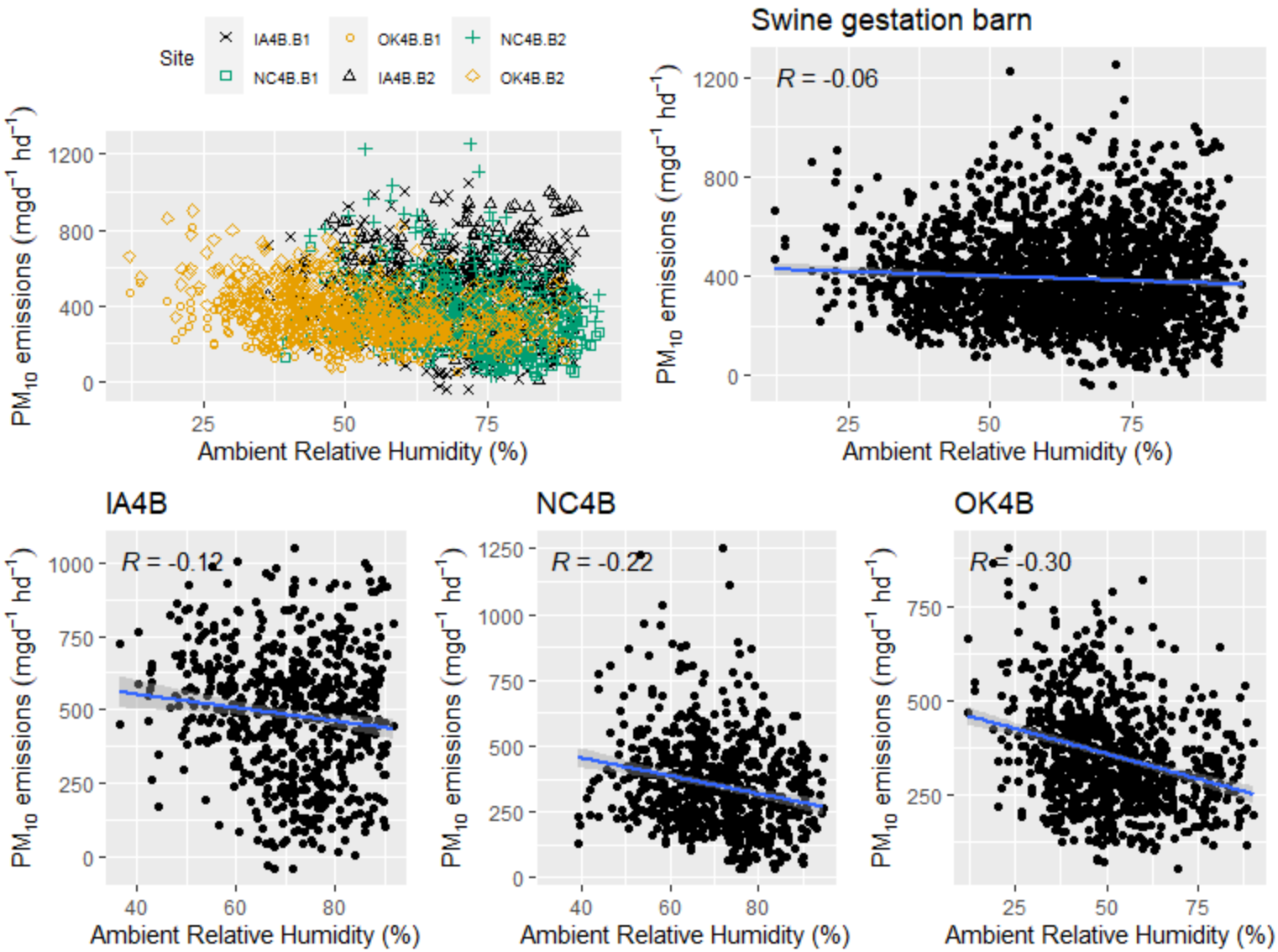


**Figure F.2-76. Scatter plot of swine gestation barn $PM_{10}$ emissions (mg $d^{-1}hd^{-1}$) versus ambient relative humidity.**

F.2.2.3.3 Air pressure

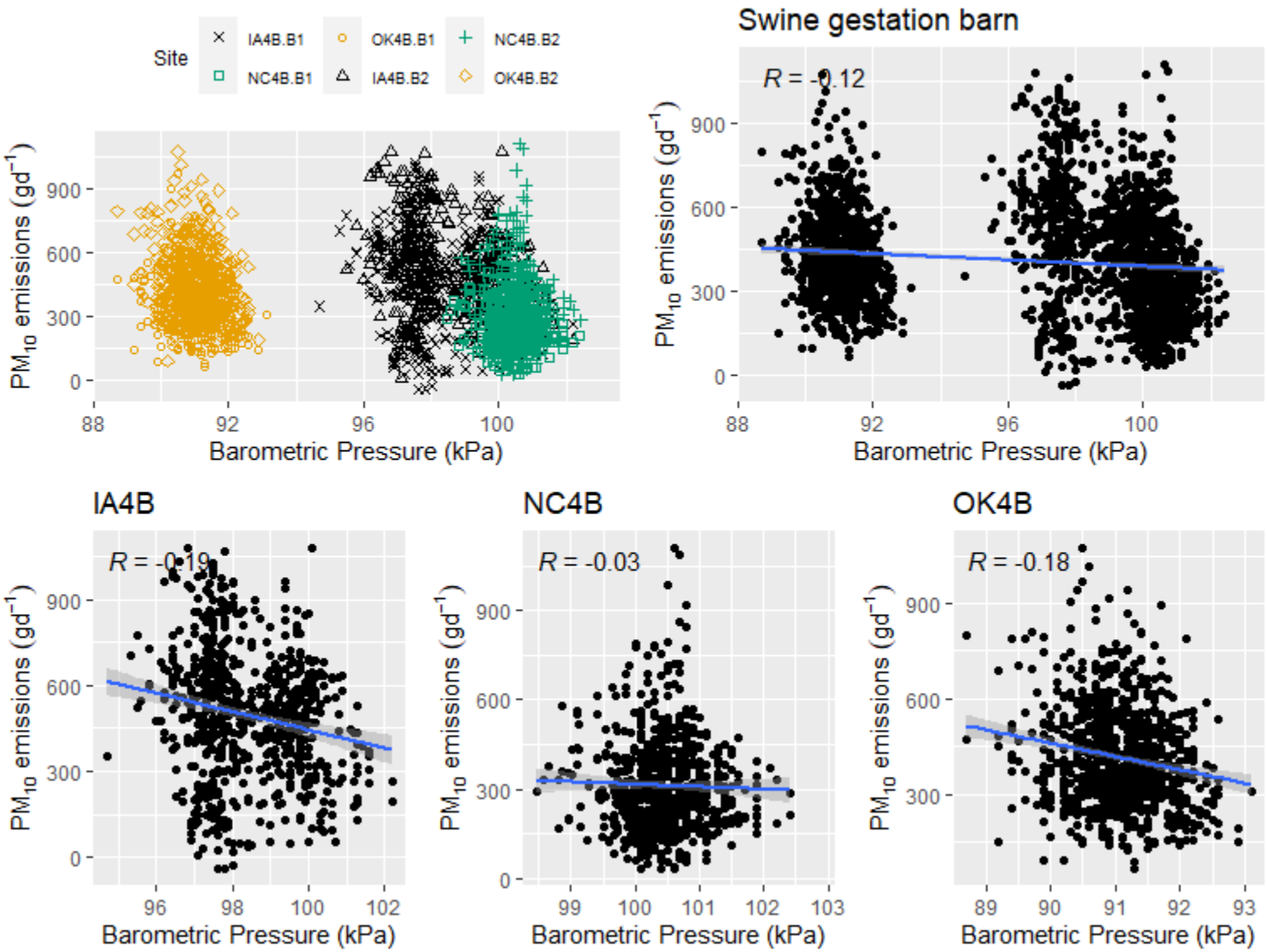


**Figure F.2-77. Scatter plot of swine gestation barn $PM_{10}$ emissions (g $d^{-1}$) versus air pressure.**

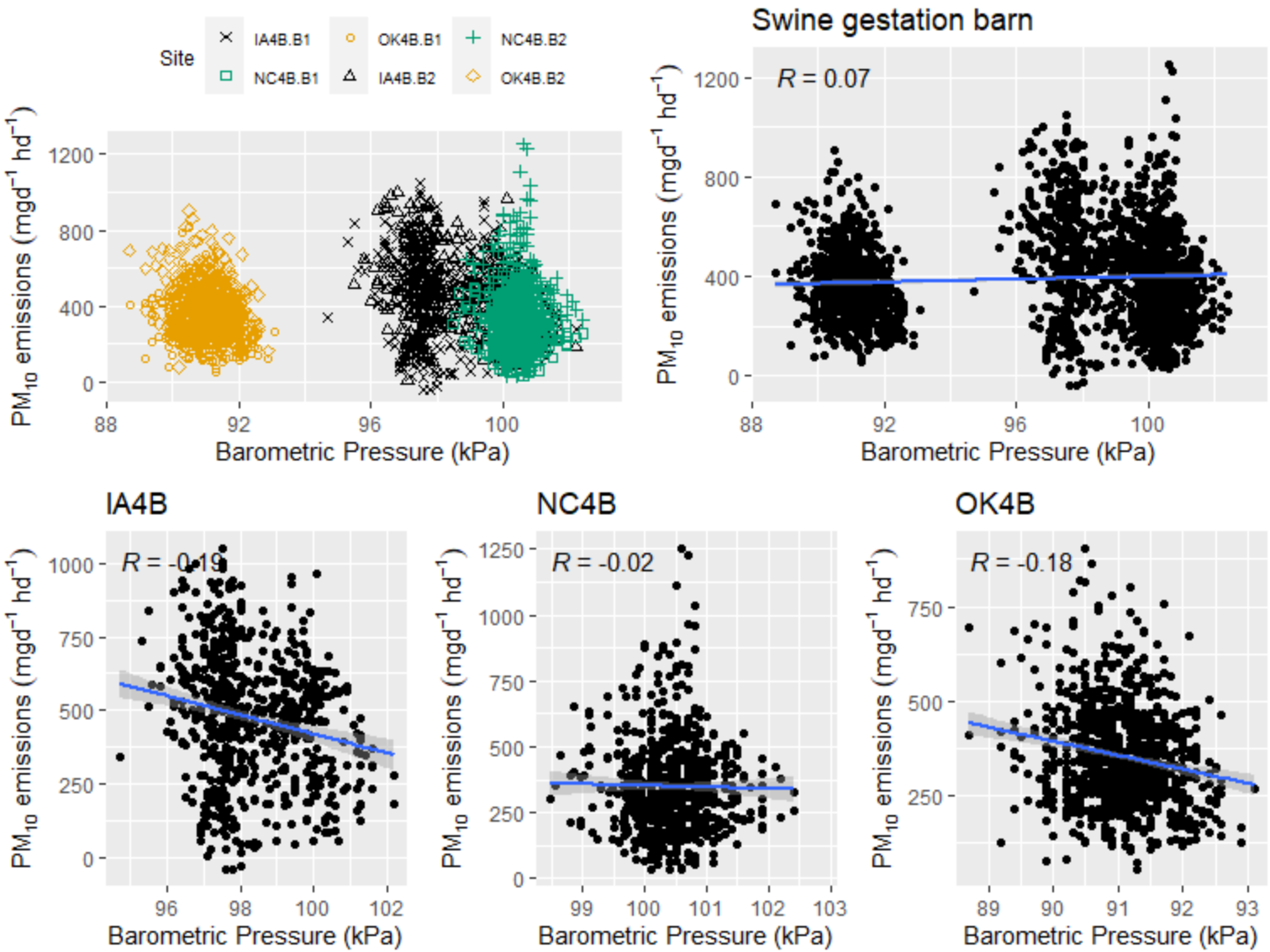


**Figure F.2-78. Scatter plot of swine gestation barn $PM_{10}$ emissions (mg $d^{-1}hd^{-1}$) versus air pressure.**

### *F.2.2.4 Fine Particulate Matter ($PM_{2.5}$)*

F.2.2.4.1 Ambient temperature

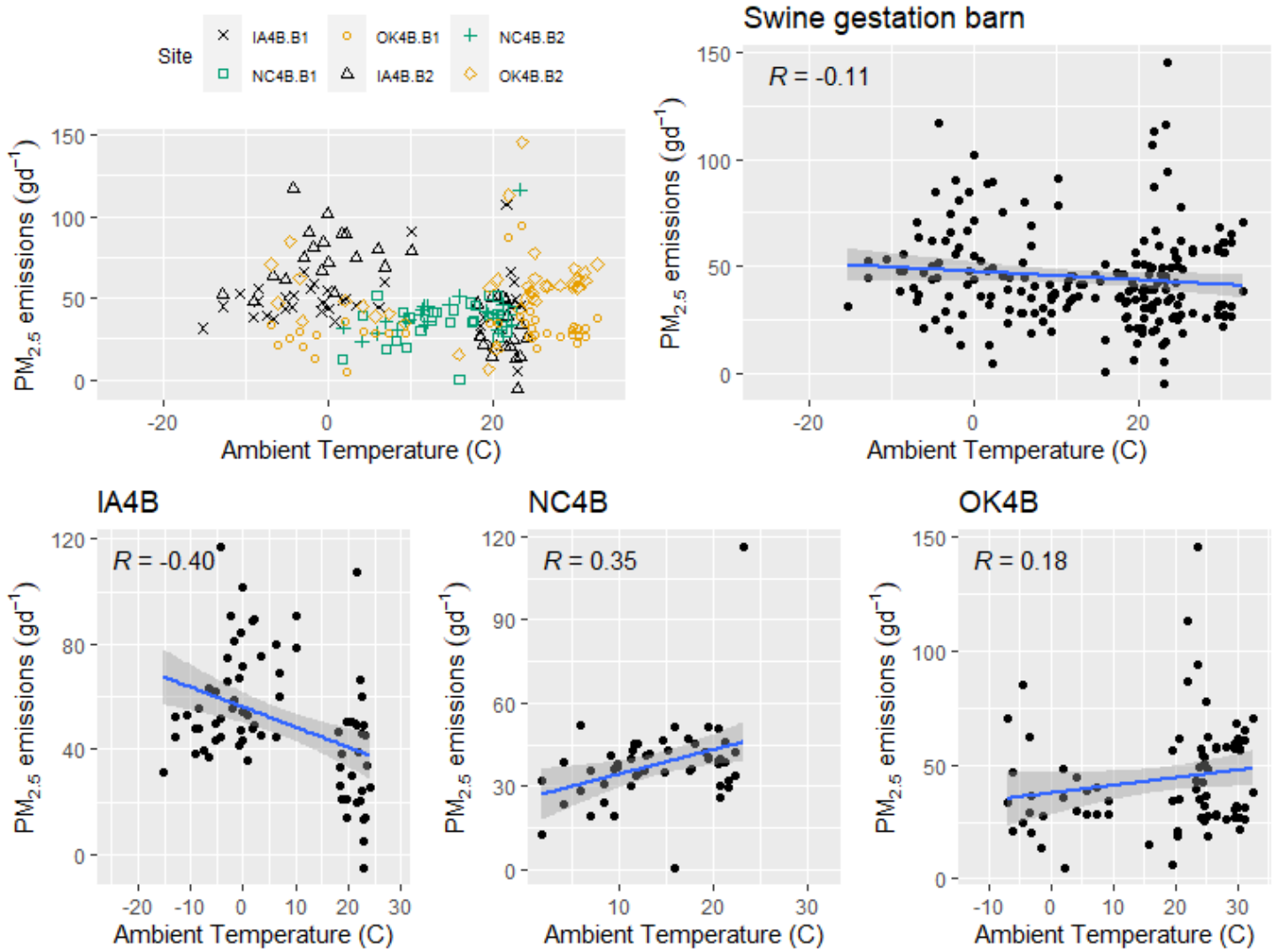


**Figure F.2-79. Scatter plot of swine gestation barn $PM_{2.5}$ emissions (g $d^{-1}$) versus ambient temperature.**

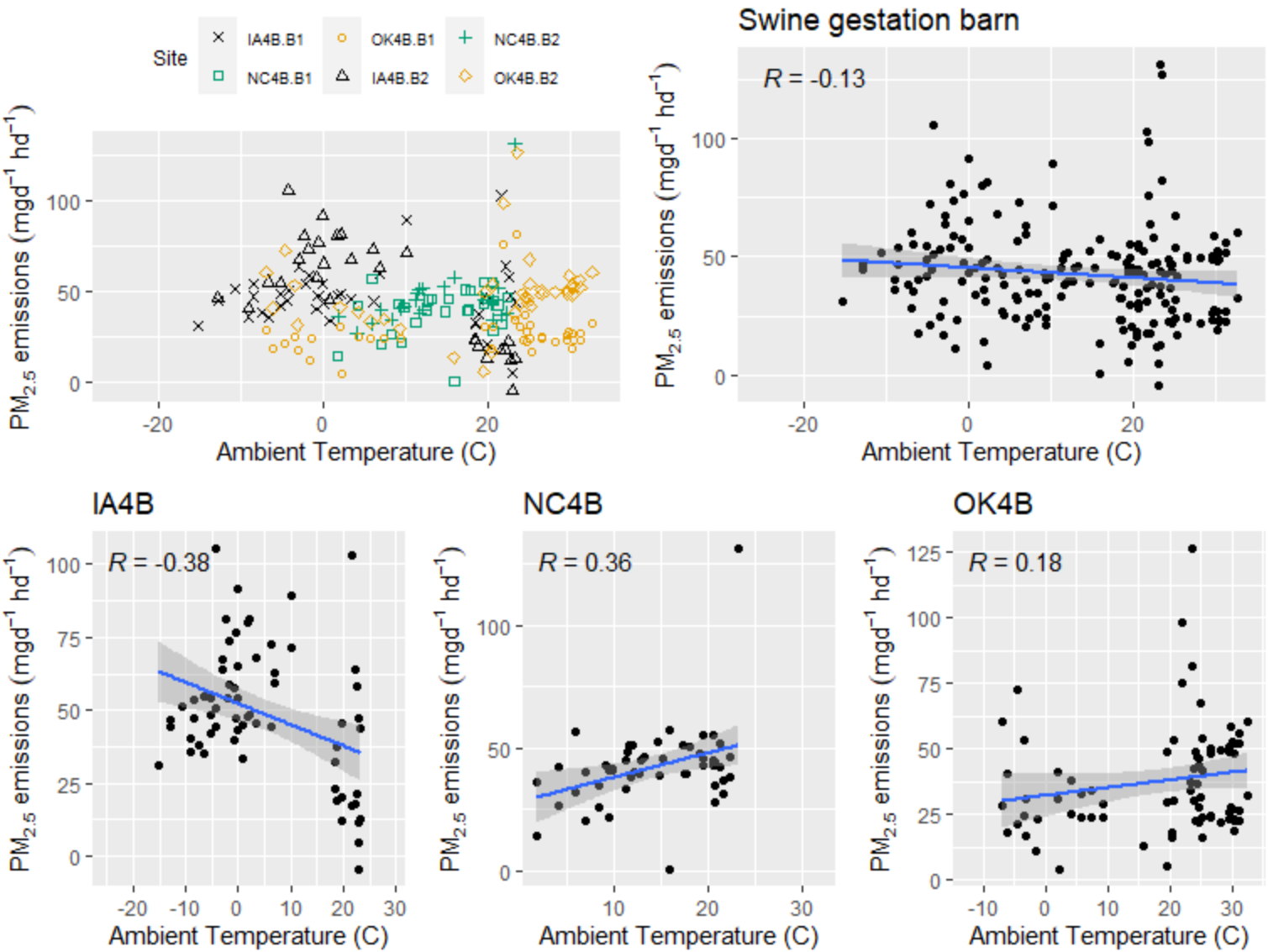


**Figure F.2-80. Scatter plot of swine gestation barn $PM_{2.5}$ emissions (mg $d^{-1}hd^{-1}$) versus ambient temperature.**

F.2.2.4.2 Ambient relative humidity

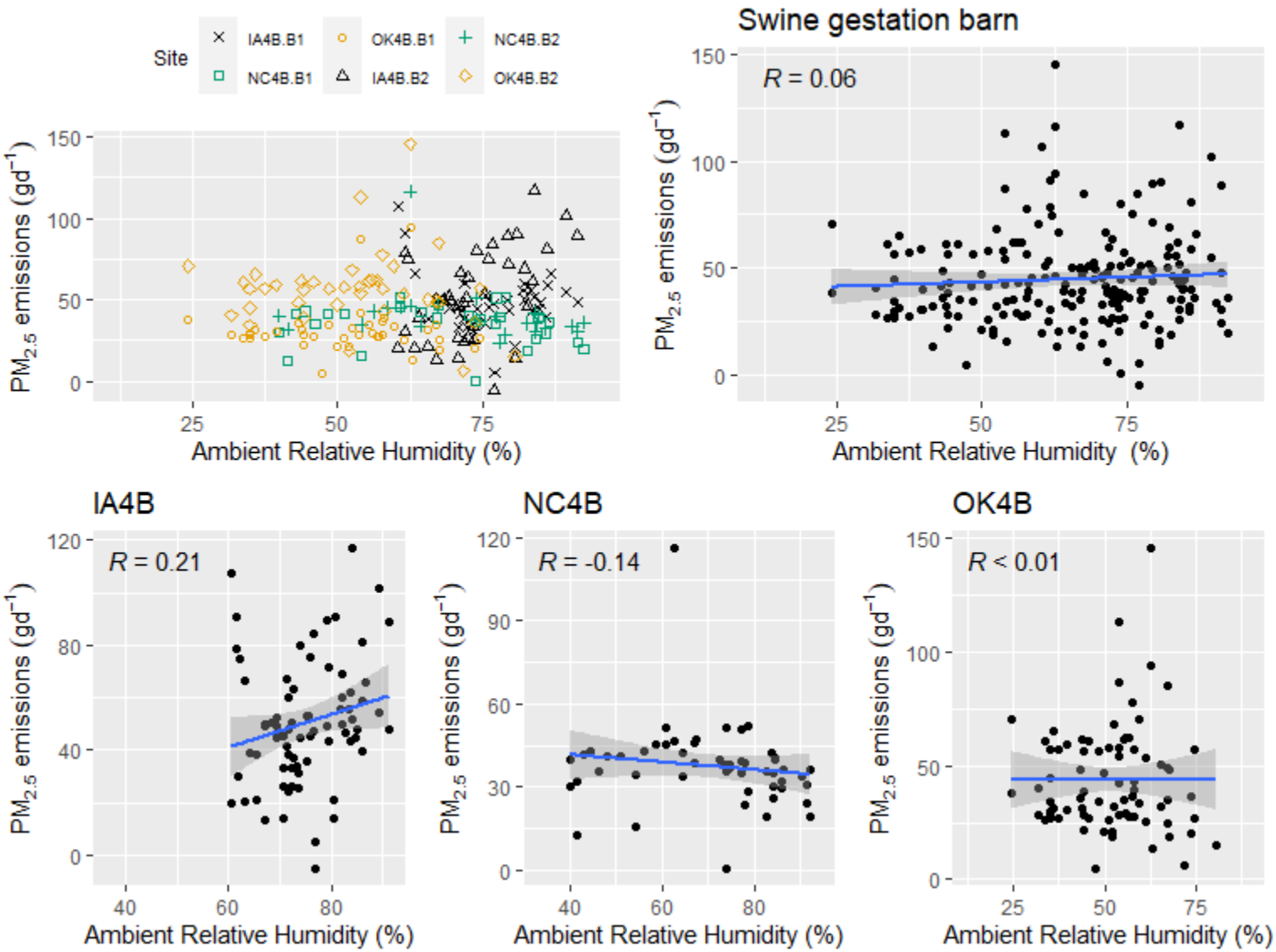


**Figure F.2-81. Scatter plot of swine gestation barn $PM_{2.5}$ emissions (g $d^{-1}$) versus ambient relative humidity.**

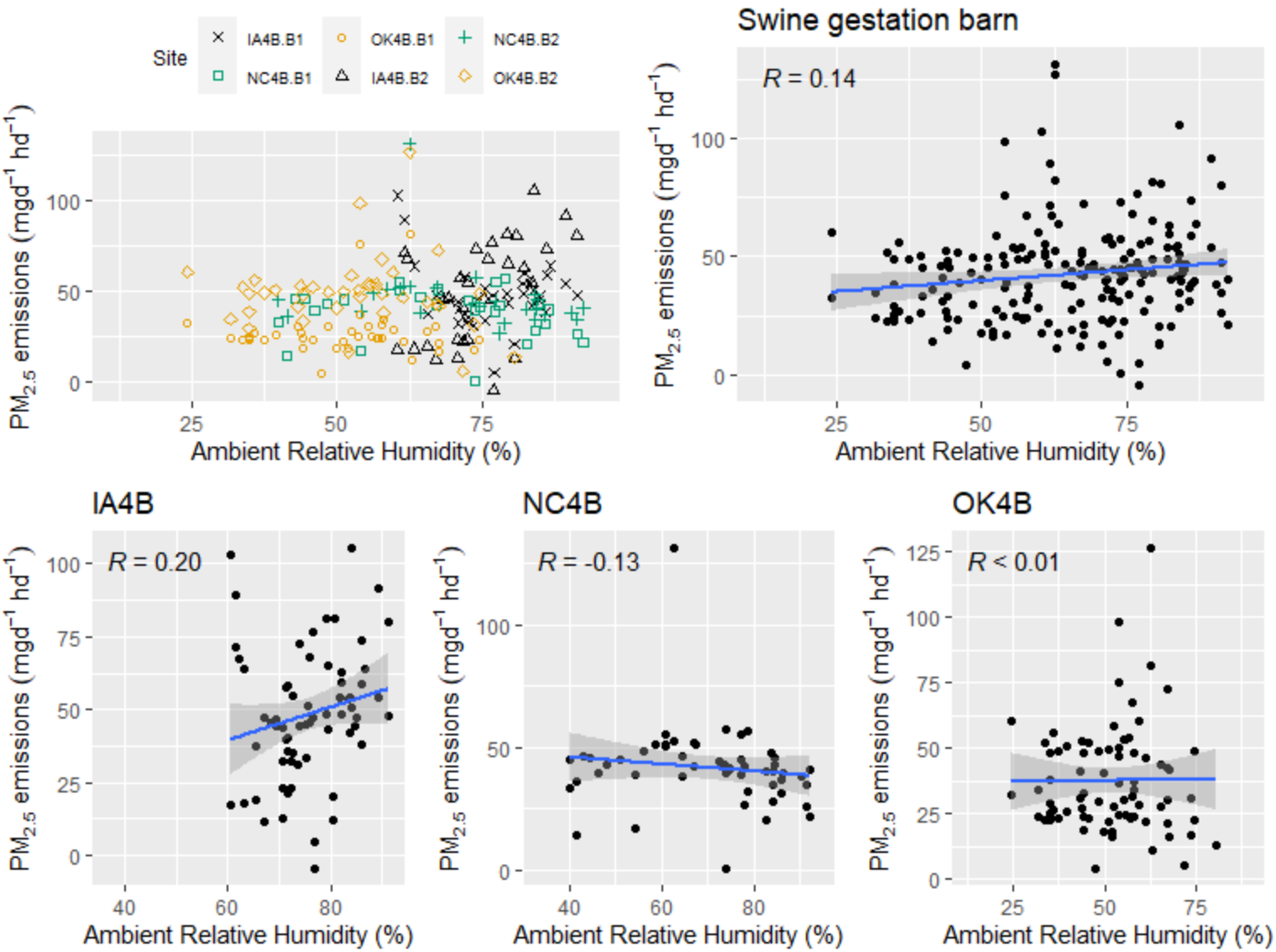


**Figure F.2-82. Scatter plot of swine gestation barn $PM_{2.5}$ emissions (mg $d^{-1}hd^{-1}$) versus ambient relative humidity.**

F.2.2.4.3 Air pressure

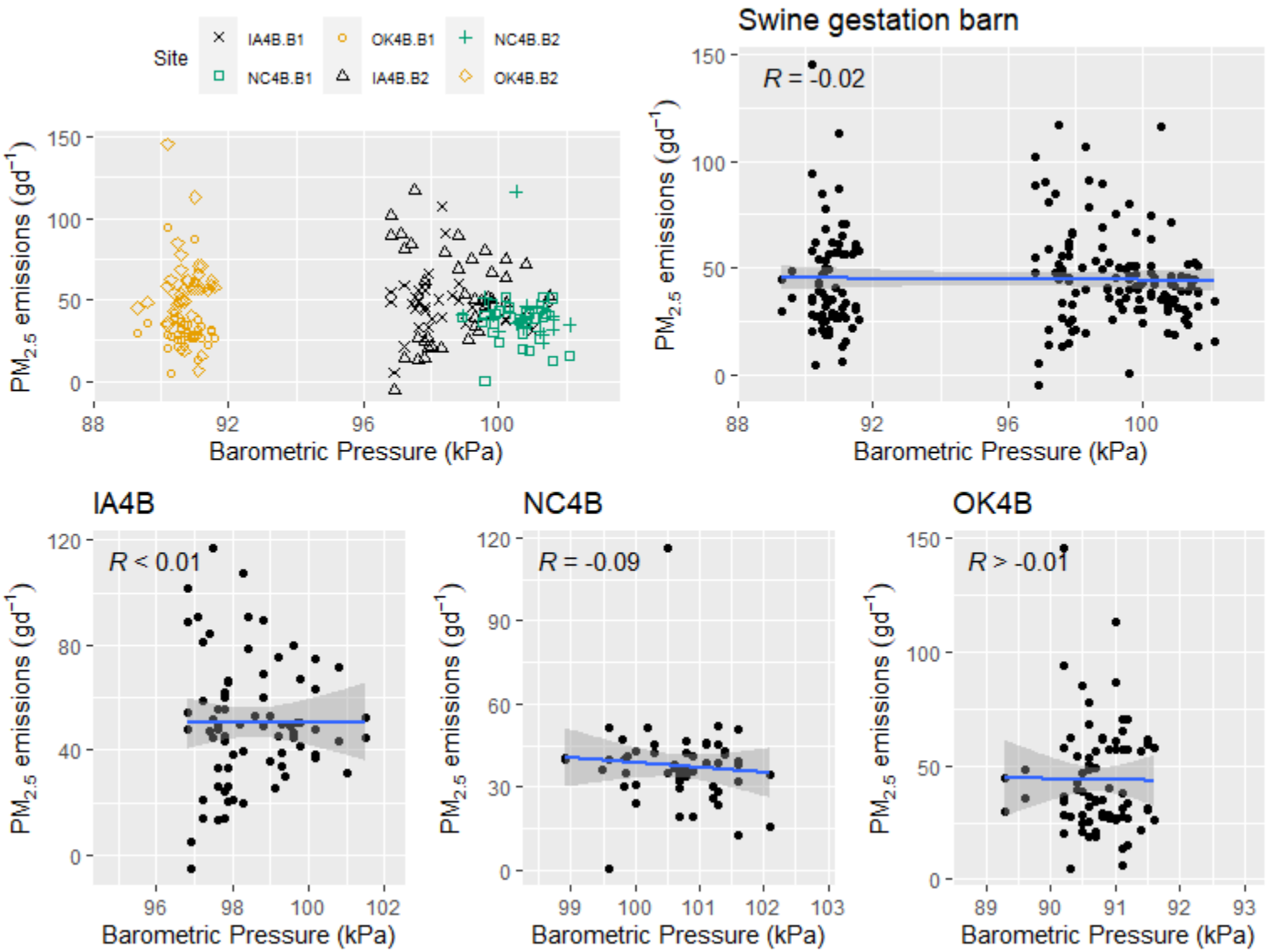


**Figure F.2-83. Scatter plot of swine gestation barn $PM_{2.5}$ emissions (g $d^{-1}$) versus air pressure.**

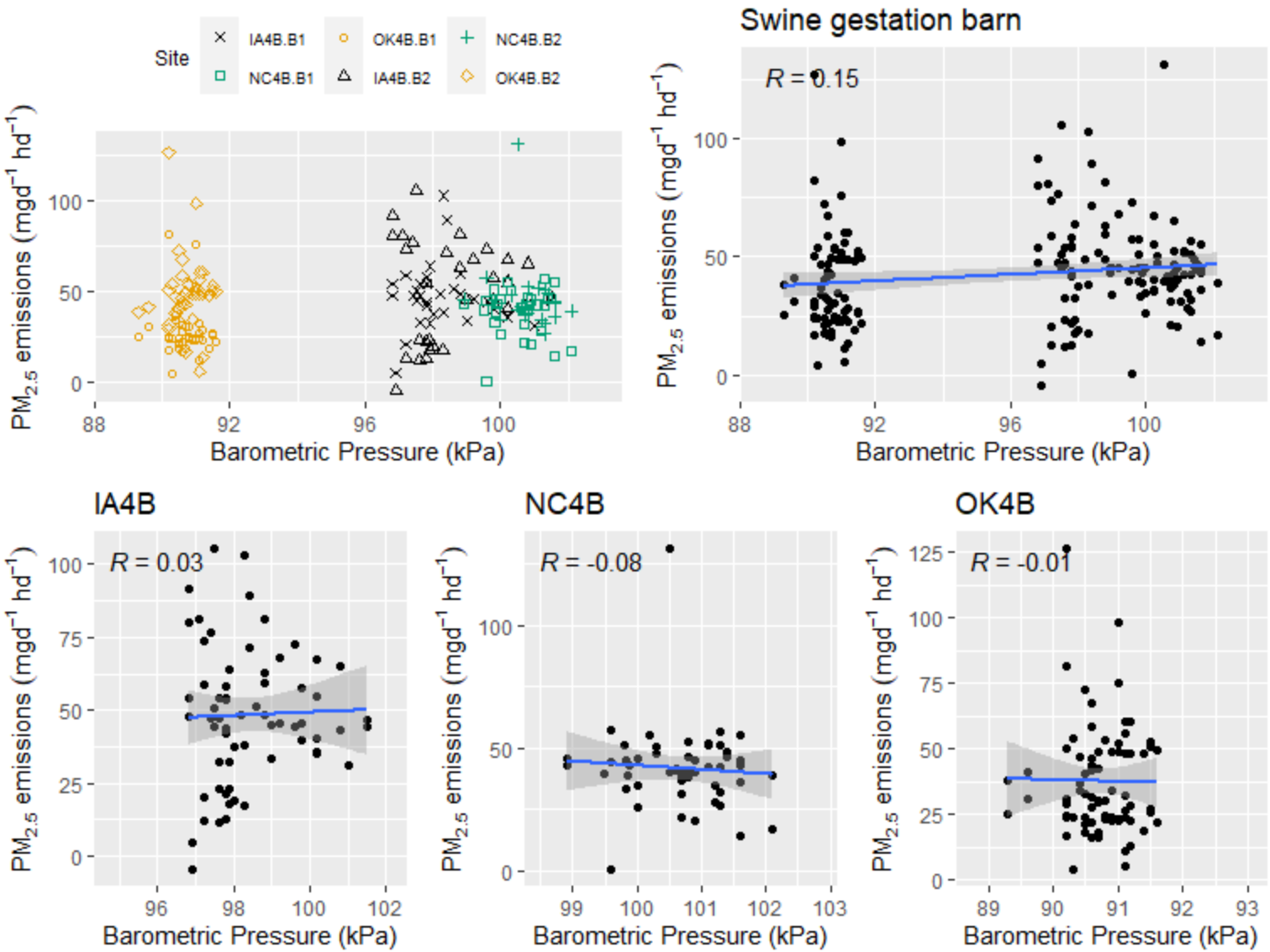


**Figure F.2-84. Scatter plot of swine gestation barn $PM_{2.5}$ emissions (mg $d^{-1}hd^{-1}$) versus air pressure.**

### *F.2.2.5 Total Suspended Particulates (TSP)*

F.2.2.5.1 Ambient temperature

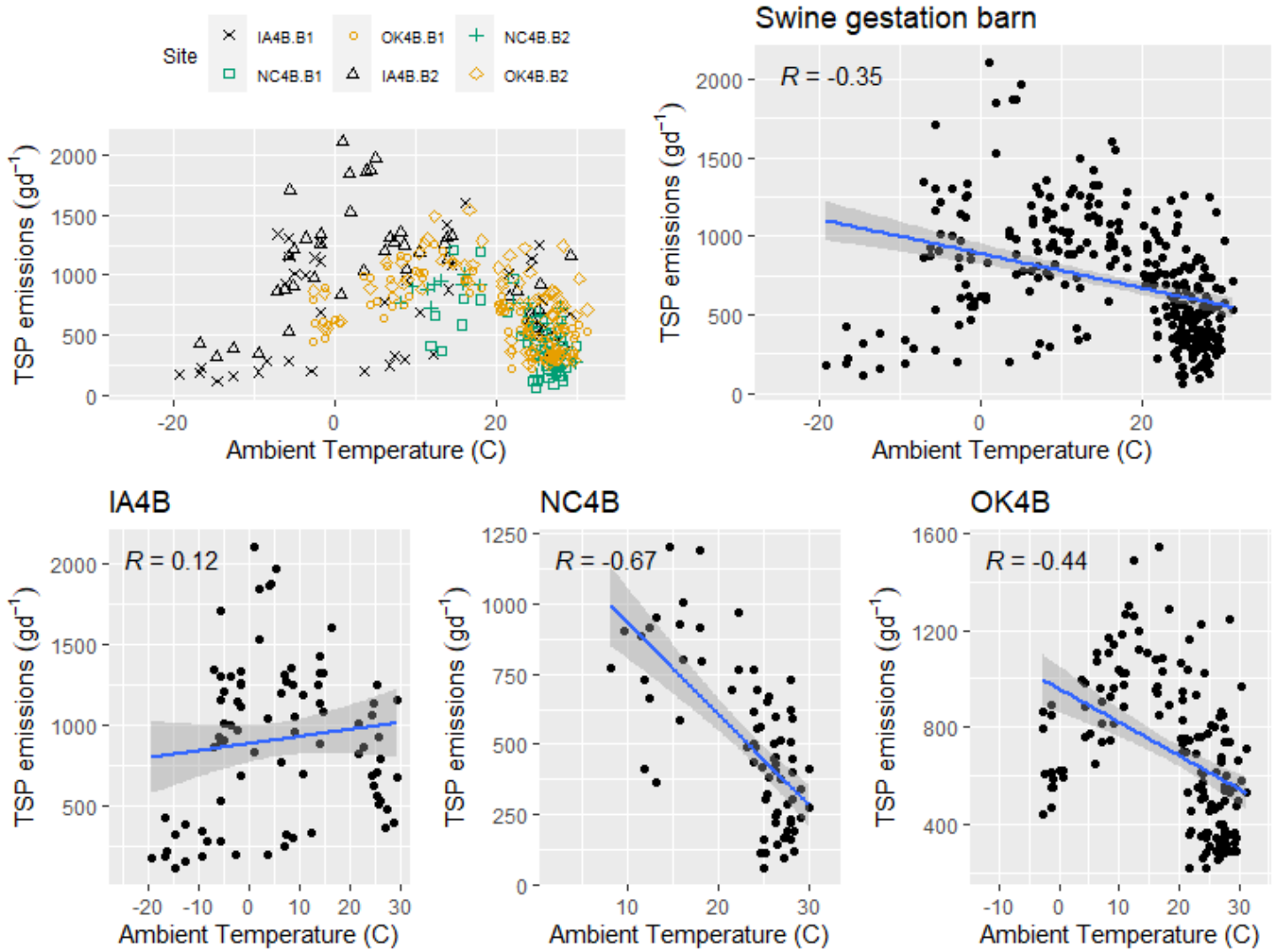


**Figure F.2-85. Scatter plot of swine gestation barn TSP emissions (g d$^{-1}$) versus ambient temperature.**

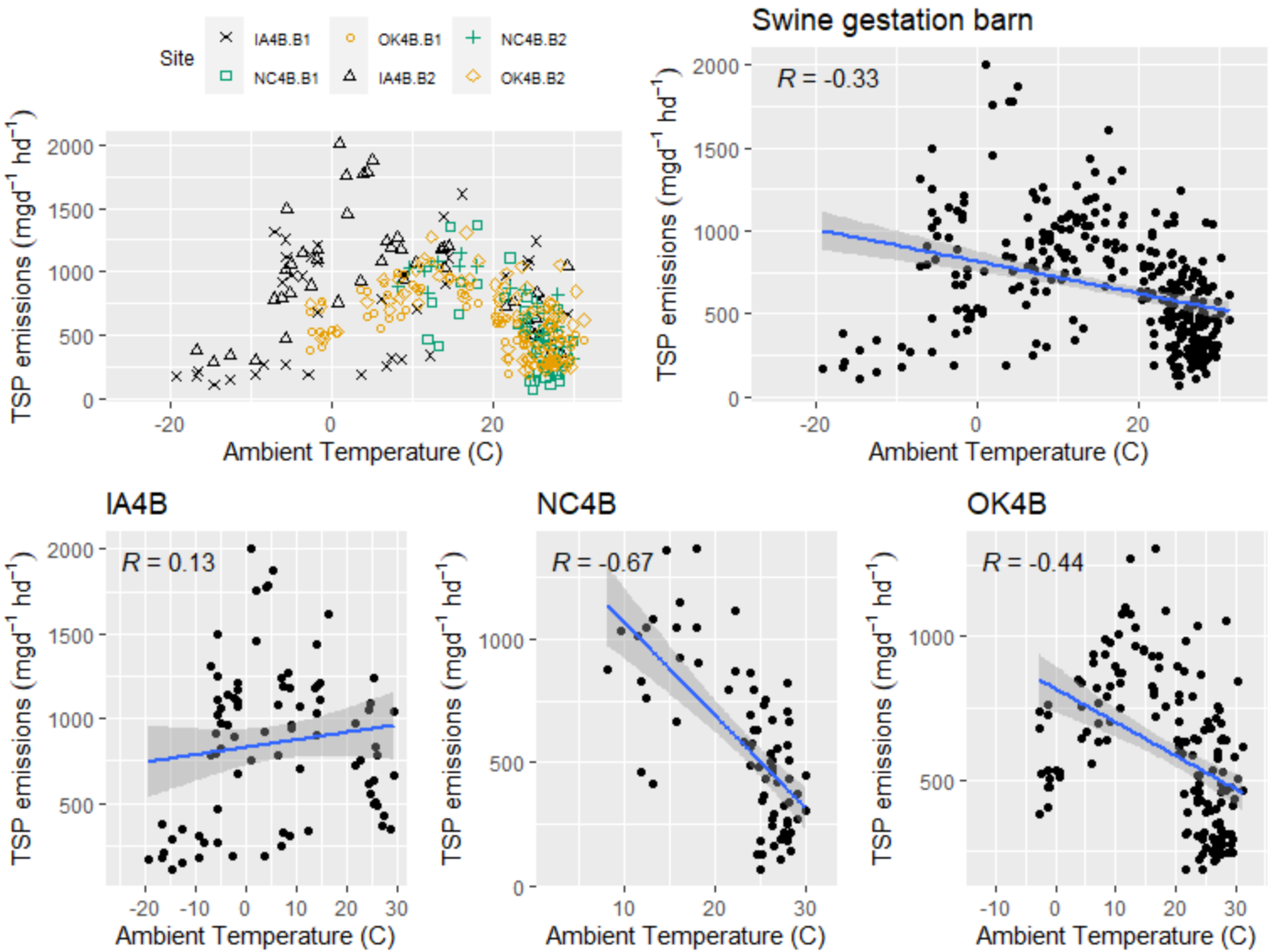


**Figure F.2-86. Scatter plot of swine gestation barn TSP emissions (mg d$^{-1}$hd$^{-1}$) versus ambient temperature.**

F.2.2.5.2 Ambient relative humidity

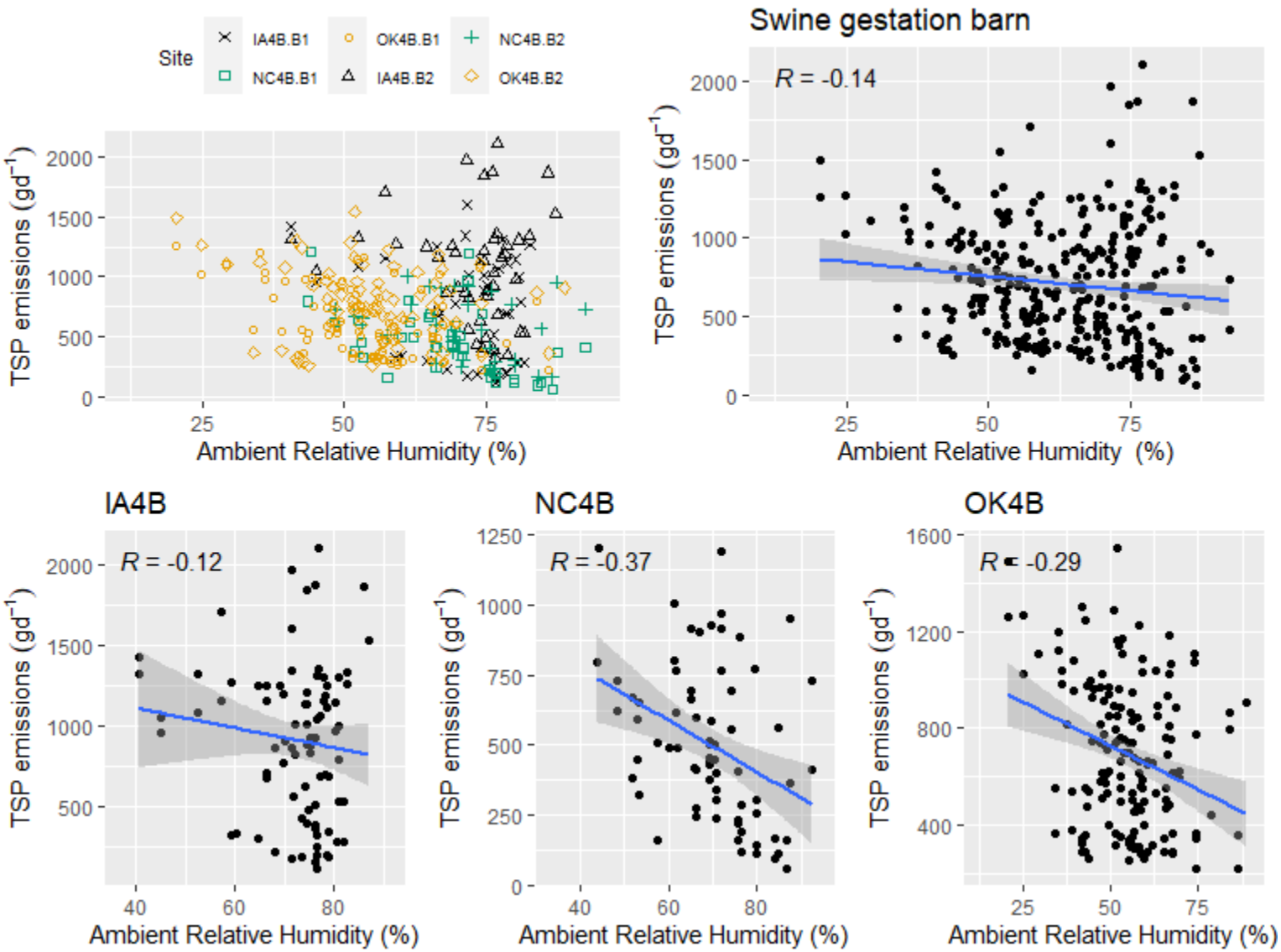


**Figure F.2-87. Scatter plot of swine gestation barn TSP emissions (g d$^{-1}$) versus ambient relative humidity.**

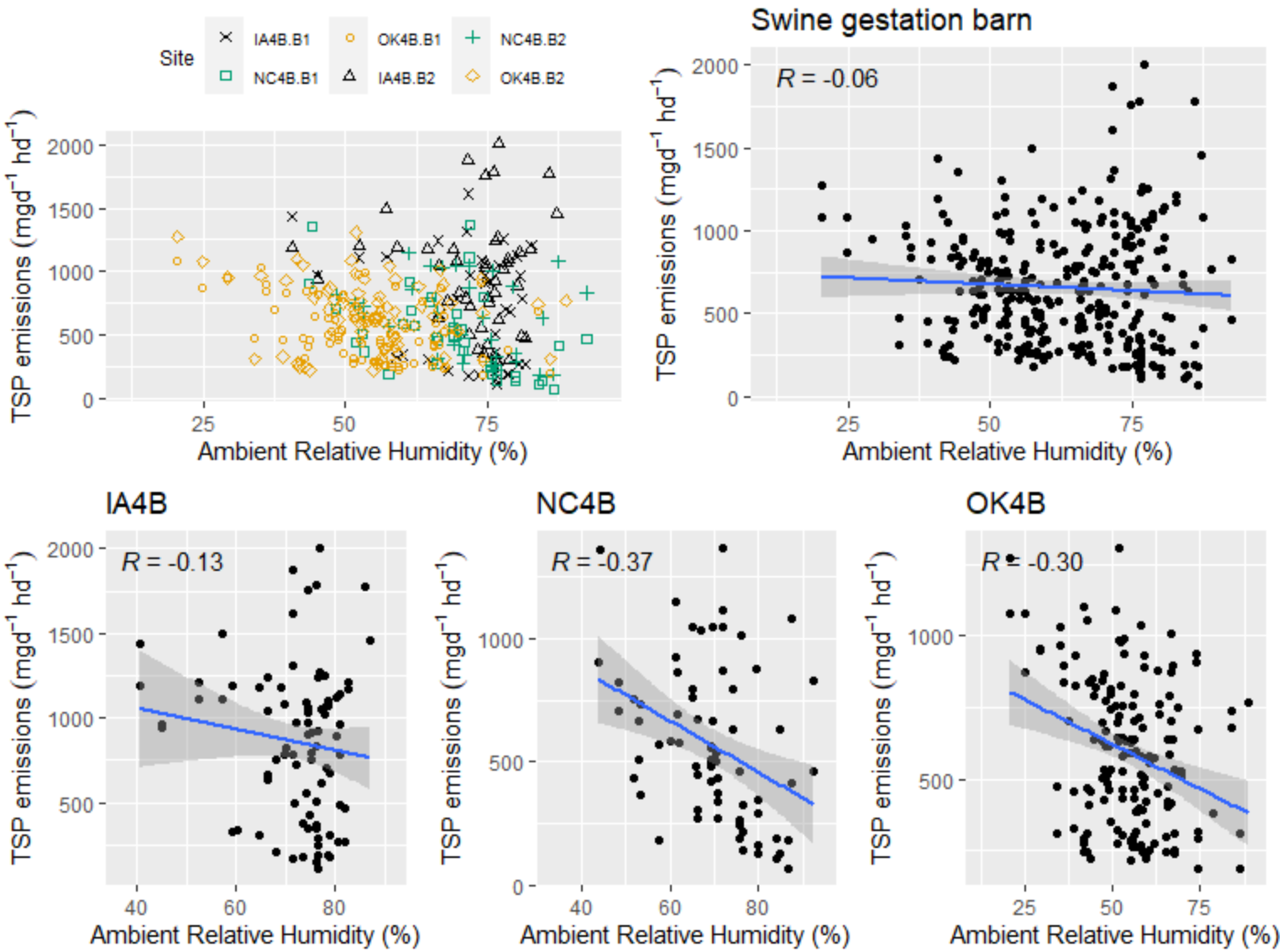


**Figure F.2-88. Scatter plot of swine gestation barn TSP emissions (mg d$^{-1}$hd$^{-1}$) versus ambient relative humidity.**

F.2.2.5.3 Air pressure

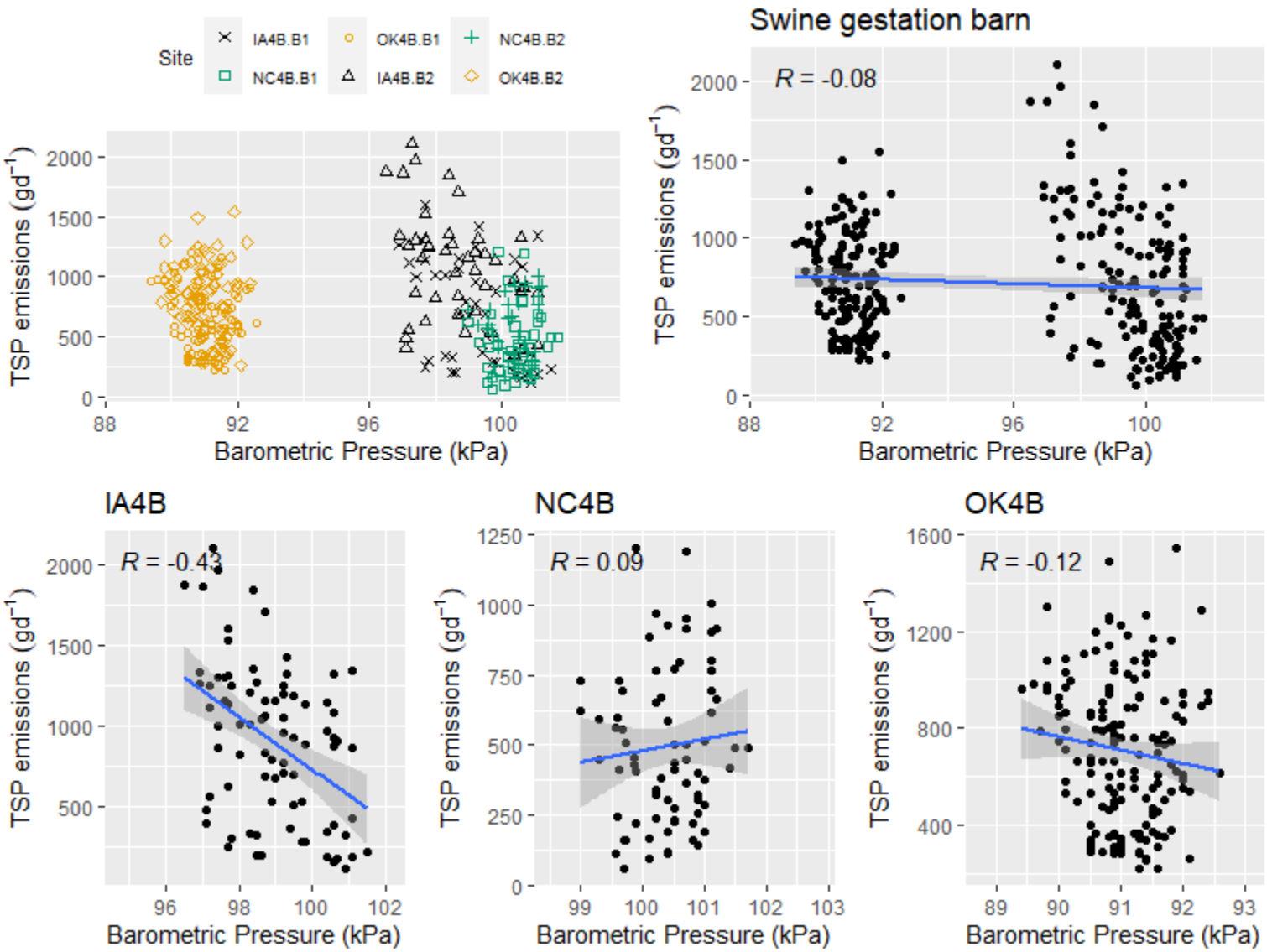


**Figure F.2-89. Scatter plot of swine gestation barn TSP emissions (g d$^{-1}$) versus air pressure.**

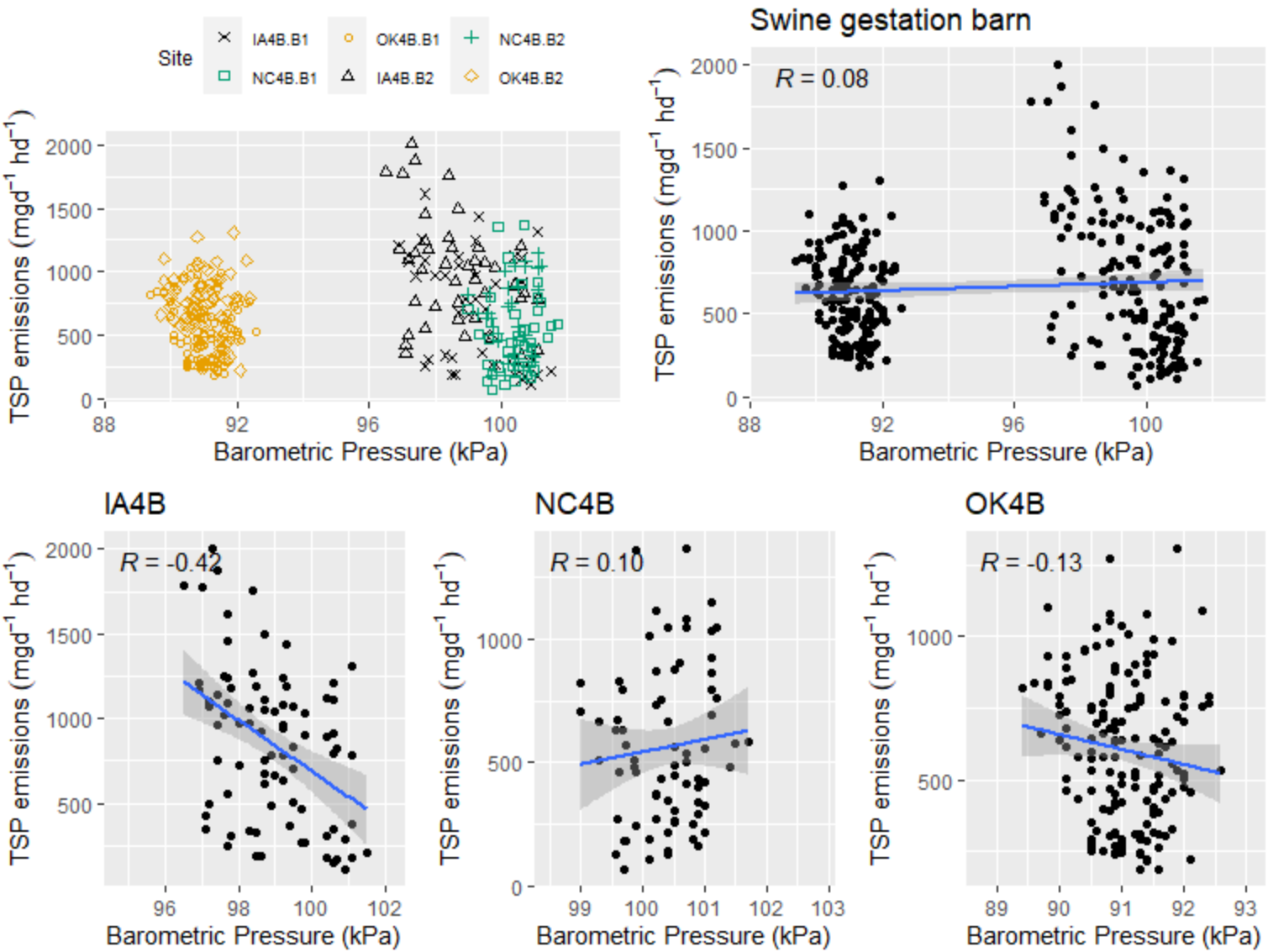


**Figure F.2-90. Scatter plot of swine gestation barn TSP emissions (mg d$^{-1}$hd$^{-1}$) versus air pressure.**

## F.3 Farrowing Rooms

### *F.3.1 Environmental*

**Table F.3.1. Summary of swine farrowing rooms $R^2$ values for environmental parameters (kg $d^{-1}$).**

| Pollutant | Parameter | R | $R^2$ | Strength | Figure |
|---|---|---|---|---|---|
| $NH_3$ ($kgd^{-1}$) | Inventory (hd) | 0.36 | 0.13 | slight or weak | F.3-1 |
| $NH_3$ ($gd^{-1}hd^{-1}$) | Inventory (hd) | -0.34 | 0.11 | slight or weak | F.3-2 |
| $NH_3$ ($kgd^{-1}$) | Average weight (kg) | -0.06 | 0.00 | slight or weak | F.3-3 |
| $NH_3$ ($gd^{-1}hd^{-1}$) | Average weight (kg) | 0.61 | 0.37 | modest | F.3-4 |
| $NH_3$ ($kgd^{-1}$) | Live animal weight (kg) | 0.46 | 0.21 | modest | F.3-5 |
| $NH_3$ ($gd^{-1}hd^{-1}$) | Live animal weight (kg) | -0.02 | 0.00 | slight or weak | F.3-6 |
| $NH_3$ ($kgd^{-1}$) | Exhaust Temperature (°C) | -0.03 | 0.00 | slight or weak | F.3-7 |
| $NH_3$ ($kgd^{-1}$) | Exhaust Relative humidity (%) | -0.09 | 0.01 | slight or weak | F.3-8 |
| $NH_3$ ($gd^{-1}hd^{-1}$) | Exhaust Temperature (°C) | 0.08 | 0.01 | slight or weak | F.3-9 |
| $NH_3$ ($gd^{-1}hd^{-1}$) | Exhaust Relative humidity (%) | 0.00 | 0.00 | slight or weak | F.3-10 |
| $NH_3$ ($kgd^{-1}$) | Airflow ($dsm^3s^{-1}$) | 0.41 | 0.17 | slight or weak | F.3-11 |
| $NH_3$ ($gd^{-1}hd^{-1}$) | Airflow ($dsm^3s^{-1}$) | 0.23 | 0.06 | slight or weak | F.3-12 |
| $H_2S$ ($gd^{-1}$) | Inventory (hd) | -0.15 | 0.02 | slight or weak | F.3-13 |
| $H_2S$ ($mgd^{-1}hd^{-1}$) | Inventory (hd) | -0.52 | 0.27 | modest | F.3-14 |
| $H_2S$ ($gd^{-1}$) | Average weight (kg) | 0.05 | 0.00 | slight or weak | F.3-15 |
| $H_2S$ ($mgd^{-1}hd^{-1}$) | Average weight (kg) | 0.62 | 0.38 | modest | F.3-16 |
| $H_2S$ ($gd^{-1}$) | Live animal weight (kg) | -0.01 | 0.00 | slight or weak | F.3-17 |
| $H_2S$ ($mgd^{-1}hd^{-1}$) | Live animal weight (kg) | -0.28 | 0.08 | slight or weak | F.3-18 |
| $H_2S$ ($gd^{-1}$) | Exhaust Temperature (°C) | 0.18 | 0.03 | slight or weak | F.3-19 |
| $H_2S$ ($mgd^{-1}hd^{-1}$) | Exhaust Temperature (°C) | 0.13 | 0.02 | slight or weak | F.3-20 |
| $H_2S$ ($gd^{-1}$) | Exhaust Relative humidity (%) | 0.17 | 0.03 | slight or weak | F.3-21 |
| $H_2S$ ($mgd^{-1}hd^{-1}$) | Exhaust Relative humidity (%) | 0.10 | 0.01 | slight or weak | F.3-22 |
| $H_2S$ ($gd^{-1}$) | Airflow ($dsm^3s^{-1}$) | 0.15 | 0.02 | slight or weak | F.3-23 |
| $H_2S$ ($mgd^{-1}hd^{-1}$) | Airflow ($dsm^3s^{-1}$) | 0.04 | 0.00 | slight or weak | F.3-24 |
| $PM_{10}$ ($gd^{-1}$) | Inventory (hd) | 0.23 | 0.05 | slight or weak | F.3-25 |
| $PM_{10}$ ($mgd^{-1}hd^{-1}$) | Inventory (hd) | -0.23 | 0.05 | slight or weak | F.3-26 |
| $PM_{10}$ ($gd^{-1}$) | Average weight (kg) | -0.06 | 0.00 | slight or weak | F.3-27 |
| $PM_{10}$ ($mgd^{-1}hd^{-1}$) | Average weight (kg) | 0.34 | 0.12 | slight or weak | F.3-28 |
| $PM_{10}$ ($gd^{-1}$) | Live animal weight (kg) | 0.31 | 0.10 | slight or weak | F.3-29 |
| $PM_{10}$ ($mgd^{-1}hd^{-1}$) | Live animal weight (kg) | 0.02 | 0.00 | slight or weak | F.3-30 |
| $PM_{10}$ ($gd^{-1}$) | Exhaust Temperature (°C) | -0.11 | 0.01 | slight or weak | F.3-31 |
| $PM_{10}$ ($mgd^{-1}hd^{-1}$) | Exhaust Temperature (°C) | 0.04 | 0.00 | slight or weak | F.3-32 |
| $PM_{10}$ ($gd^{-1}$) | Exhaust Relative humidity (%) | -0.19 | 0.04 | slight or weak | F.3-33 |
| $PM_{10}$ ($mgd^{-1}hd^{-1}$) | Exhaust Relative humidity (%) | -0.03 | 0.00 | slight or weak | F.3-34 |
| $PM_{10}$ ($gd^{-1}$) | Airflow ($dsm^3s^{-1}$) | 0.19 | 0.03 | slight or weak | F.3-35 |
| $PM_{10}$ ($mgd^{-1}hd^{-1}$) | Airflow ($dsm^3s^{-1}$) | 0.18 | 0.03 | slight or weak | F.3-36 |

| Pollutant | Parameter | R | $R^2$ | Strength | Figure |
|---|---|---|---|---|---|
| $PM_{2.5}$ ($gd^{-1}$) | Inventory (hd) | 0.22 | 0.05 | slight or weak | F.3-37 |
| $PM_{2.5}$ ($mgd^{-1}hd^{-1}$) | Inventory (hd) | -0.69 | 0.47 | moderate | F.3-38 |
| $PM_{2.5}$ ($gd^{-1}$) | Average weight (kg) | -0.01 | 0.00 | slight or weak | F.3-39 |
| $PM_{2.5}$ ($mgd^{-1}hd^{-1}$) | Average weight (kg) | 0.91 | 0.83 | strong | F.3-40 |
| $PM_{2.5}$ ($gd^{-1}$) | Live animal weight (kg) | 0.33 | 0.11 | slight or weak | F.3-41 |
| $PM_{2.5}$ ($mgd^{-1}hd^{-1}$) | Live animal weight (kg) | -0.38 | 0.14 | slight or weak | F.3-42 |
| $PM_{2.5}$ ($gd^{-1}$) | Exhaust Temperature (°C) | 0.28 | 0.08 | slight or weak | F.3-43 |
| $PM_{2.5}$ ($mgd^{-1}hd^{-1}$) | Exhaust Temperature (°C) | 0.17 | 0.03 | slight or weak | F.3-44 |
| $PM_{2.5}$ ($gd^{-1}$) | Exhaust Relative humidity (%) | -0.19 | 0.03 | slight or weak | F.3-45 |
| $PM_{2.5}$ ($mgd^{-1}hd^{-1}$) | Exhaust Relative humidity (%) | 0.03 | 0.00 | slight or weak | F.3-46 |
| $PM_{2.5}$ ($gd^{-1}$) | Airflow ($dsm^3s^{-1}$) | 0.51 | 0.26 | modest | F.3-47 |
| $PM_{2.5}$ ($mgd^{-1}hd^{-1}$) | Airflow ($dsm^3s^{-1}$) | 0.10 | 0.01 | slight or weak | F.3-48 |
| TSP ($gd^{-1}$) | Inventory (hd) | 0.13 | 0.02 | slight or weak | F.3-49 |
| TSP ($mgd^{-1}hd^{-1}$) | Inventory (hd) | -0.63 | 0.39 | modest | F.3-50 |
| TSP ($gd^{-1}$) | Average weight (kg) | -0.14 | 0.02 | slight or weak | F.3-51 |
| TSP ($mgd^{-1}hd^{-1}$) | Average weight (kg) | 0.74 | 0.55 | moderate | F.3-52 |
| TSP ($gd^{-1}$) | Live animal weight (kg) | 0.26 | 0.07 | slight or weak | F.3-53 |
| TSP ($mgd^{-1}hd^{-1}$) | Live animal weight (kg) | -0.33 | 0.11 | slight or weak | F.3-54 |
| TSP ($gd^{-1}$) | Exhaust Temperature (°C) | -0.27 | 0.07 | slight or weak | F.3-55 |
| TSP ($mgd^{-1}hd^{-1}$) | Exhaust Temperature (°C) | 0.04 | 0.00 | slight or weak | F.3-56 |
| TSP ($gd^{-1}$) | Exhaust Relative humidity (%) | -0.44 | 0.20 | slight or weak | F.3-57 |
| TSP ($mgd^{-1}hd^{-1}$) | Exhaust Relative humidity (%) | -0.13 | 0.02 | slight or weak | F.3-58 |
| TSP ($gd^{-1}$) | Airflow ($dsm^3s^{-1}$) | 0.00 | 0.00 | slight or weak | F.3-59 |
| TSP ($mgd^{-1}hd^{-1}$) | Airflow ($dsm^3s^{-1}$) | 0.13 | 0.02 | slight or weak | F.3-60 |

### *F.3.1.1 Ammonia ($NH_3$)*

F.3.1.1.1 Inventory

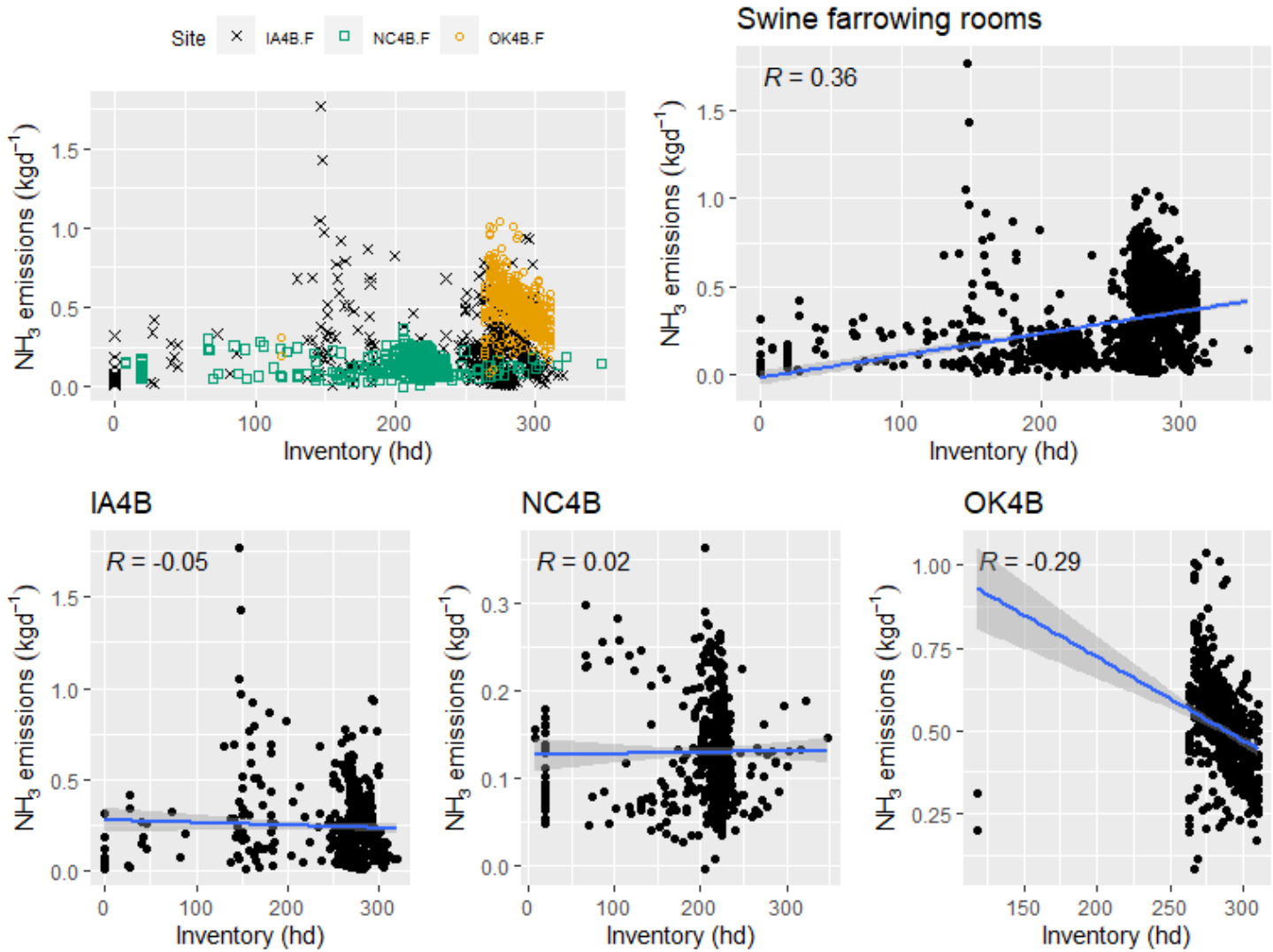


**Figure F.3-1. Scatter plot of swine farrowing rooms $NH_3$ emissions (kg $d^{-1}$) versus Inventory.**

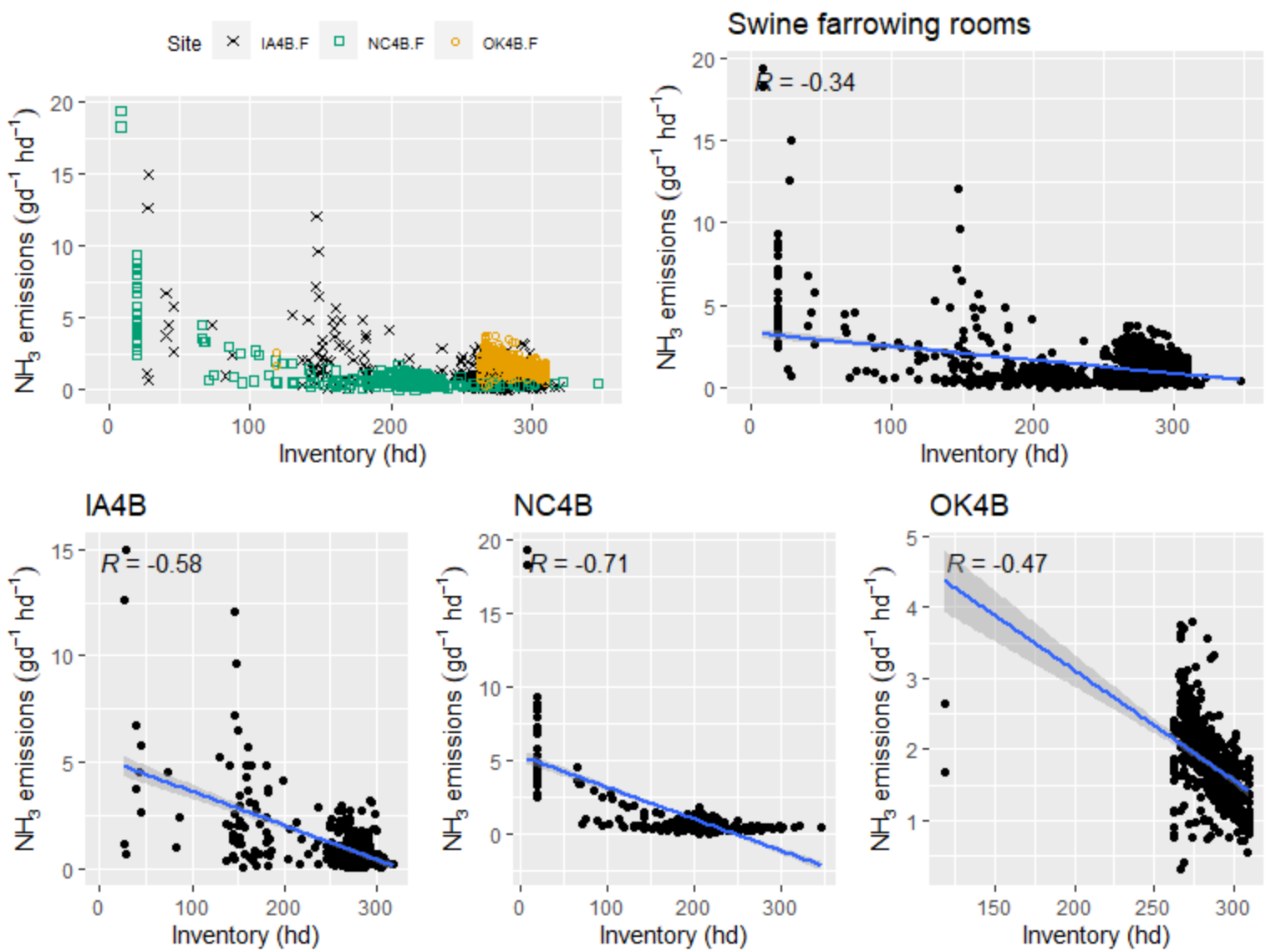


**Figure F.3-2. Scatter plot of swine farrowing rooms $NH_3$ emissions (g $d^{-1}hd^{-1}$) versus Inventory.**

F.3.1.1.2 Average animal weight

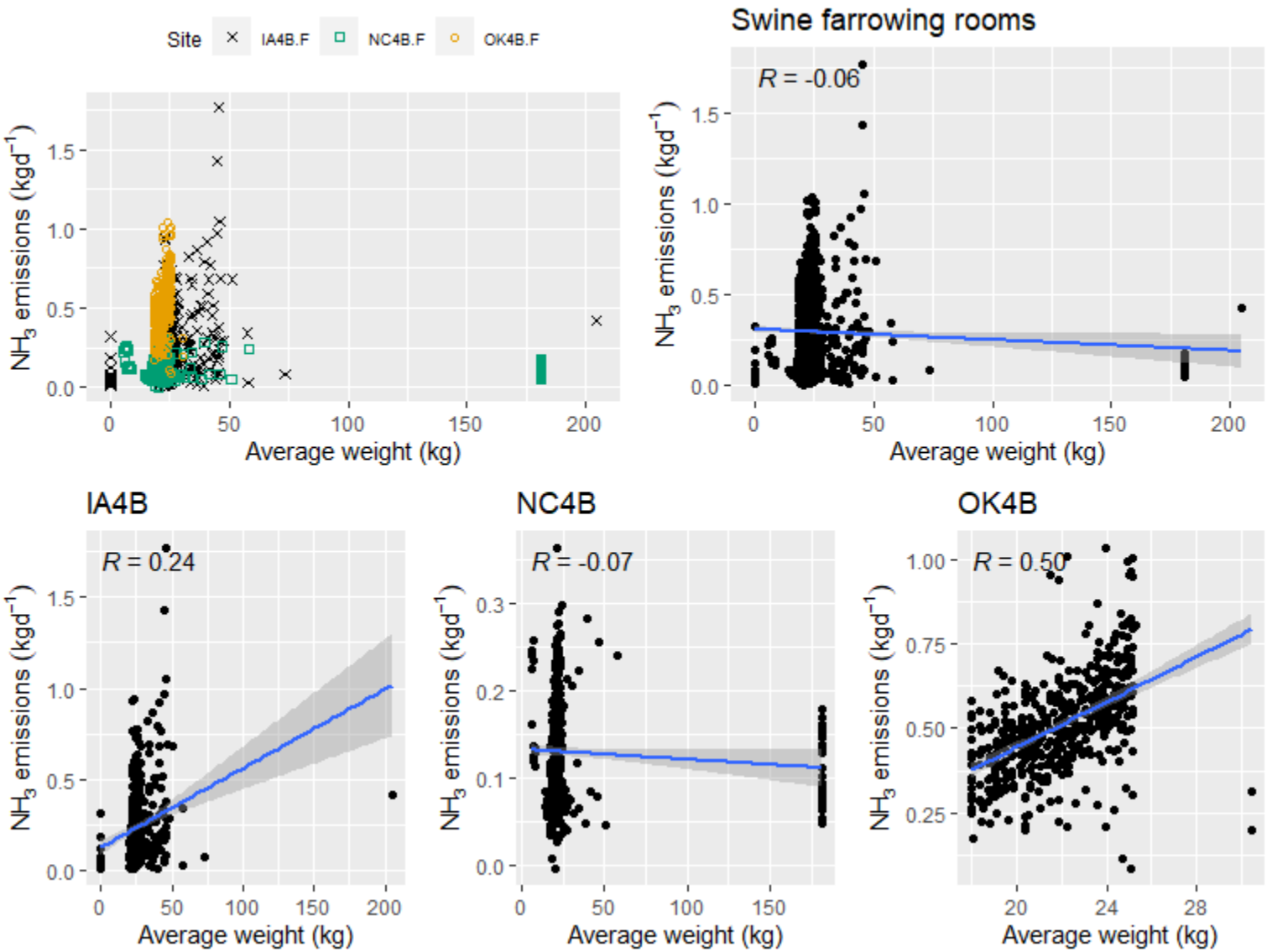


**Figure F.3-3. Scatter plot of swine farrowing rooms $NH_3$ emissions (kg $d^{-1}$) versus average animal weight.**

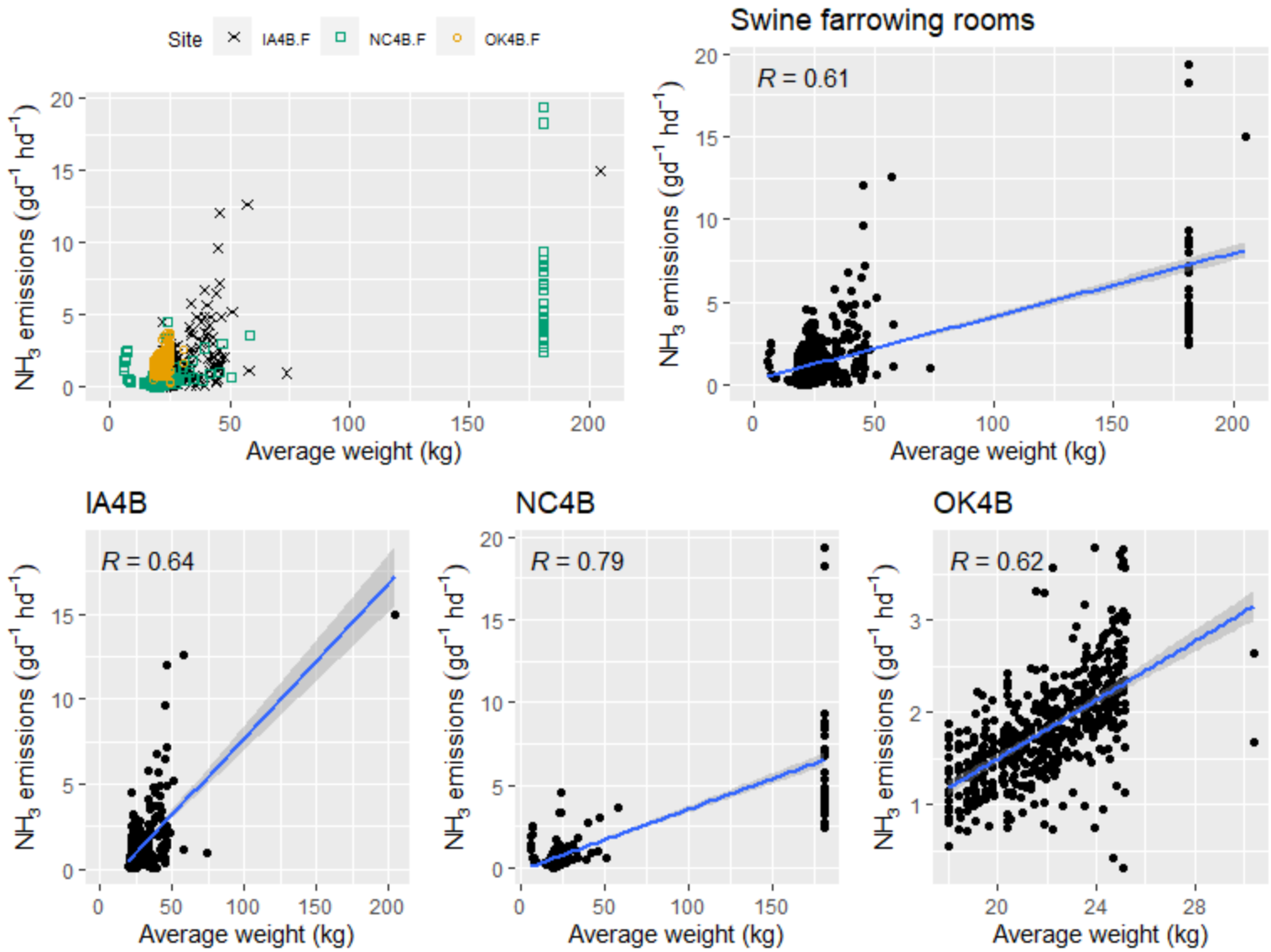


**Figure F.3-4. Scatter plot of swine farrowing rooms $NH_3$ emissions (g $d^{-1}hd^{-1}$) versus average animal weight.**

F.3.1.1.3 Live animal weight

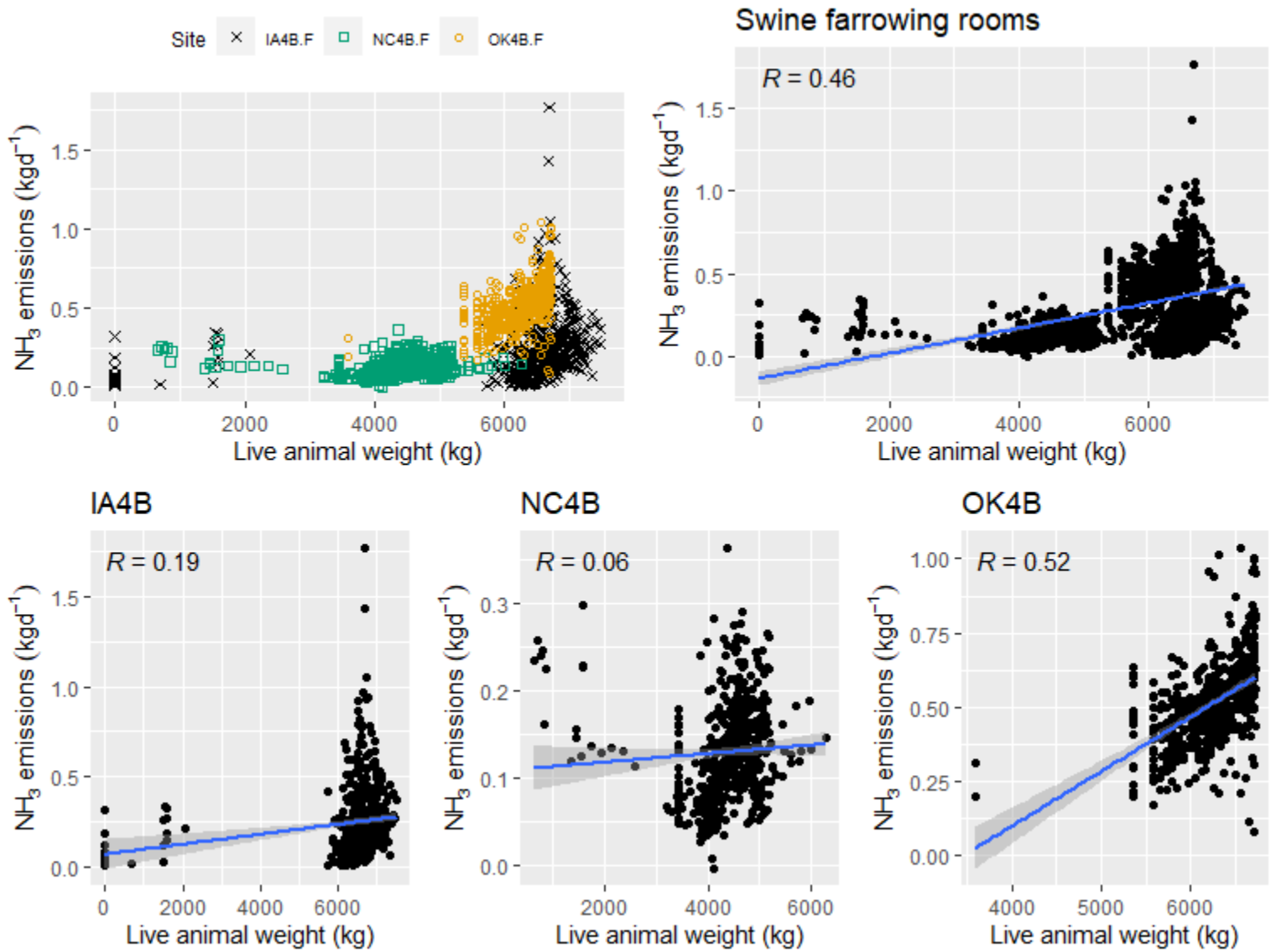


**Figure F.3-5. Scatter plot of swine farrowing rooms $NH_3$ emissions (kg $d^{-1}$) versus live animal weight.**

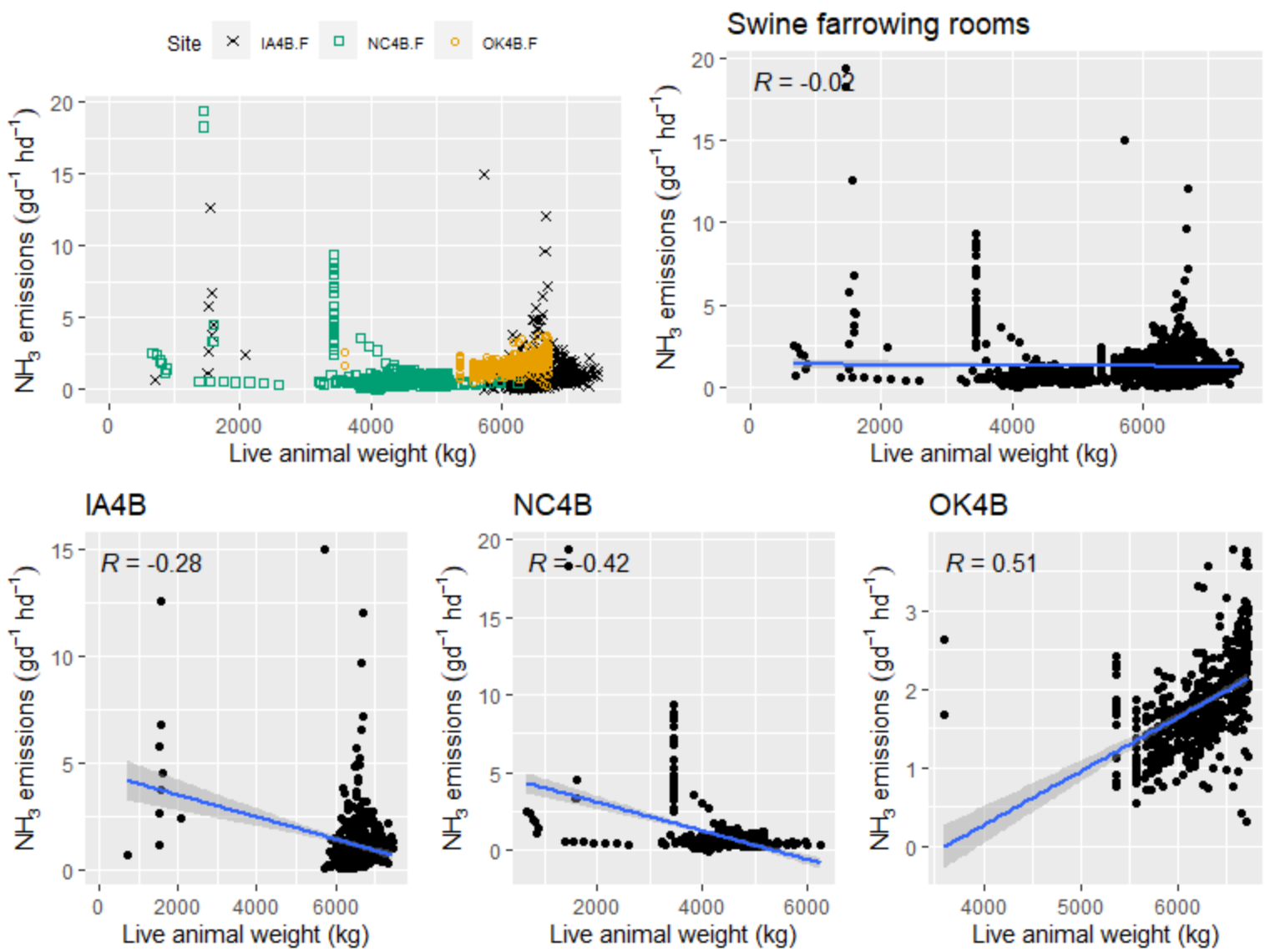


**Figure F.3-6. Scatter plot of swine farrowing rooms $NH_3$ emissions (g $d^{-1}hd^{-1}$) versus live animal weight.**

F.3.1.1.4 Exhaust temperature

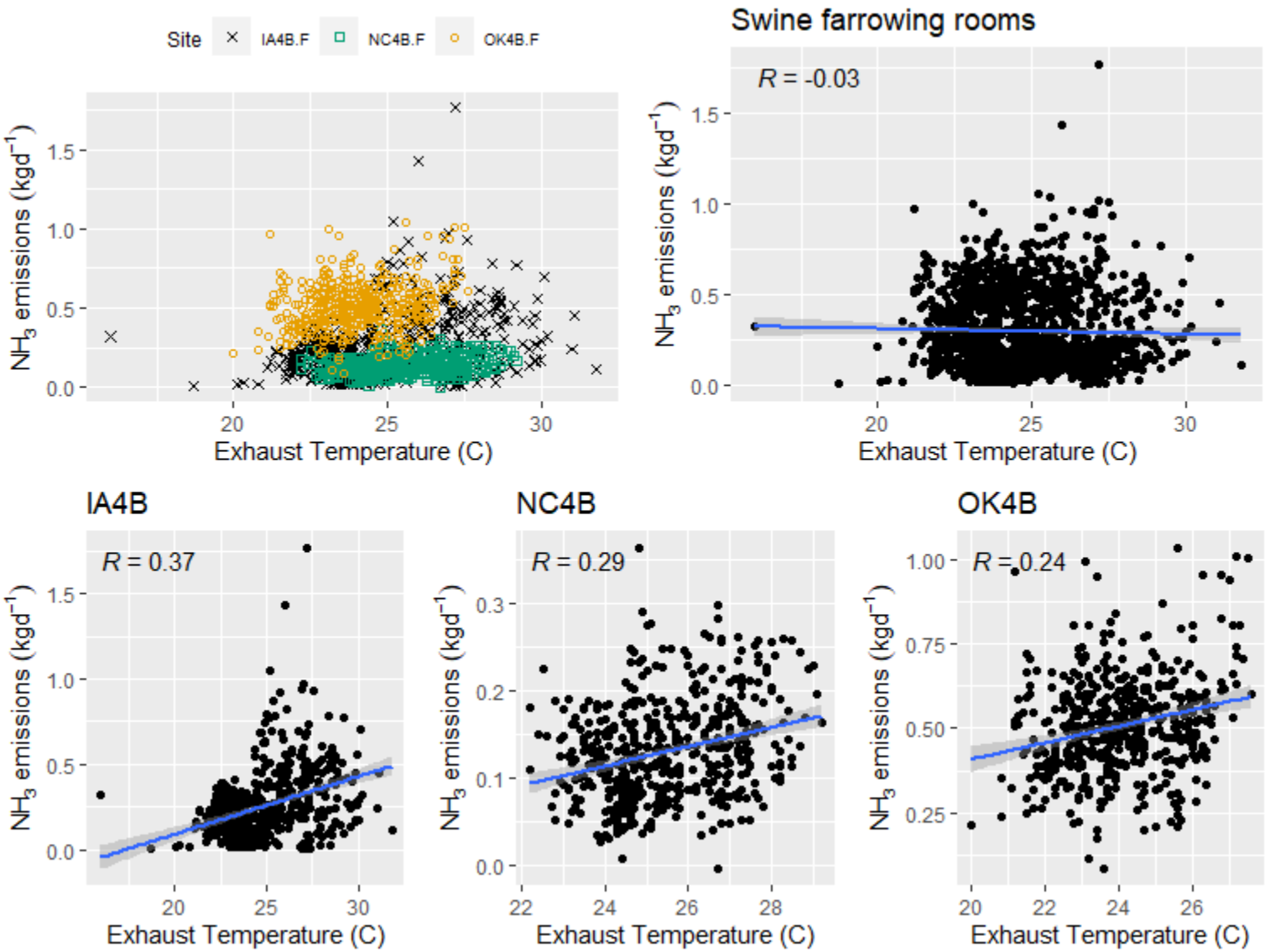


**Figure F.3-7. Scatter plot of swine farrowing rooms $NH_3$ emissions (kg $d^{-1}$) versus exhaust temperature.**

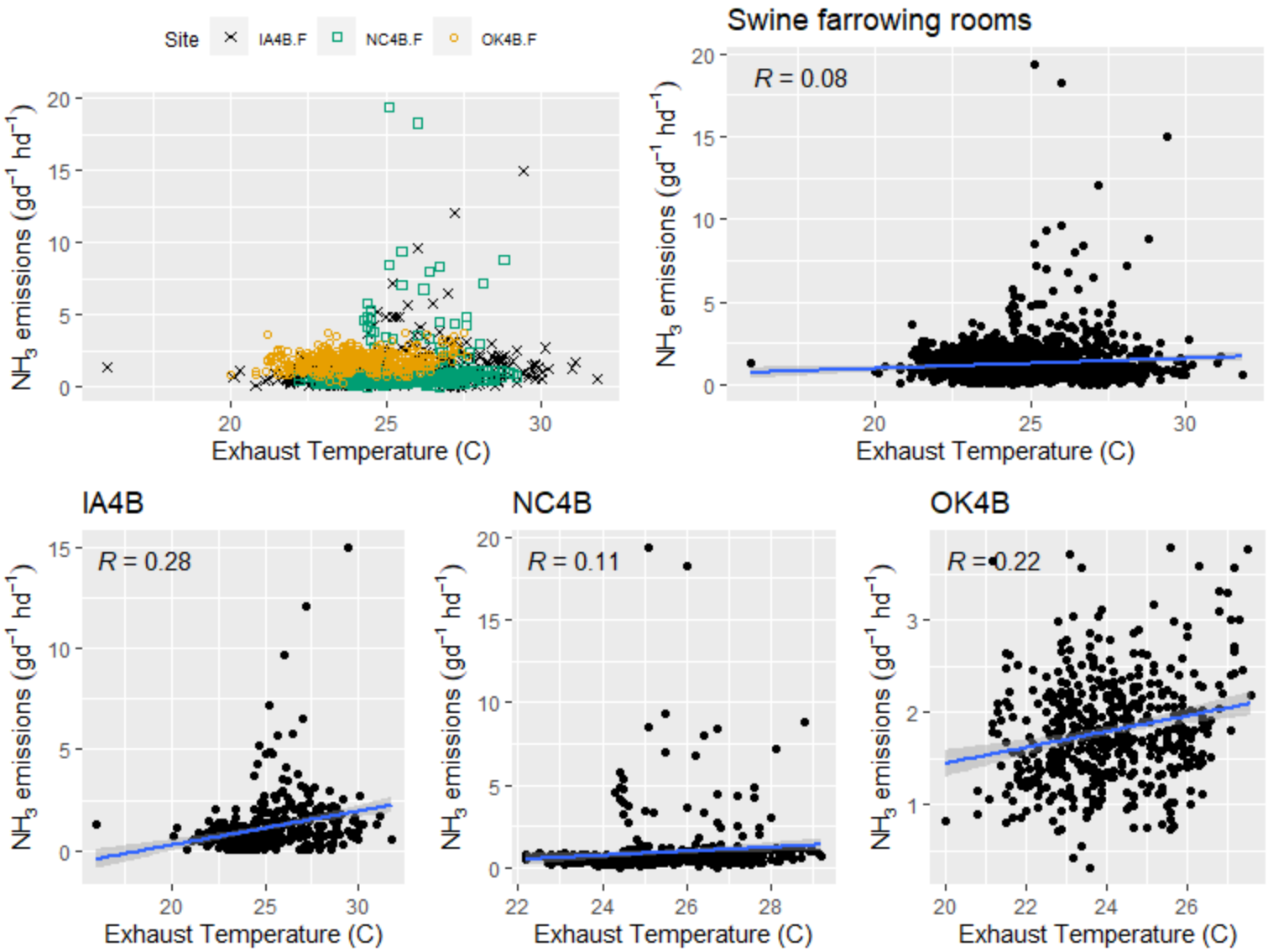


**Figure F.3-8. Scatter plot of swine farrowing rooms $NH_3$ emissions (g $d^{-1}hd^{-1}$) versus exhaust temperature.**

F.3.1.1.5 Exhaust relative humidity

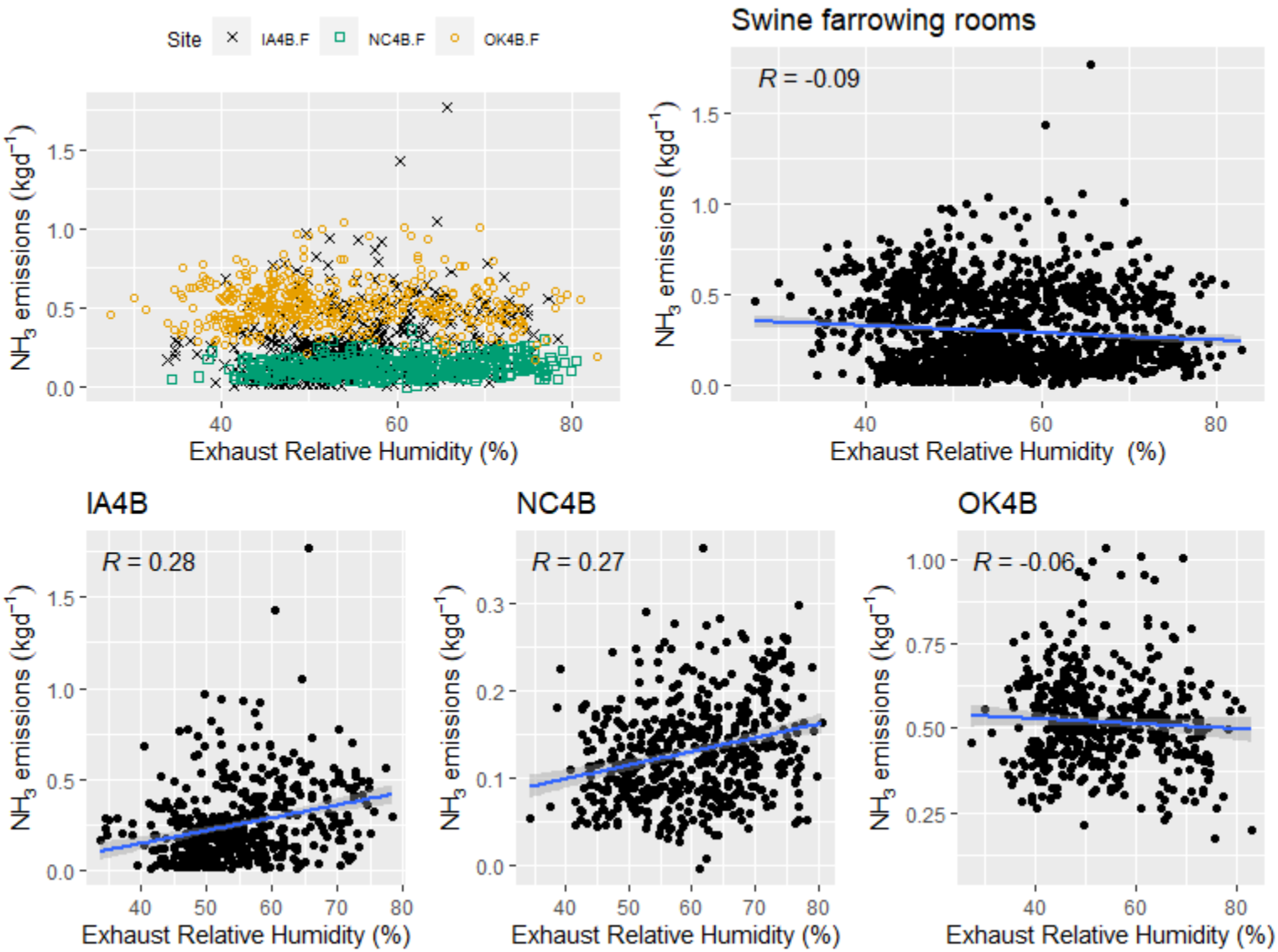


**Figure F.3-9. Scatter plot of swine farrowing rooms $NH_3$ emissions (kg $d^{-1}$) versus exhaust relative humidity.**

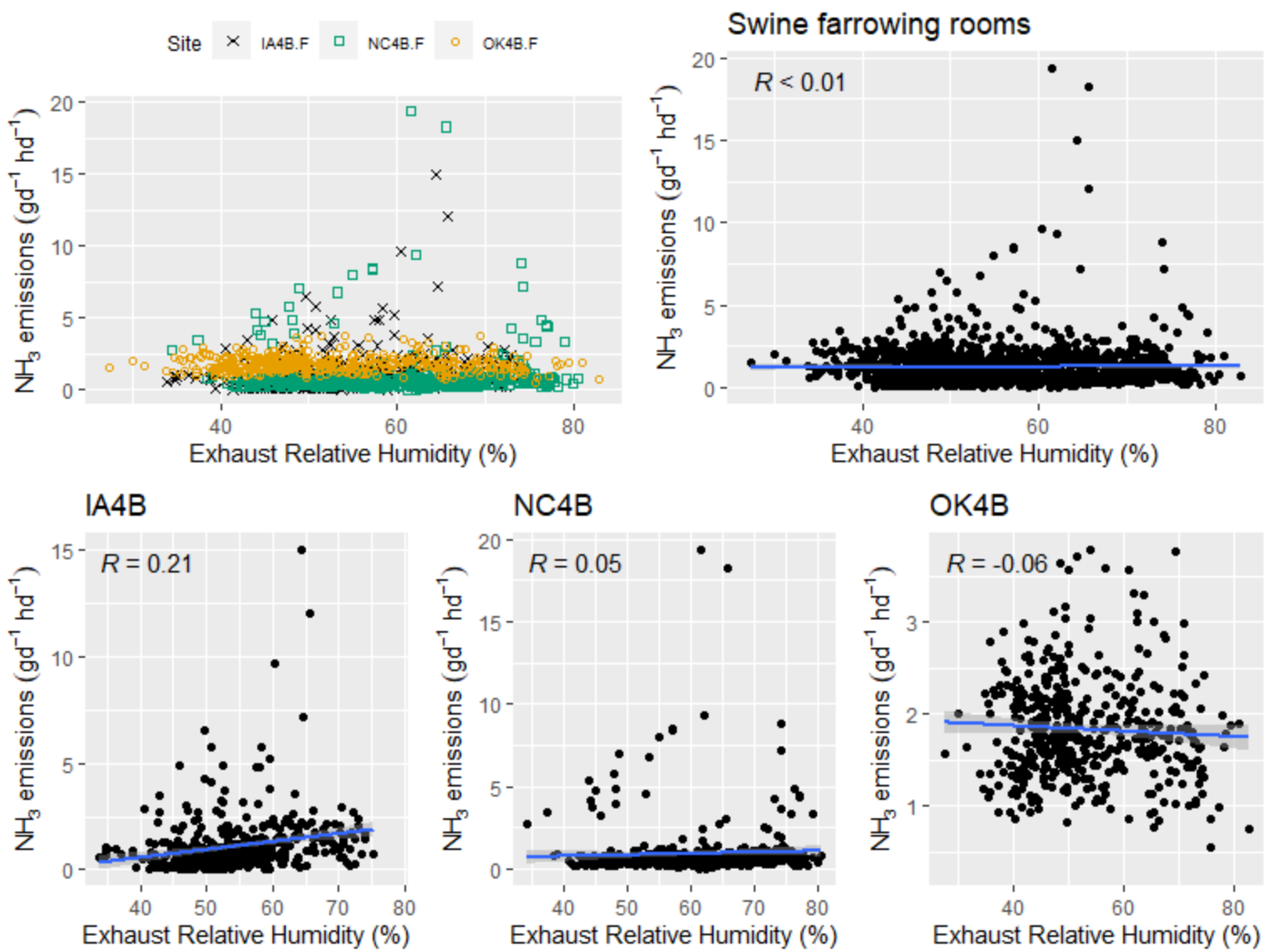


**Figure F.3-10. Scatter plot of swine farrowing rooms $NH_3$ emissions (g $d^{-1}hd^{-1}$) versus exhaust relative humidity.**

F.3.1.1.6 Airflow

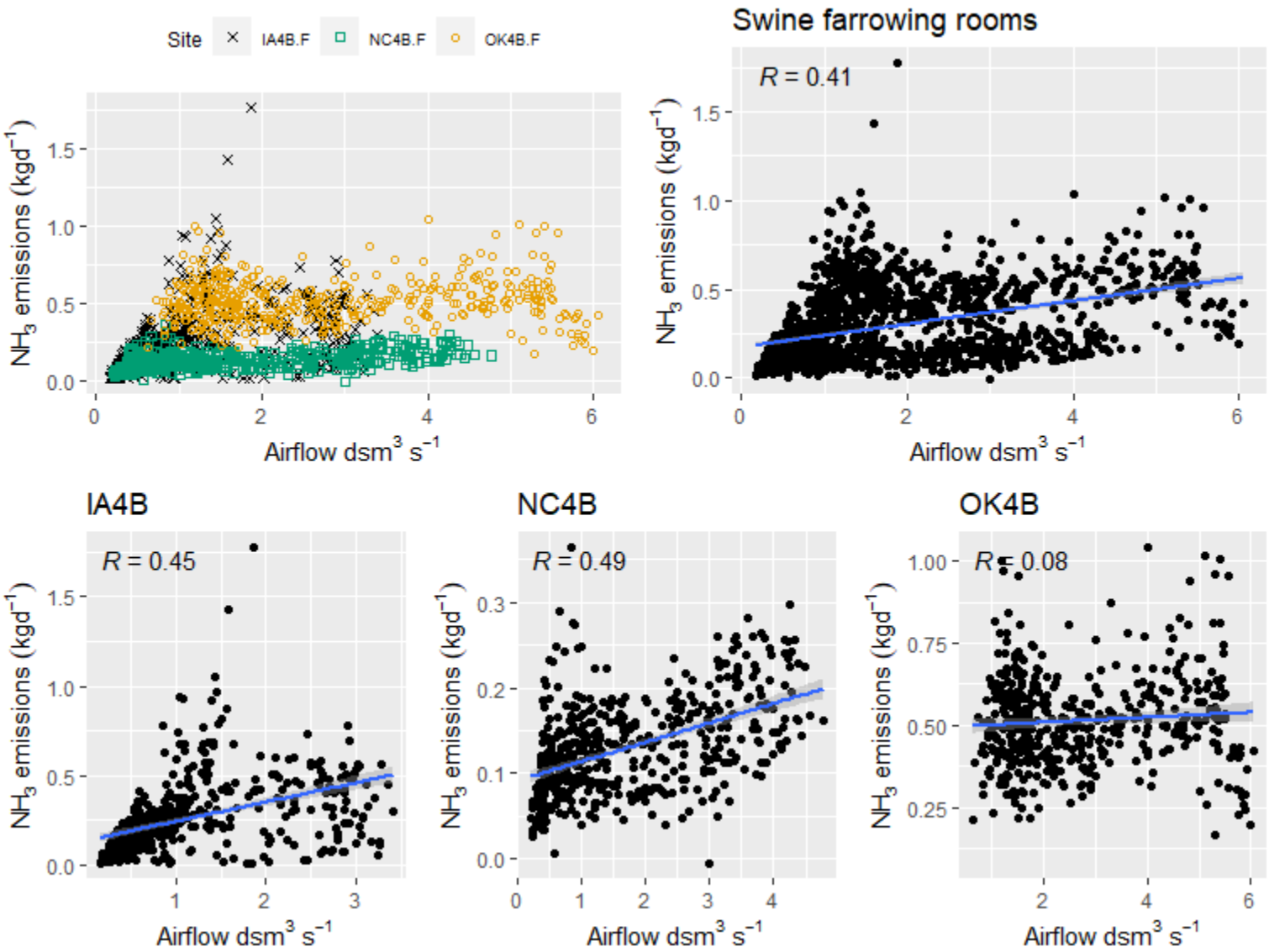


**Figure F.3-11. Scatter plot of swine farrowing rooms $NH_3$ emissions (kg $d^{-1}$) versus airflow.**

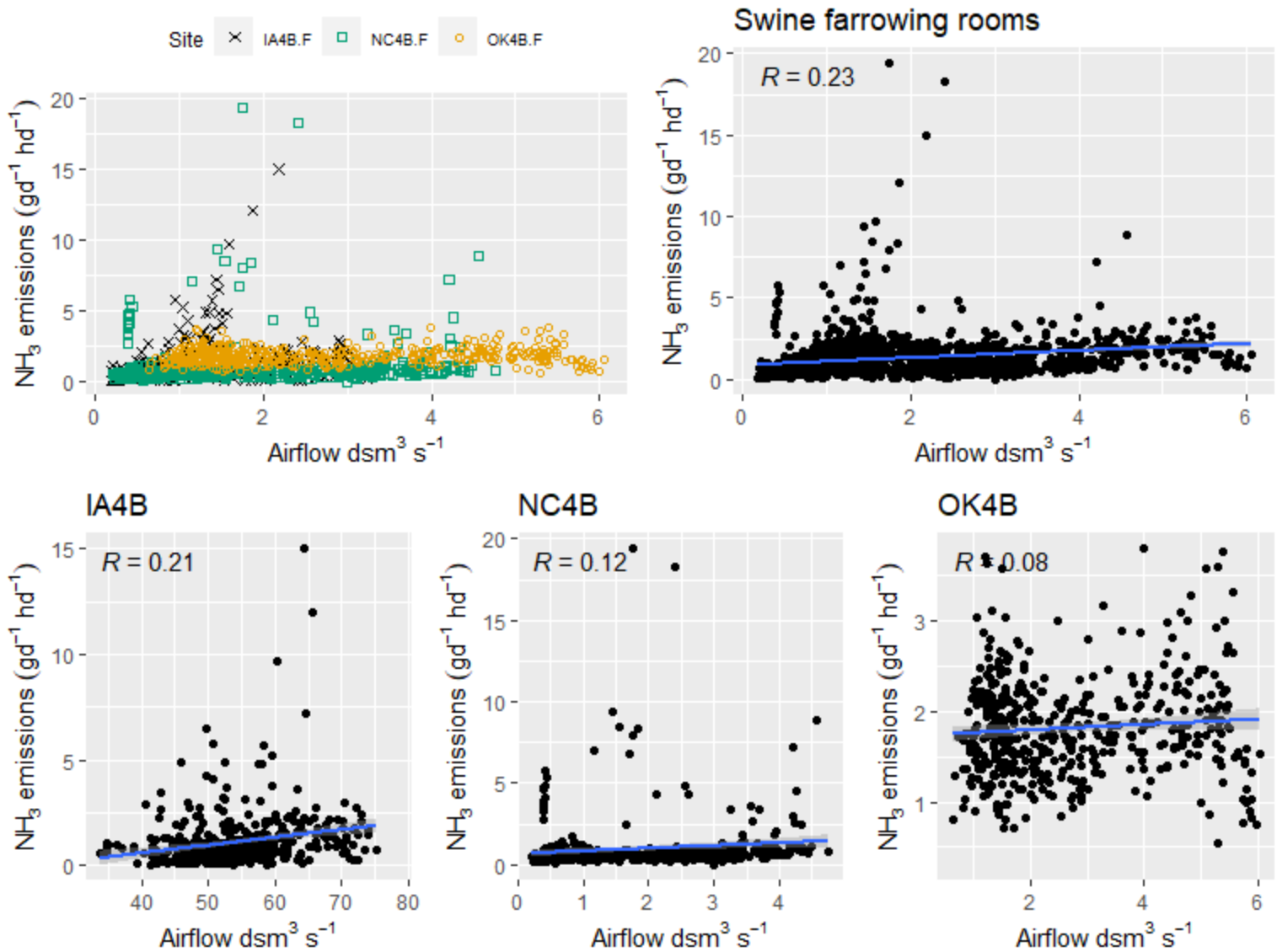


**Figure F.3-12. Scatter plot of swine farrowing rooms $NH_3$ emissions (g $d^{-1}hd^{-1}$) versus airflow.**

### *F.3.1.2 Hydrogen Sulfide ($H_2S$)*

F.3.1.2.1 Inventory

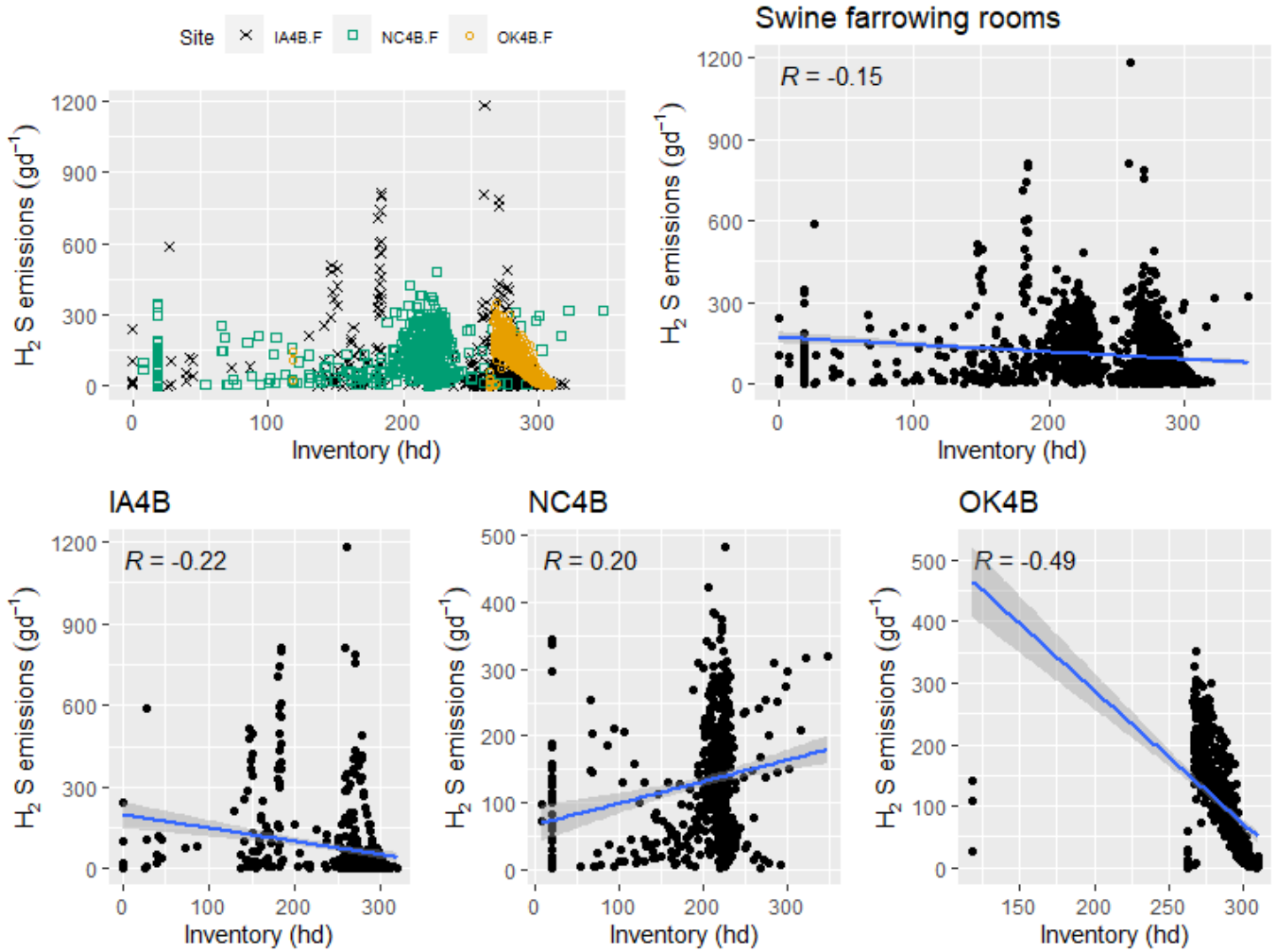


**Figure F.3-13. Scatter plot of swine farrowing rooms $H_2S$ emissions (g $d^{-1}$) versus Inventory.**

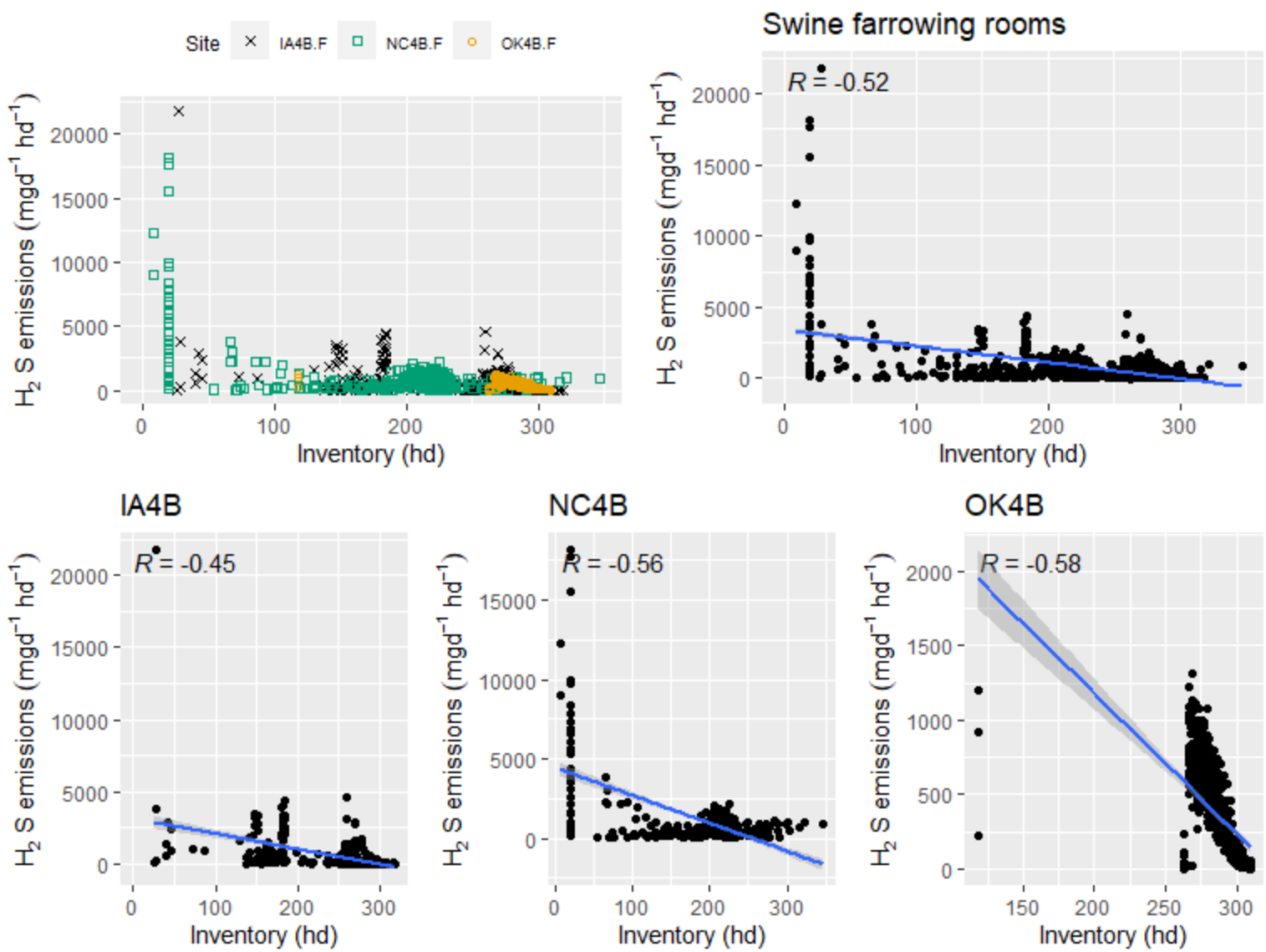


**Figure F.3-14. Scatter plot of swine farrowing rooms $H_2S$ emissions (mg $d^{-1}hd^{-1}$) versus Inventory.**

F.3.1.2.2 Average animal weight

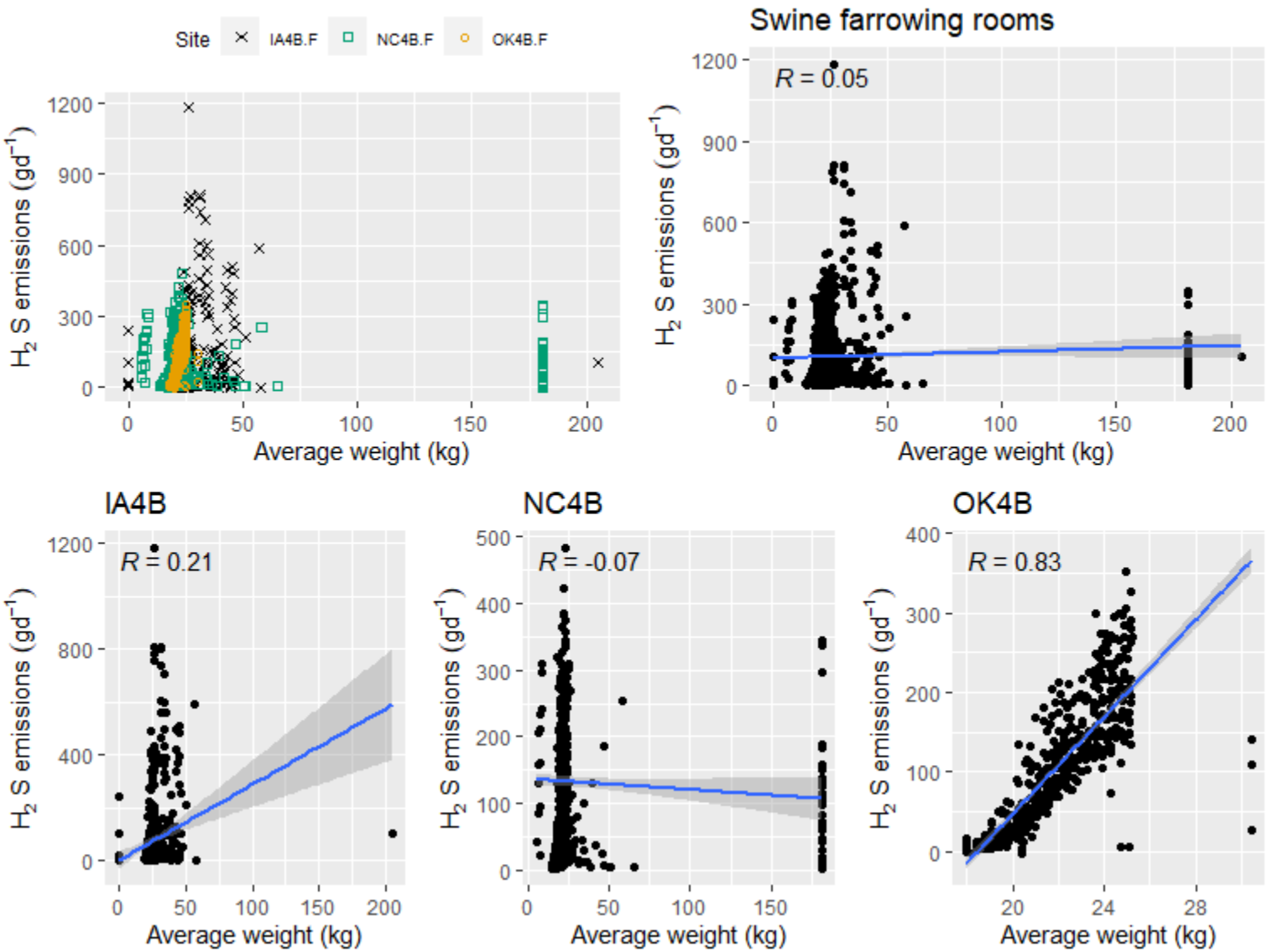


**Figure F.3-15. Scatter plot of swine farrowing rooms $H_2S$ emissions (g $d^{-1}$) versus average animal weight.**

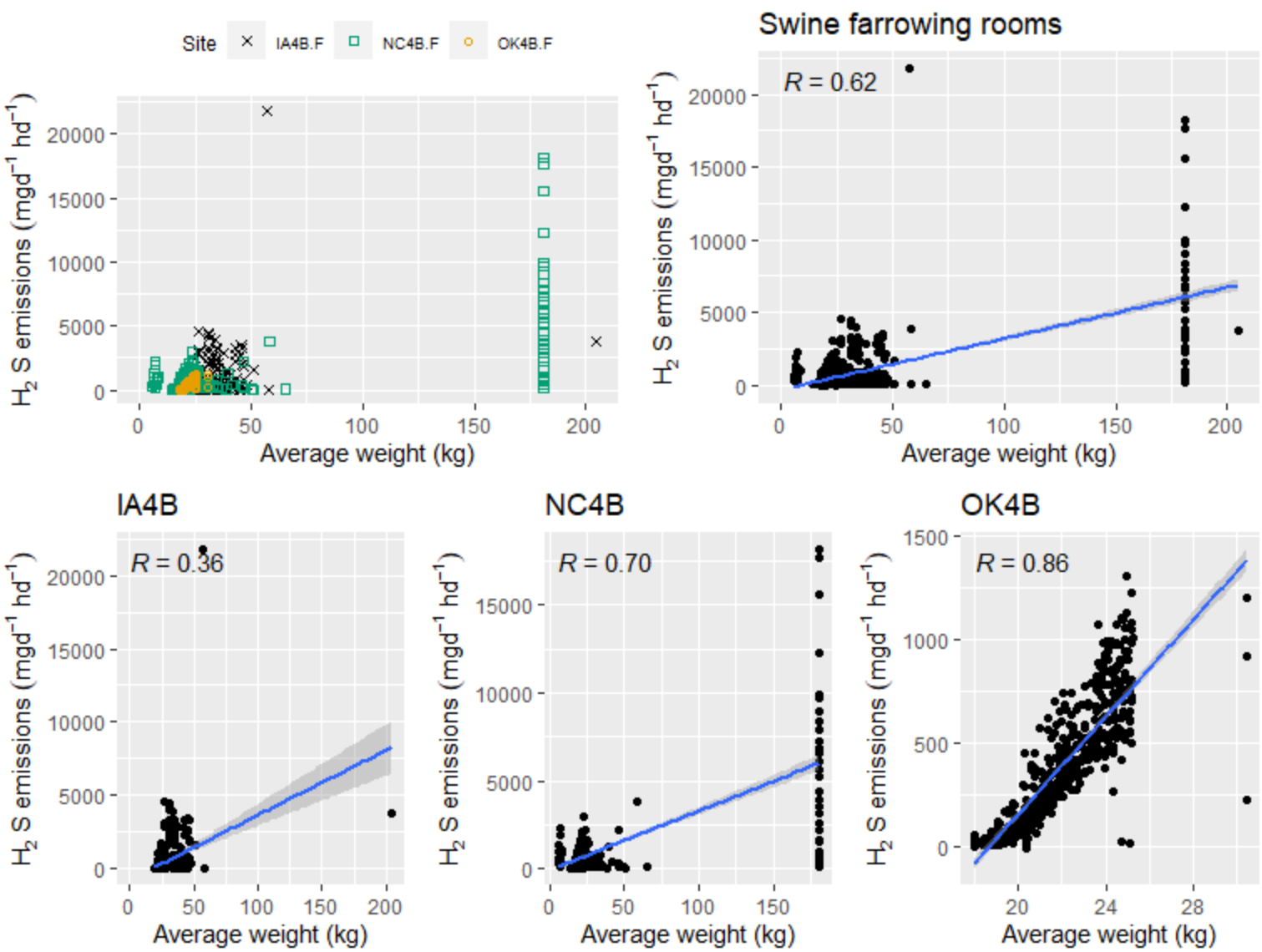


**Figure F.3-16. Scatter plot of swine farrowing rooms $H_2S$ emissions (mg $d^{-1}hd^{-1}$) versus average animal weight.**

F.3.1.2.3 Live animal weight

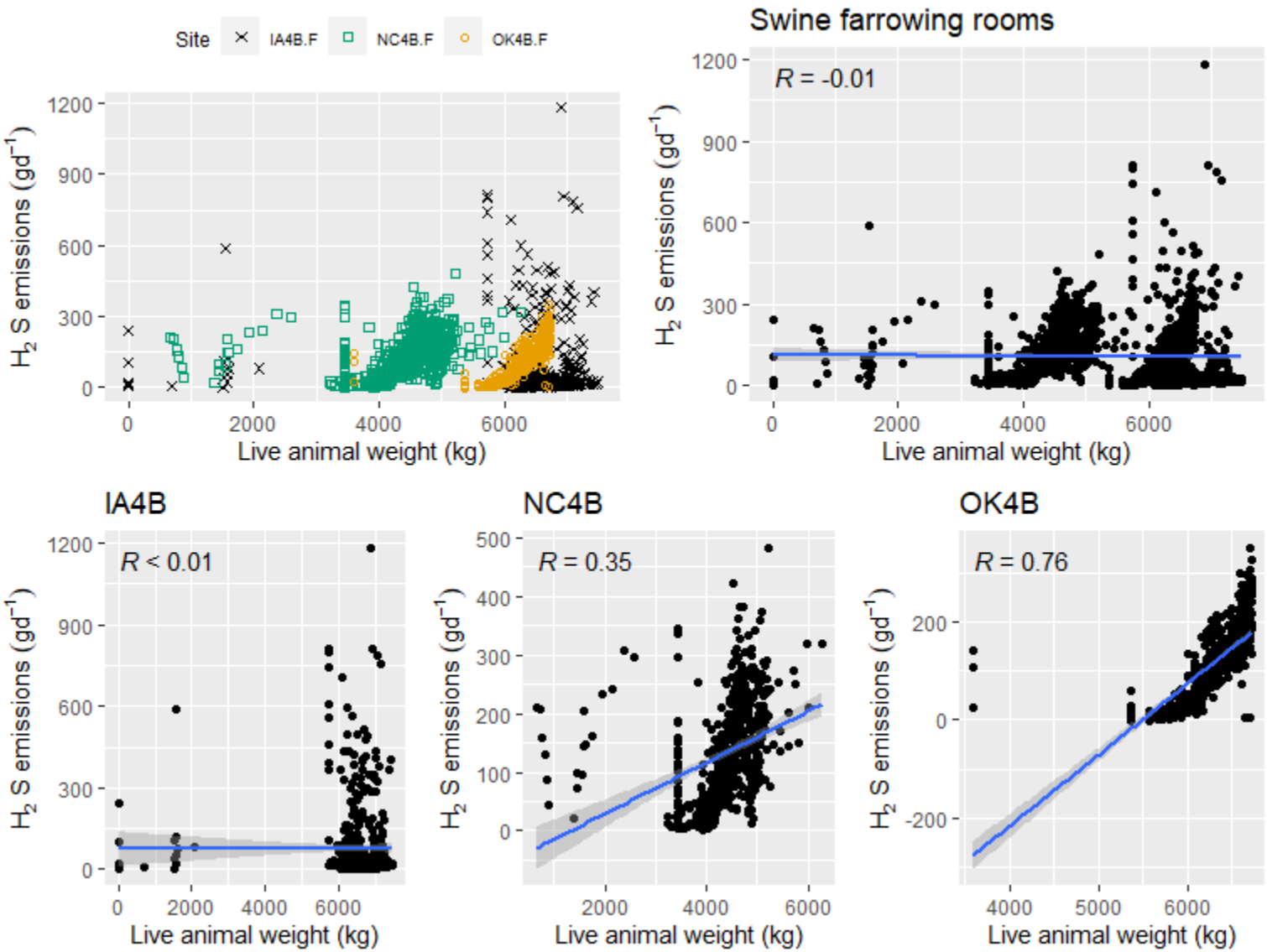


**Figure F.3-17. Scatter plot of swine farrowing rooms $H_2S$ emissions (g $d^{-1}$)versus live animal weight.**

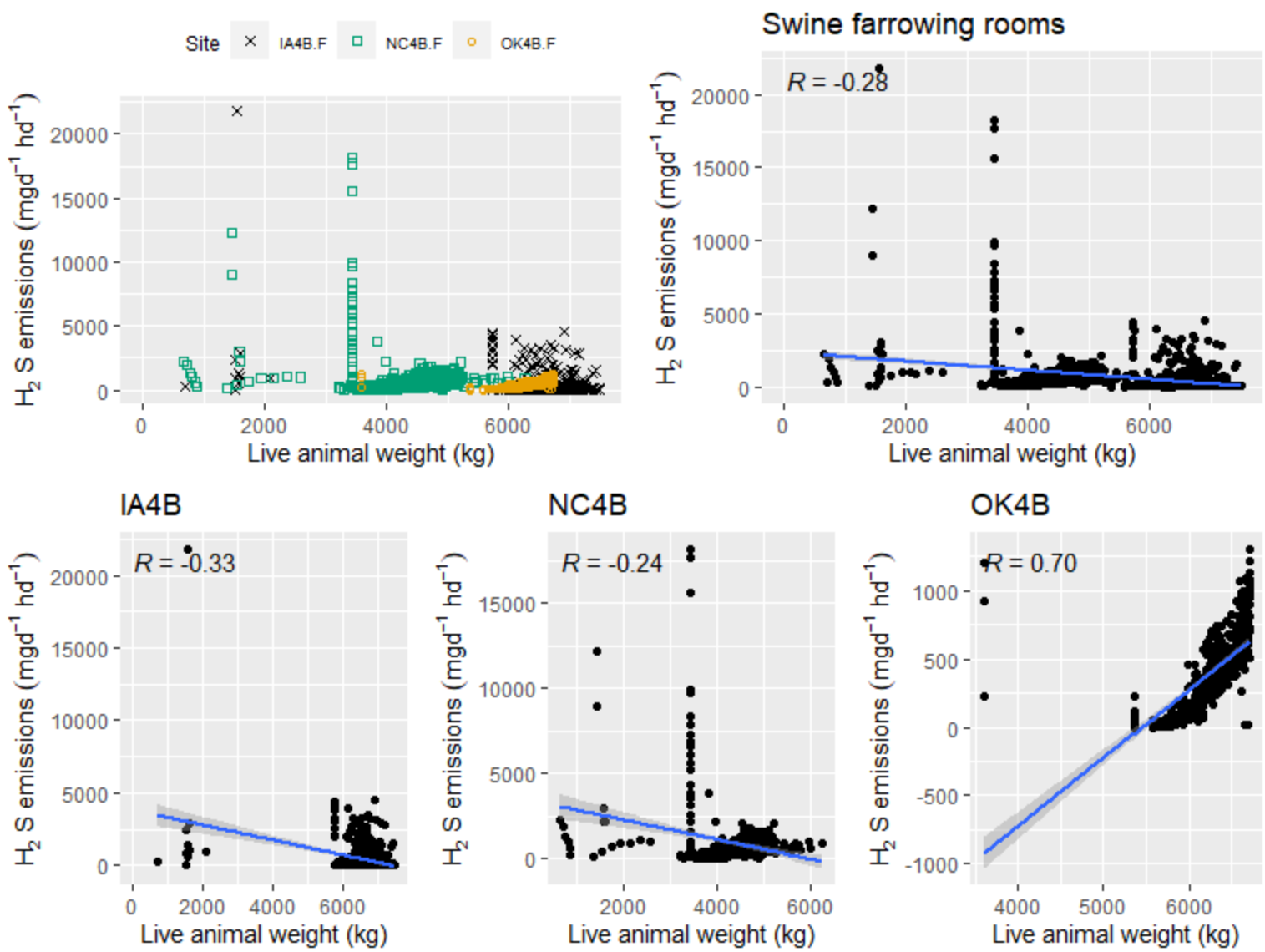


**Figure F.3-18. Scatter plot of swine farrowing rooms $H_2S$ emissions (mg $d^{-1}hd^{-1}$) versus live animal weight.**

F.3.1.2.4 Exhaust temperature

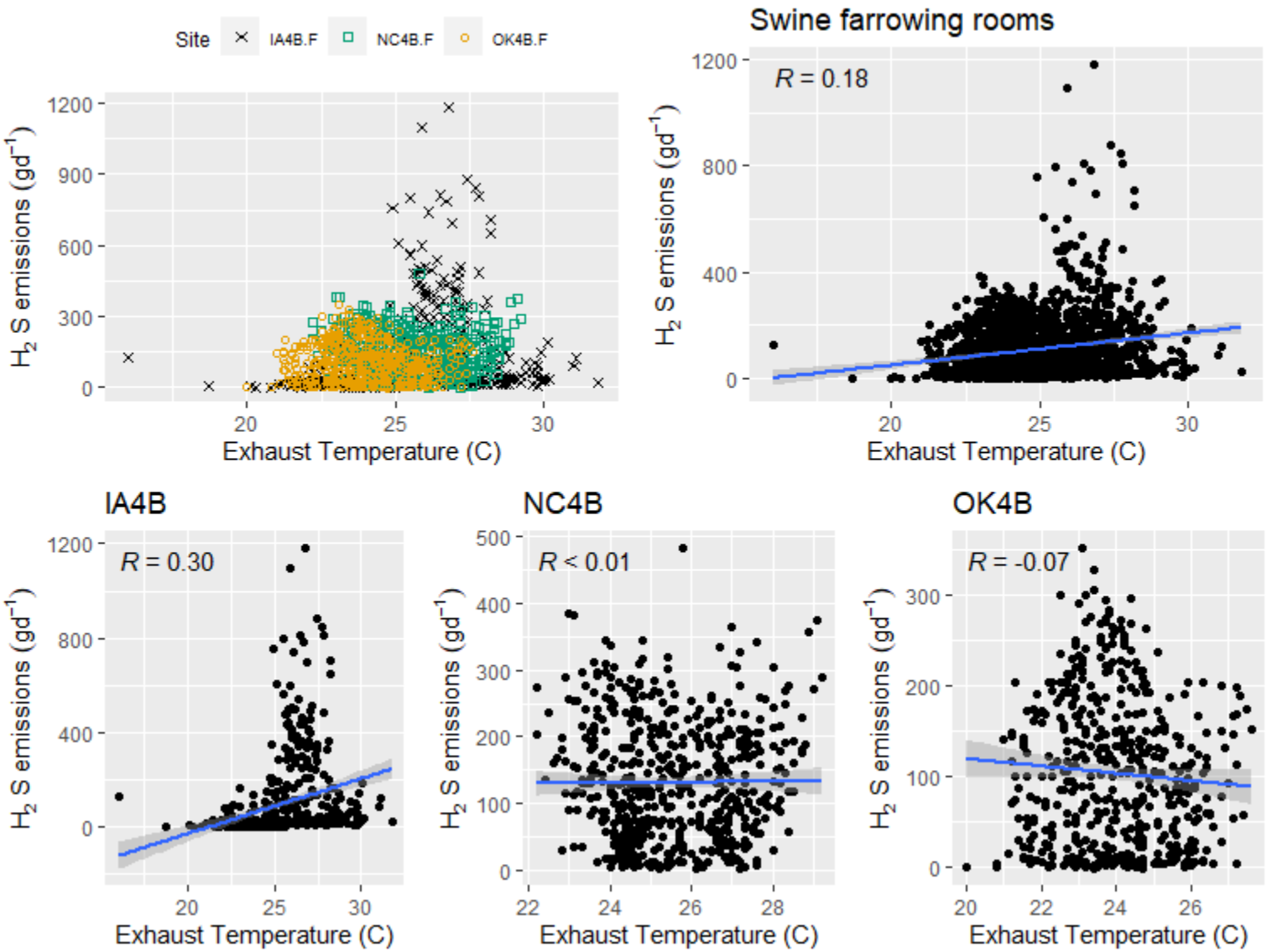


**Figure F.3-19. Scatter plot of swine farrowing rooms $H_2S$ emissions (g $d^{-1}$) versus exhaust temperature.**

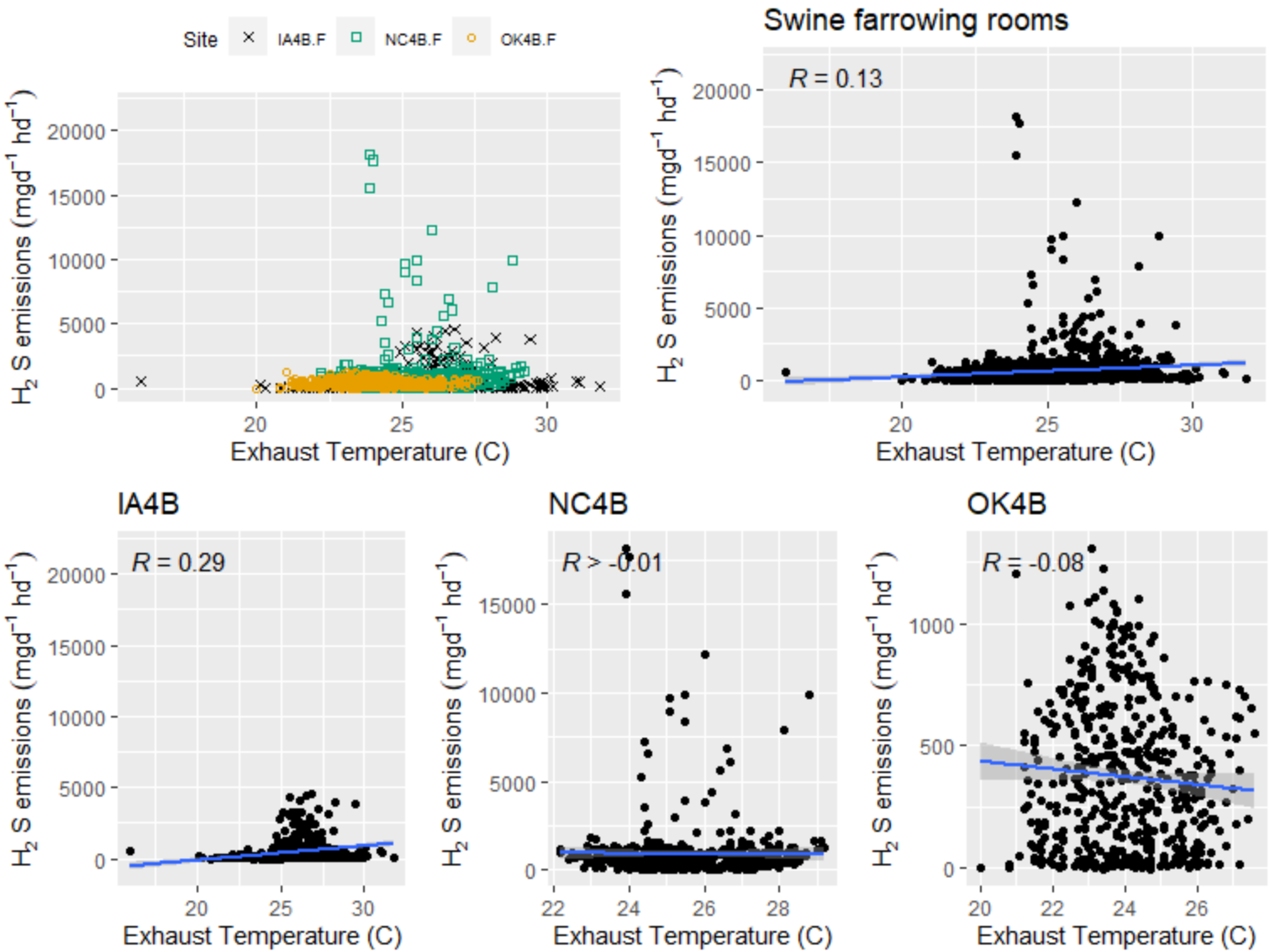


**Figure F.3-20. Scatter plot of swine farrowing rooms $H_2S$ emissions (mg $d^{-1}hd^{-1}$) versus exhaust temperature.**

F.3.1.2.5 Exhaust relative humidity

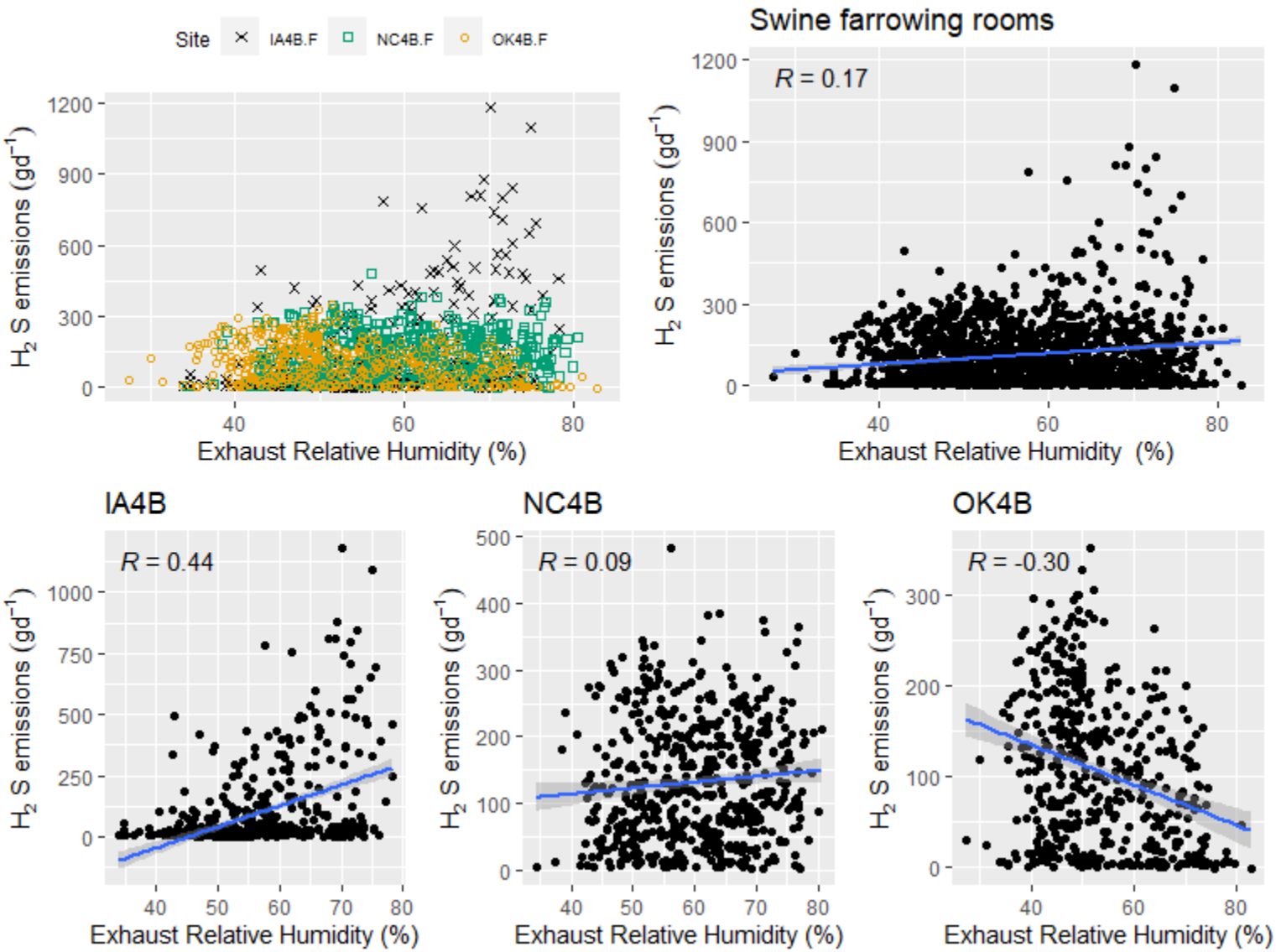


**Figure F.3-21. Scatter plot of swine farrowing rooms $H_2S$ emissions (g $d^{-1}$) versus exhaust relative humidity.**

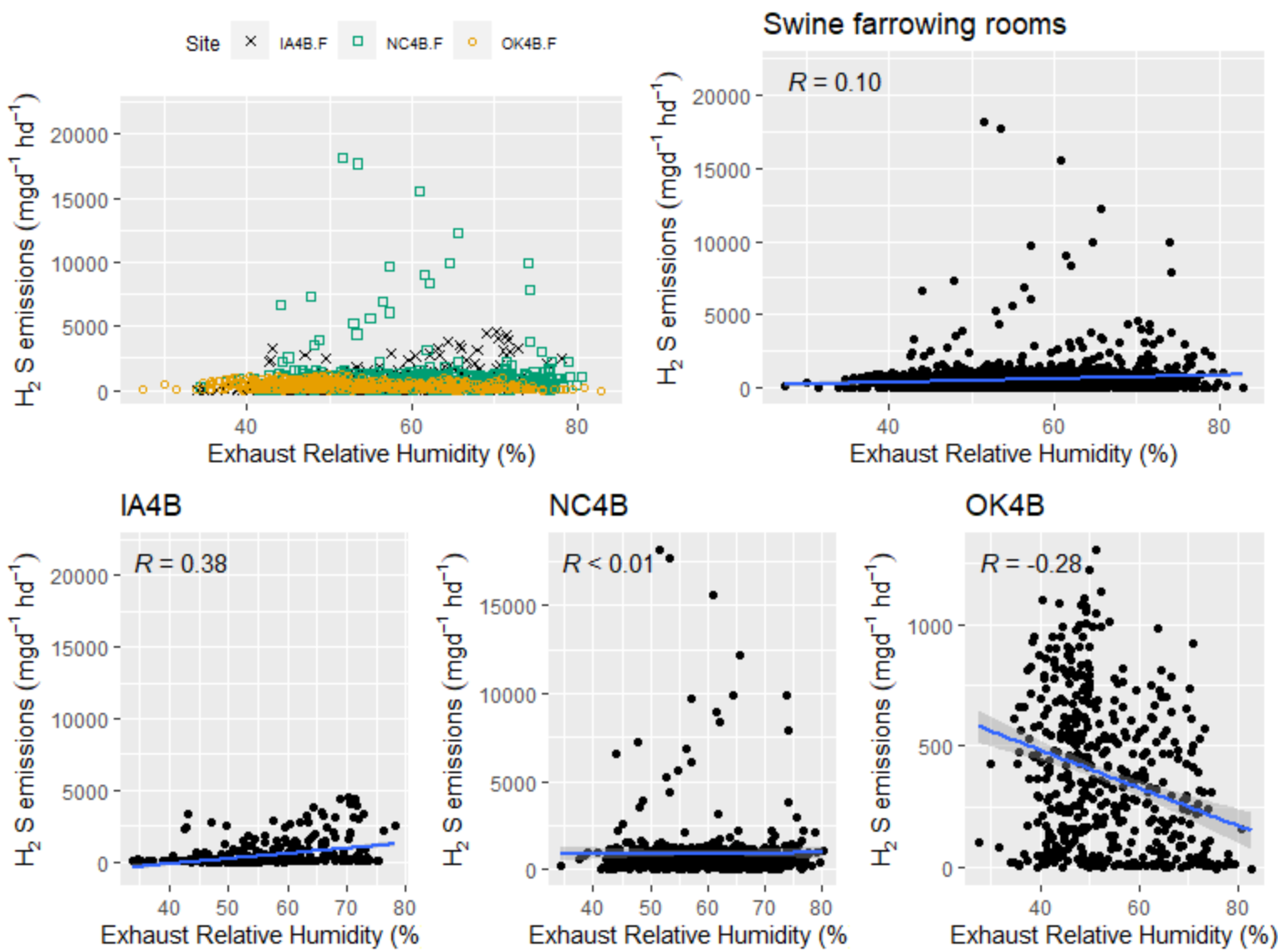


**Figure F.3-22. Scatter plot of swine farrowing rooms $H_2S$ emissions (mg $d^{-1}hd^{-1}$) versus exhaust relative humidity.**

F.3.1.2.6 Airflow

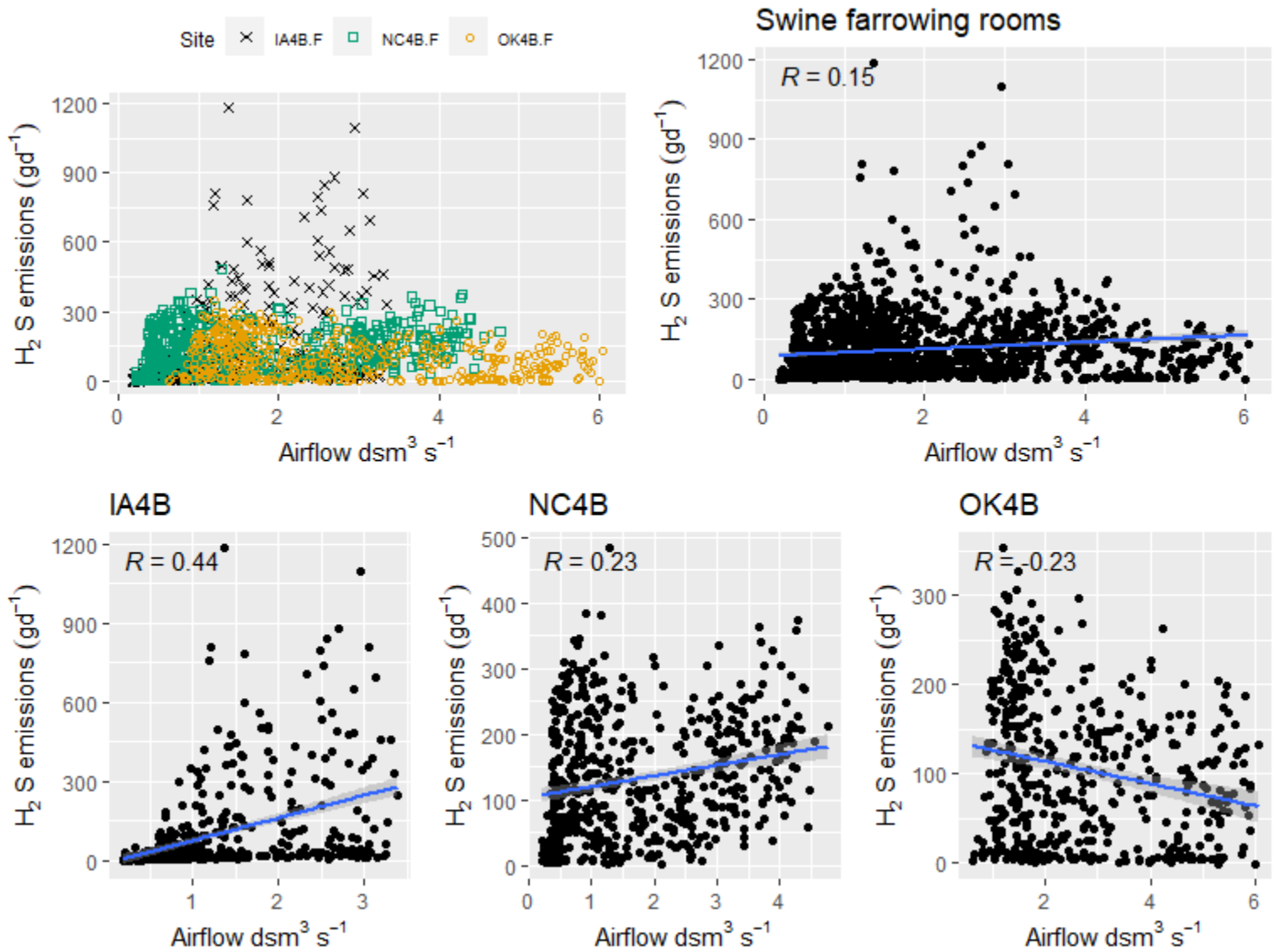


**Figure F.3-23. Scatter plot of swine farrowing rooms $H_2S$ emissions (g $d^{-1}$) versus airflow.**

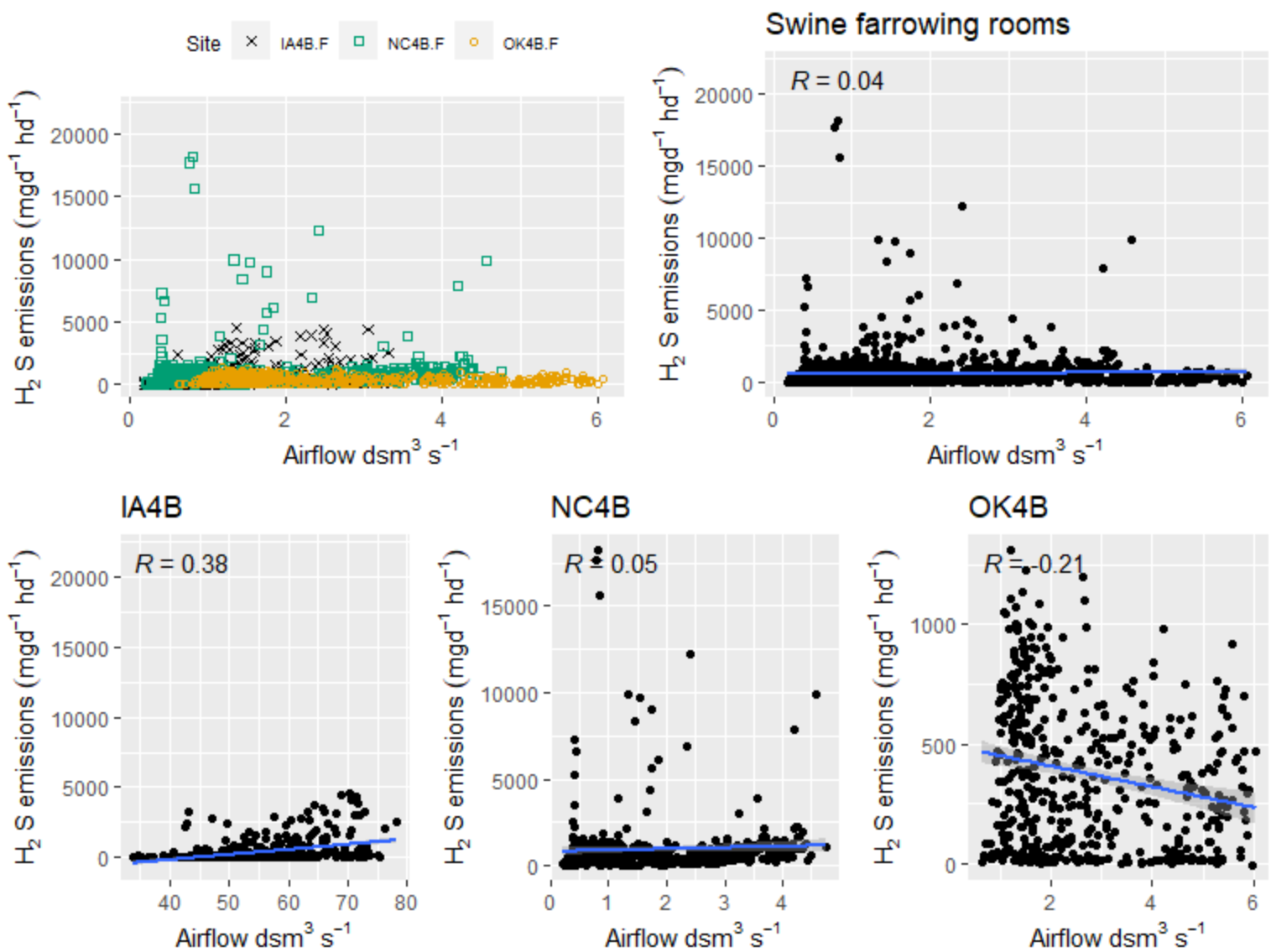


**Figure F.3-24. Scatter plot of swine farrowing rooms $H_2S$ emissions (mg $d^{-1}hd^{-1}$) versus airflow.**

### *F.3.1.3 Particulate Matter ($PM_{10}$)*

F.3.1.3.1 Inventory

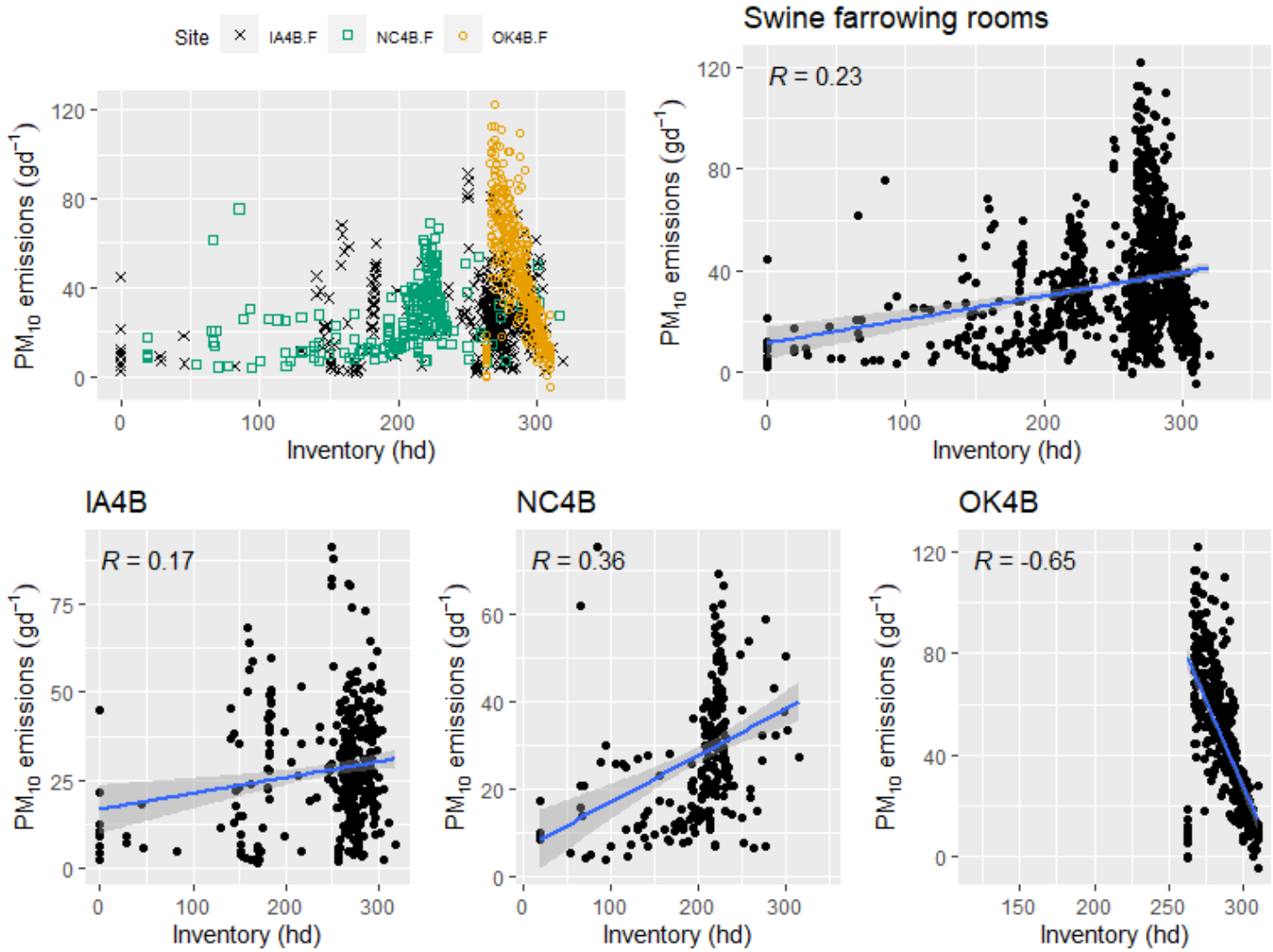


**Figure F.3-25. Scatter plot of swine farrowing rooms $PM_{10}$ emissions (g $d^{-1}$) versus Inventory.**

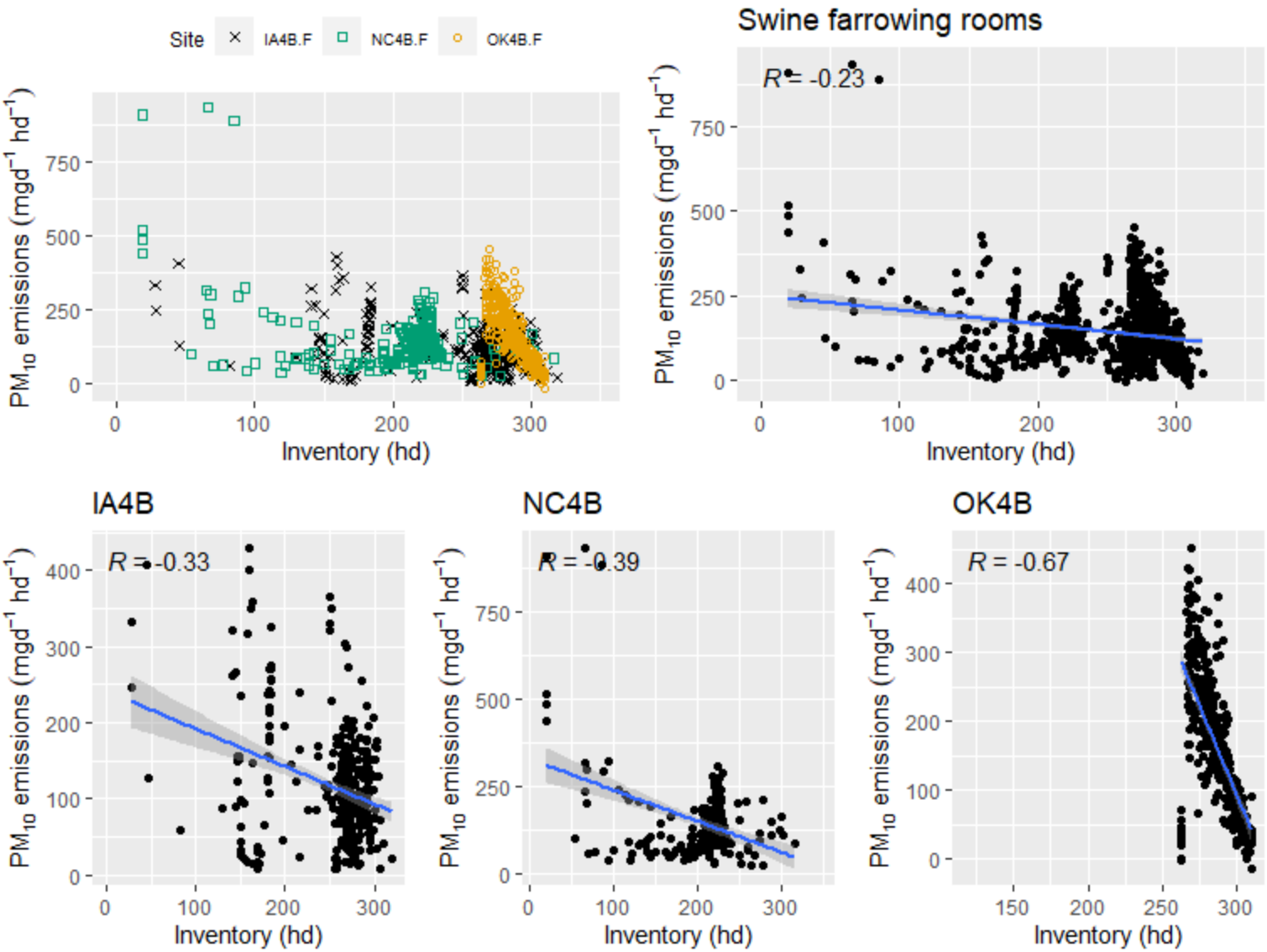


**Figure F.3-26. Scatter plot of swine farrowing rooms $PM_{10}$ emissions (mg $d^{-1}hd^{-1}$) versus Inventory.**

F.3.1.3.2 Average animal weight

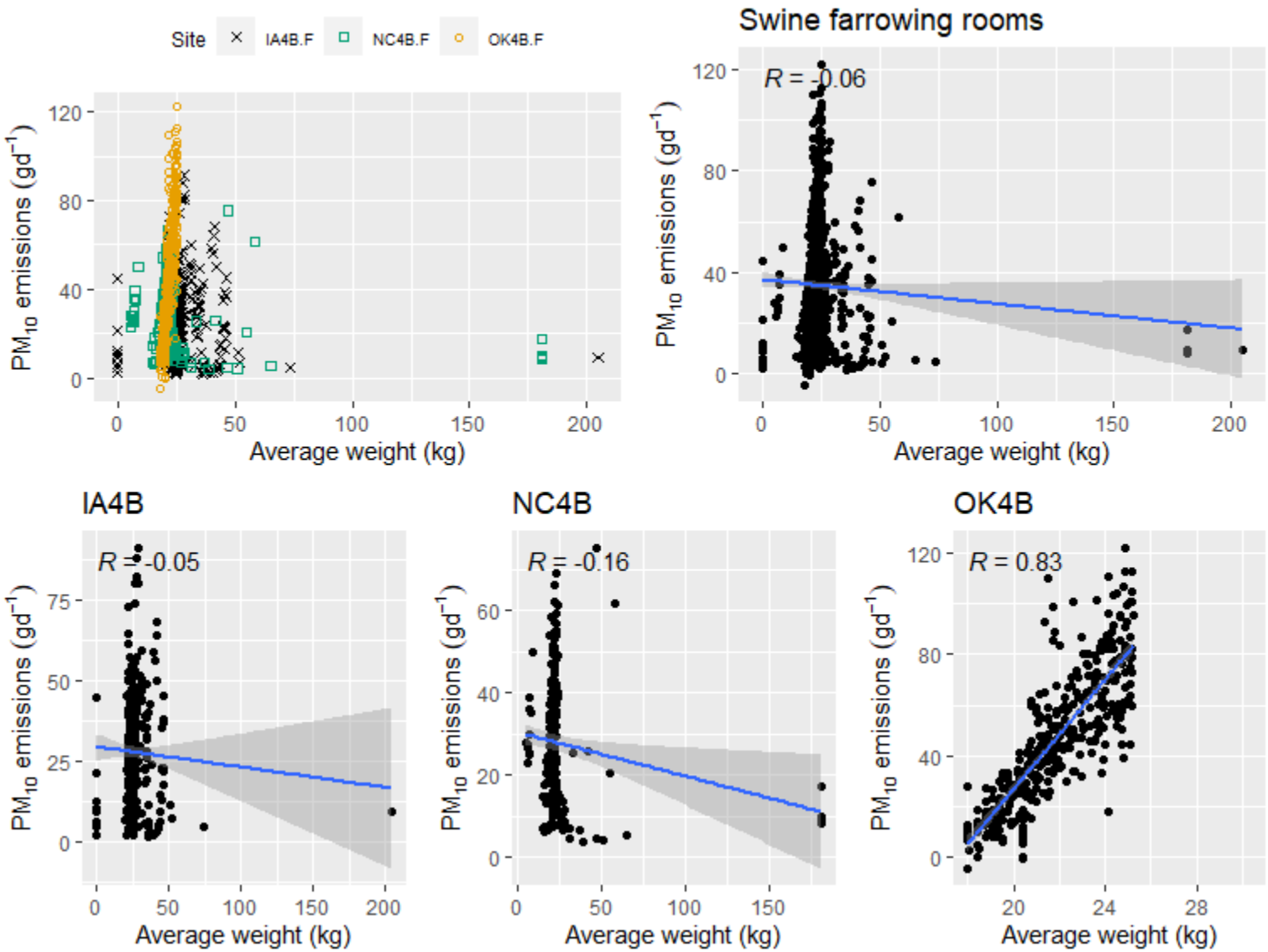


**Figure F.3-27. Scatter plot of swine farrowing rooms $PM_{10}$ emissions (g $d^{-1}$) versus average animal weight.**

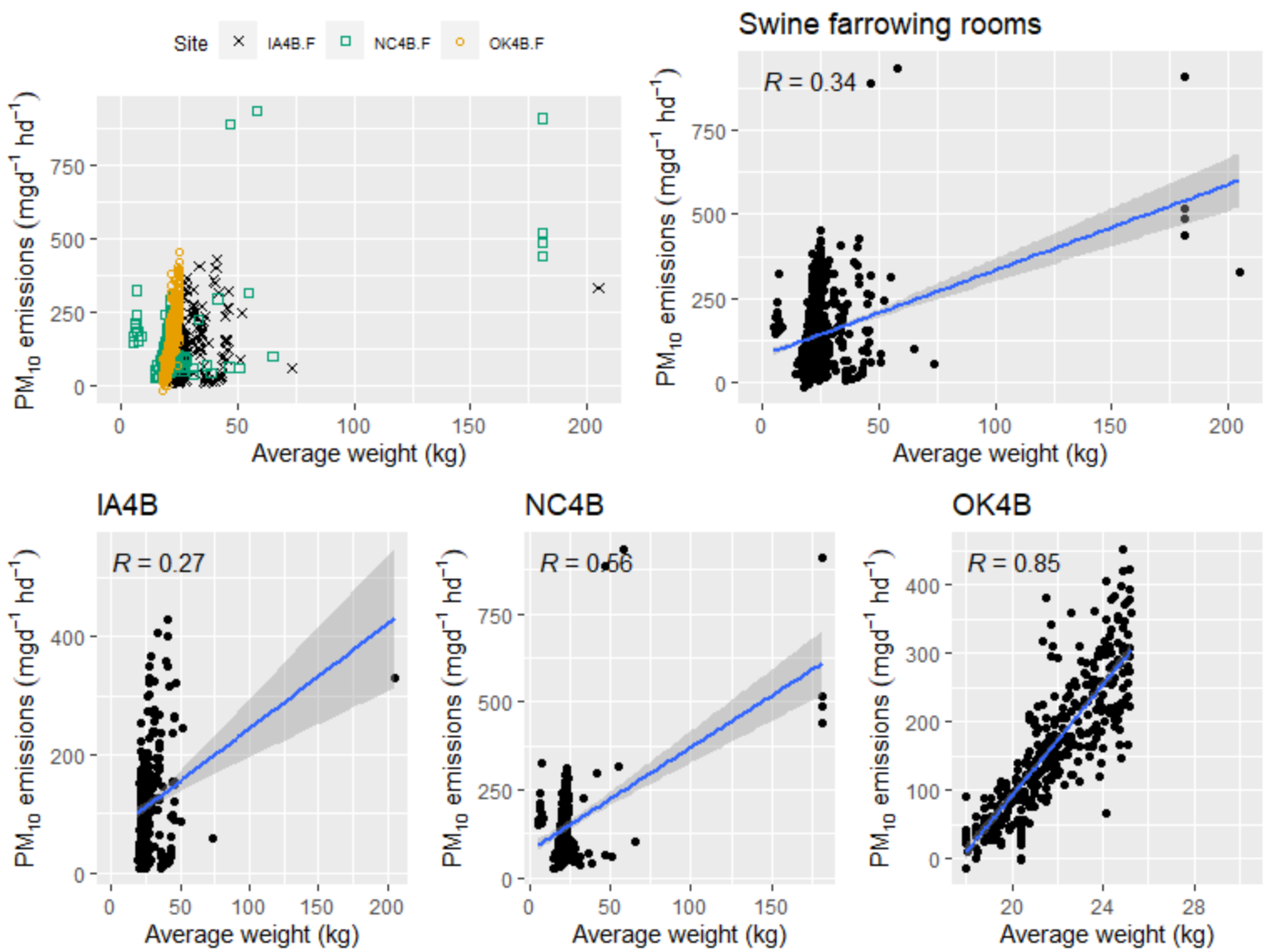


**Figure F.3-28. Scatter plot of swine farrowing rooms $PM_{10}$ emissions (mg $d^{-1}hd^{-1}$) versus average animal weight.**

F.3.1.3.3 Live animal weight

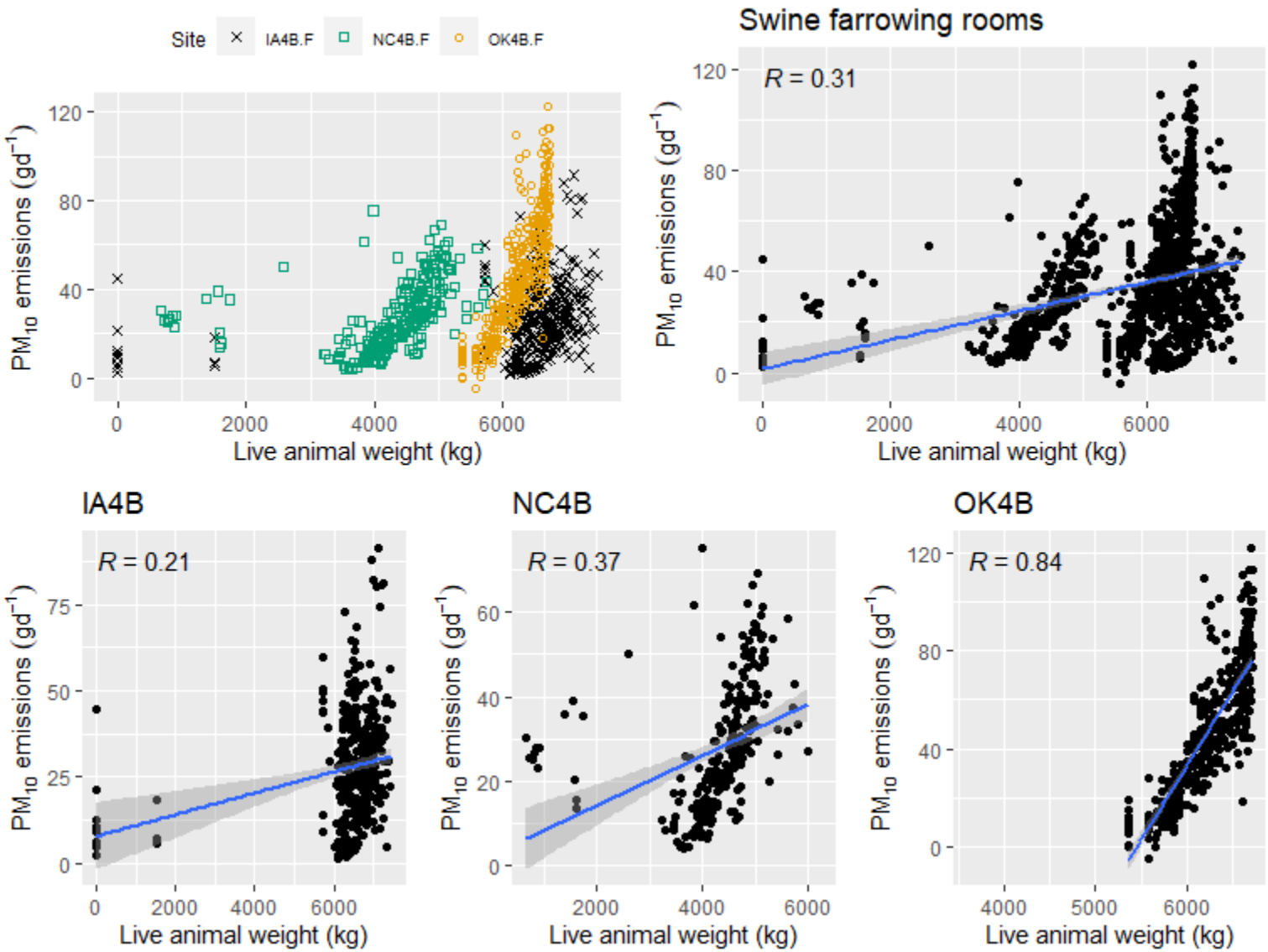


**Figure F.3-29. Scatter plot of swine farrowing rooms $PM_{10}$ emissions (g $d^{-1}$)versus live animal weight.**

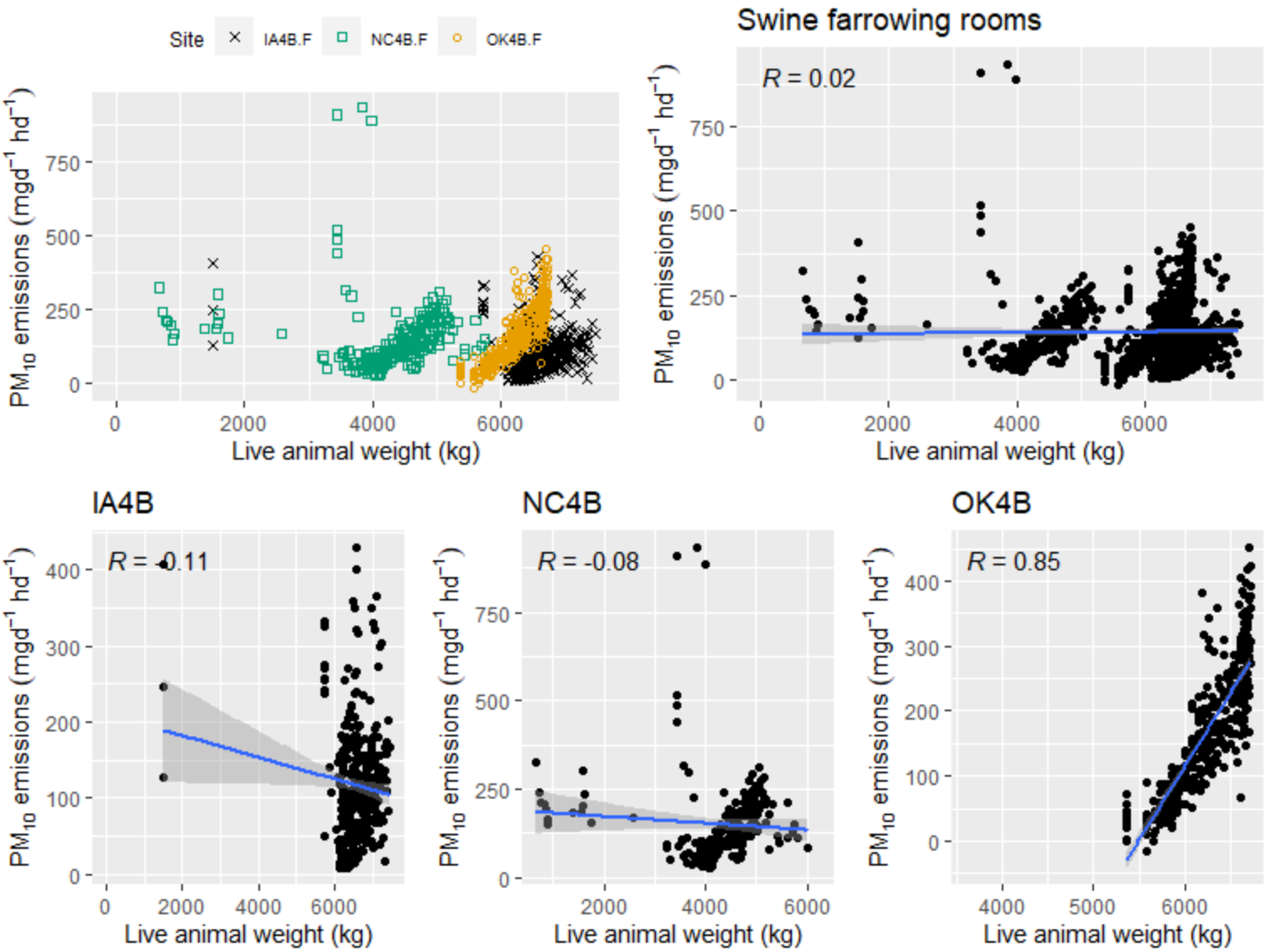


**Figure F.3-30. Scatter plot of swine farrowing rooms $PM_{10}$ emissions (mg $d^{-1}hd^{-1}$) versus live animal weight.**

F.3.1.3.4 Exhaust temperature

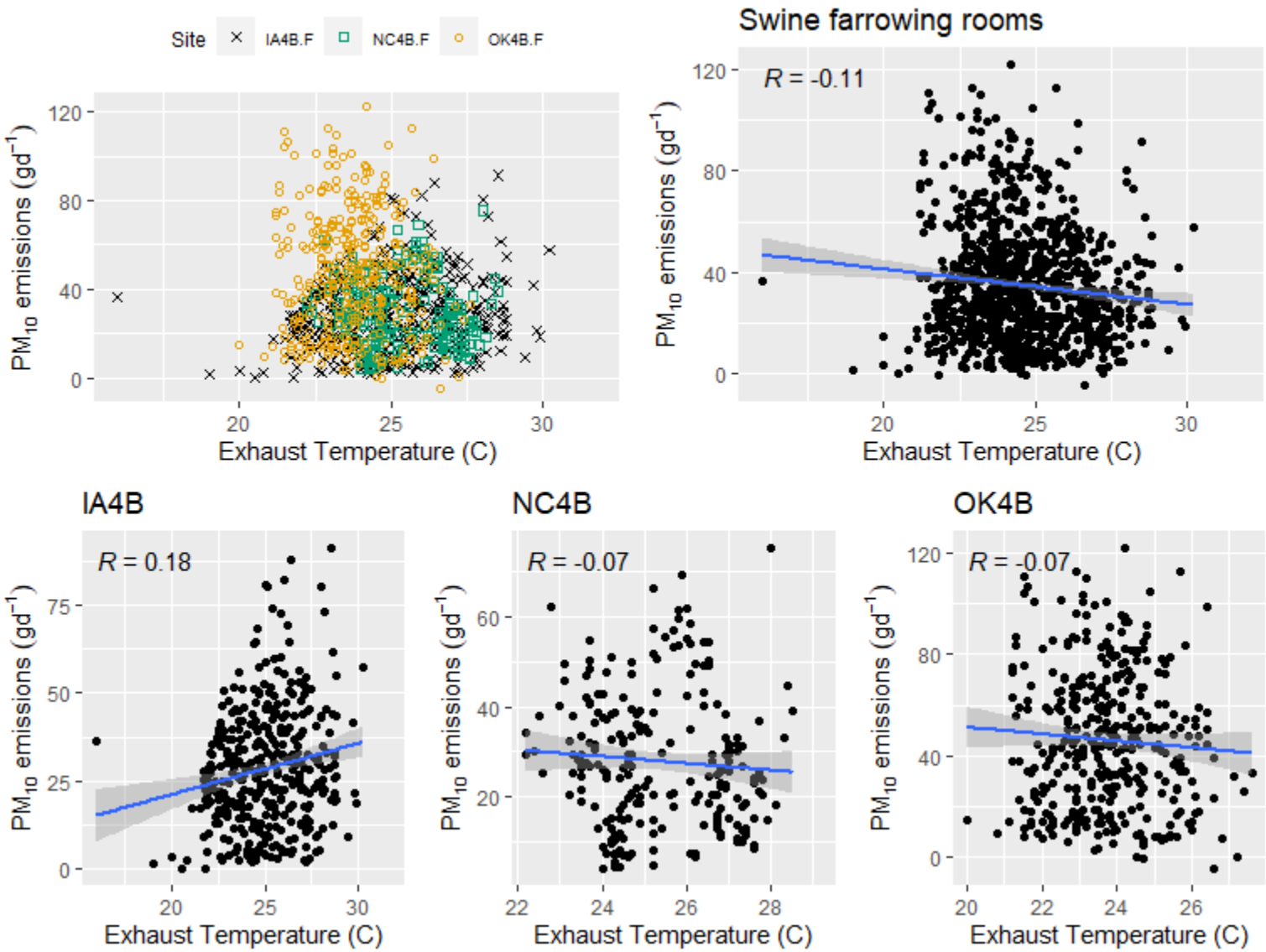


**Figure F.3-31. Scatter plot of swine farrowing rooms $PM_{10}$ emissions (g $d^{-1}$) versus exhaust temperature.**

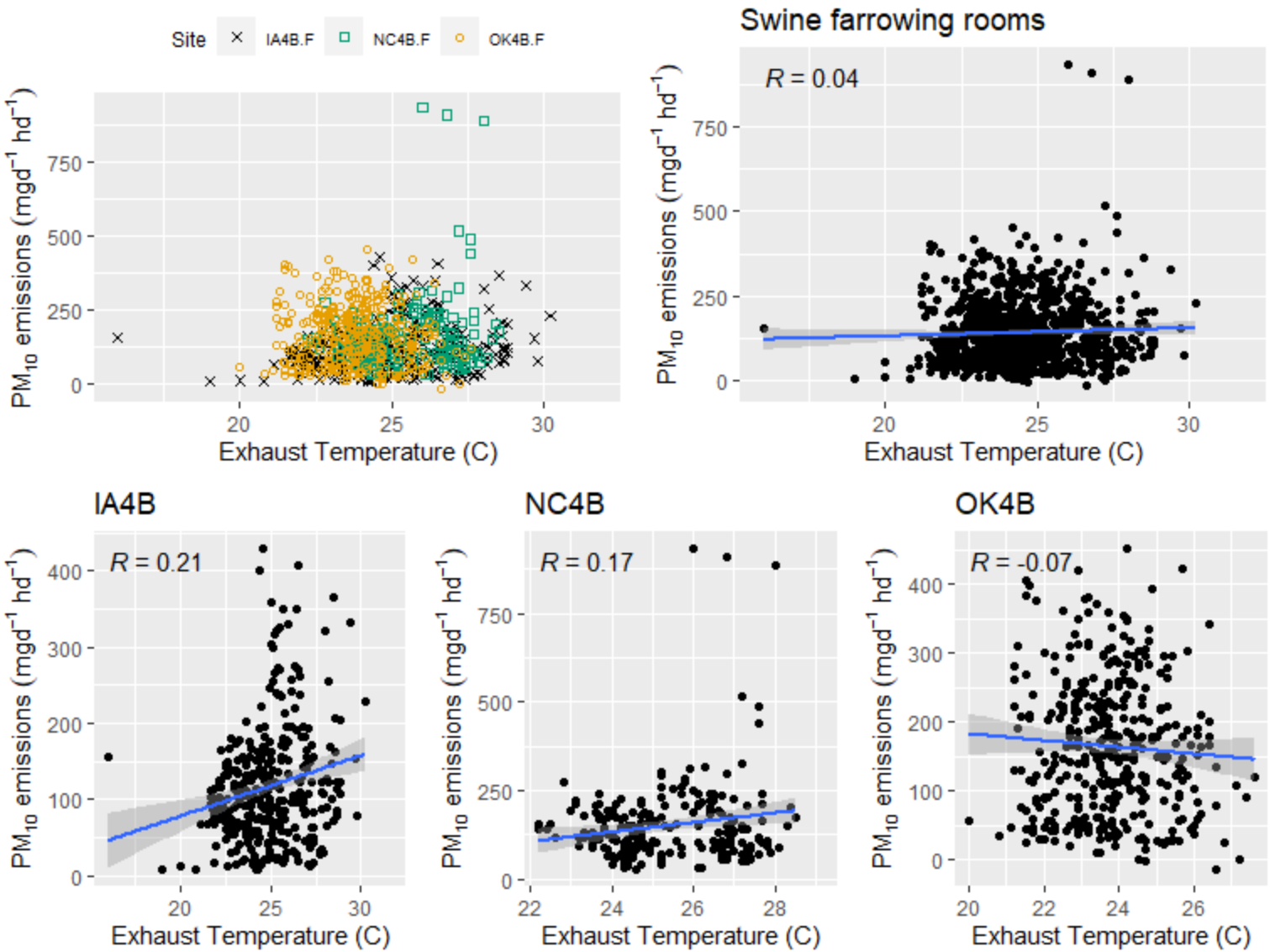


**Figure F.3-32. Scatter plot of swine farrowing rooms $PM_{10}$ emissions (mg $d^{-1}hd^{-1}$) versus exhaust temperature.**

F.3.1.3.5 Exhaust relative humidity

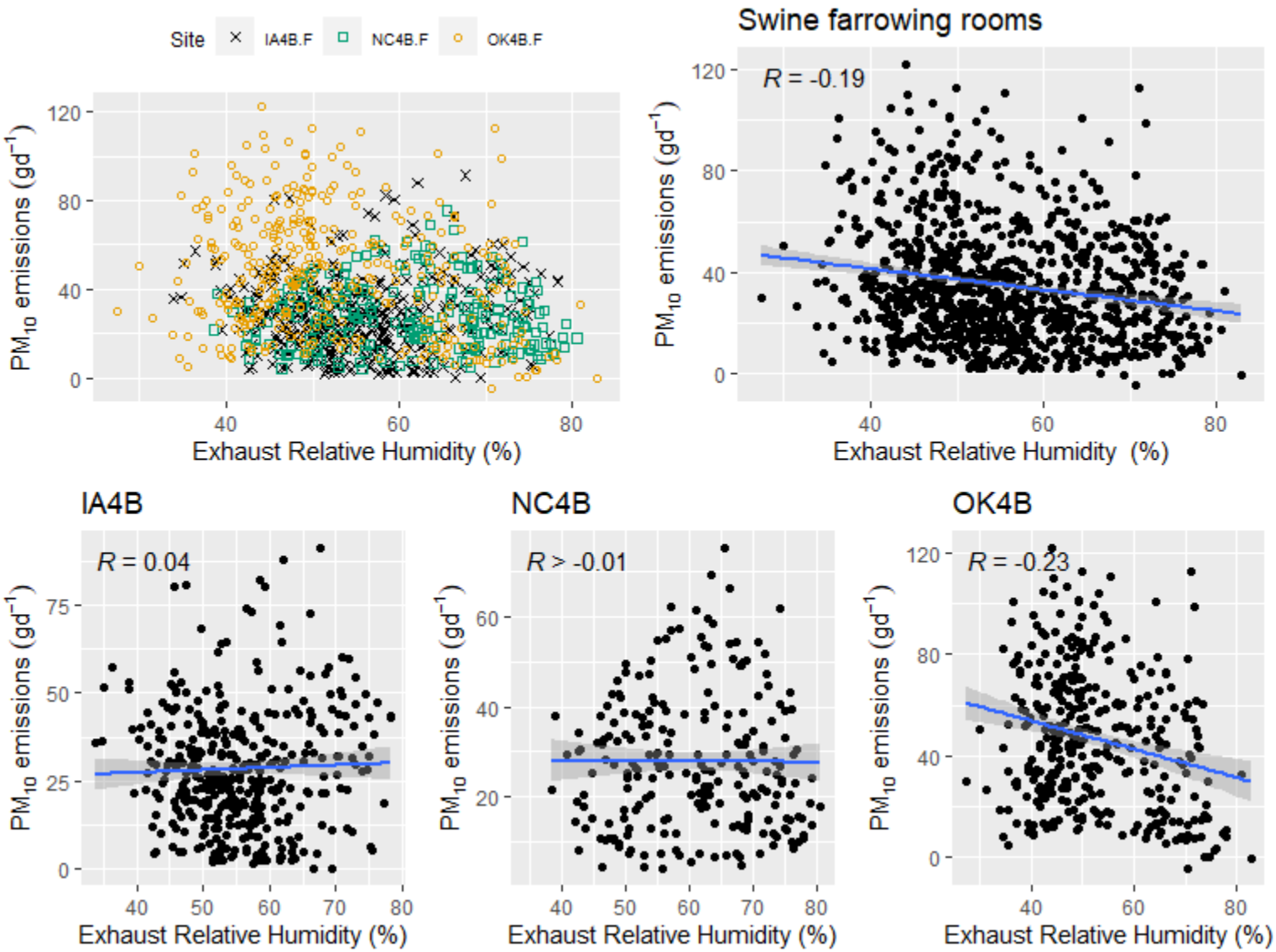


**Figure F.3-33. Scatter plot of swine farrowing rooms $PM_{10}$ emissions (g $d^{-1}$) versus exhaust relative humidity.**

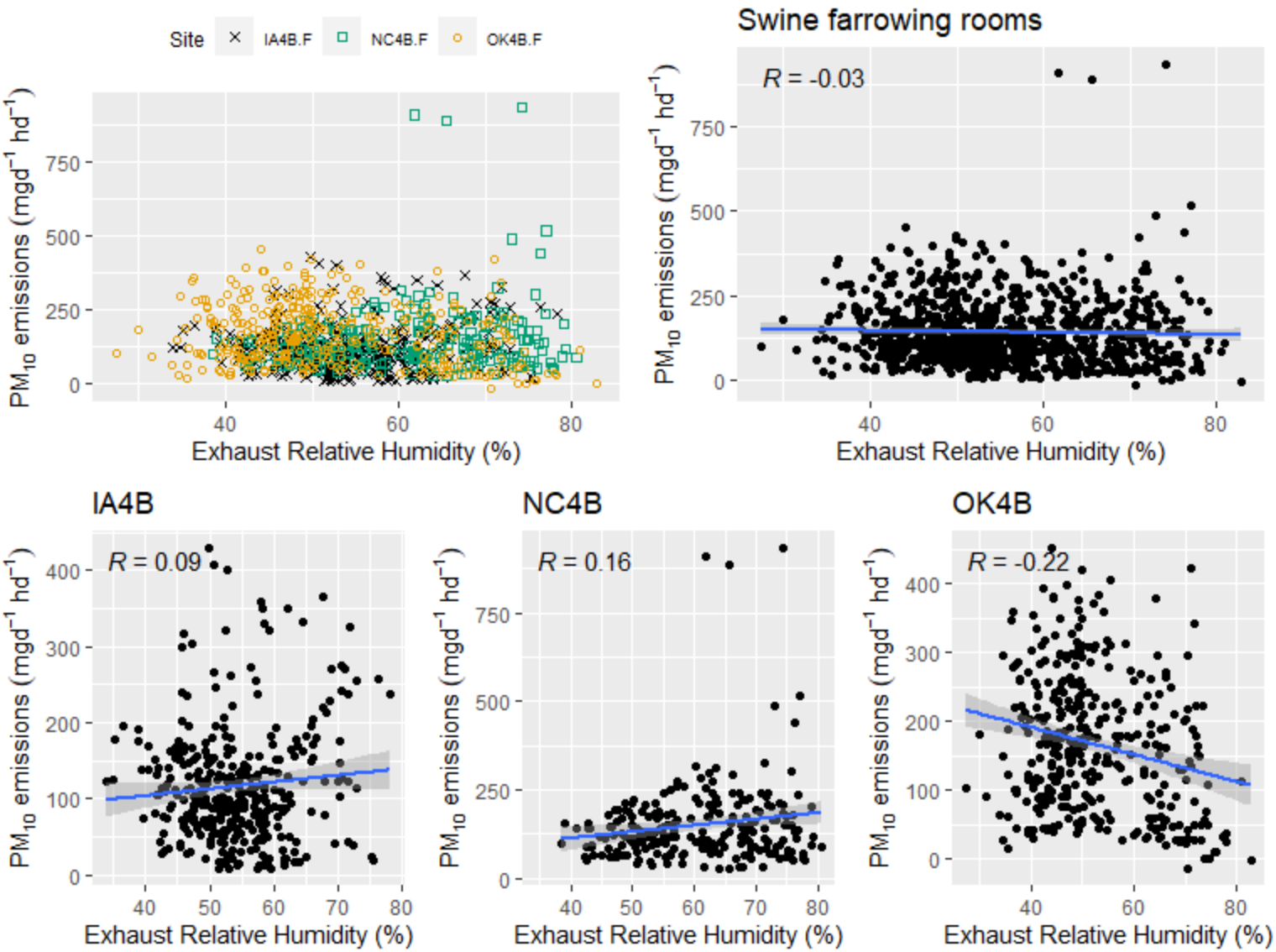


**Figure F.3-34. Scatter plot of swine farrowing rooms $PM_{10}$ emissions (mg $d^{-1}hd^{-1}$) versus exhaust relative humidity.**

F.3.1.3.6 Airflow

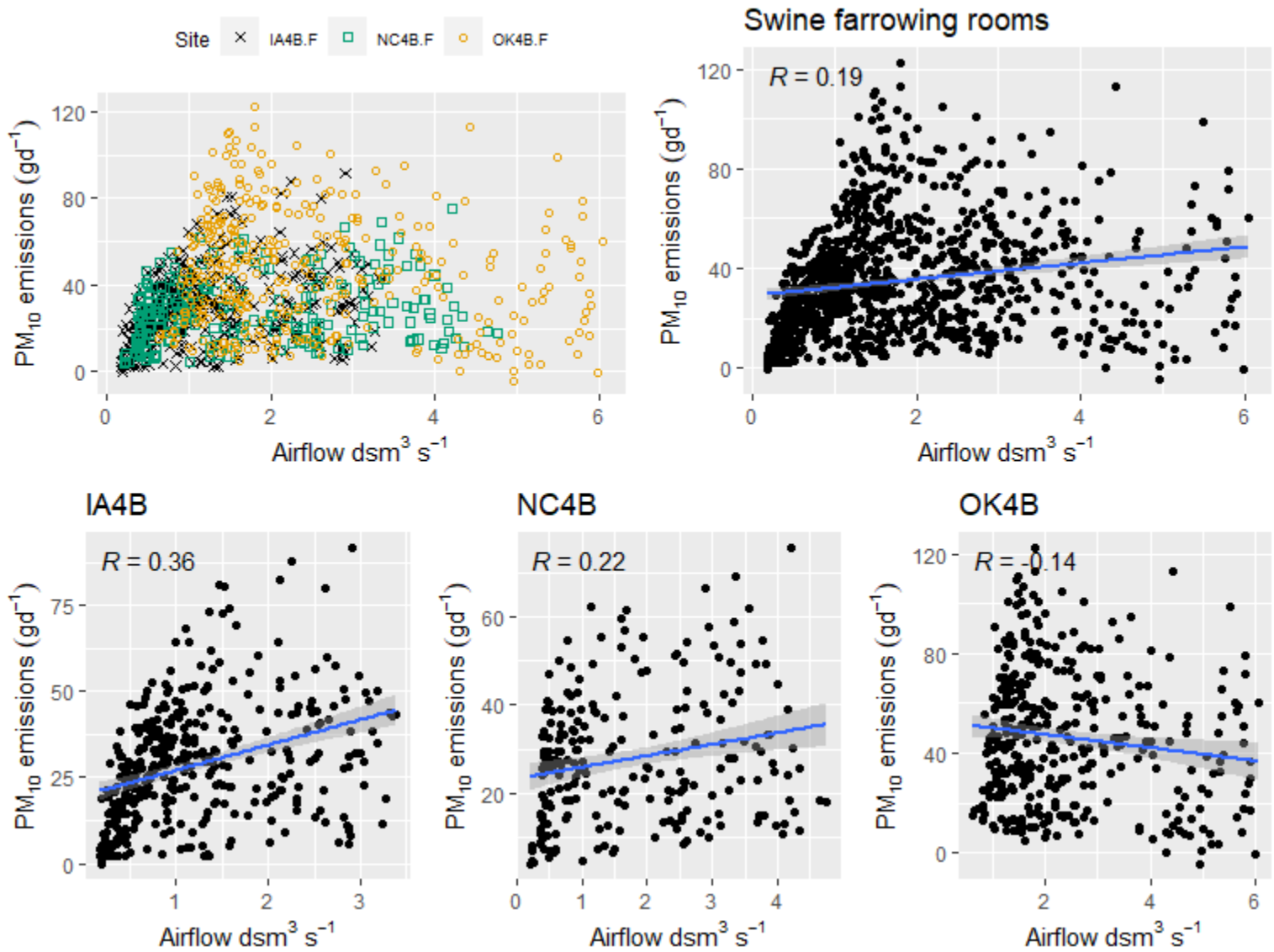


**Figure F.3-35. Scatter plot of swine farrowing rooms $PM_{10}$ emissions (g $d^{-1}$) versus airflow.**

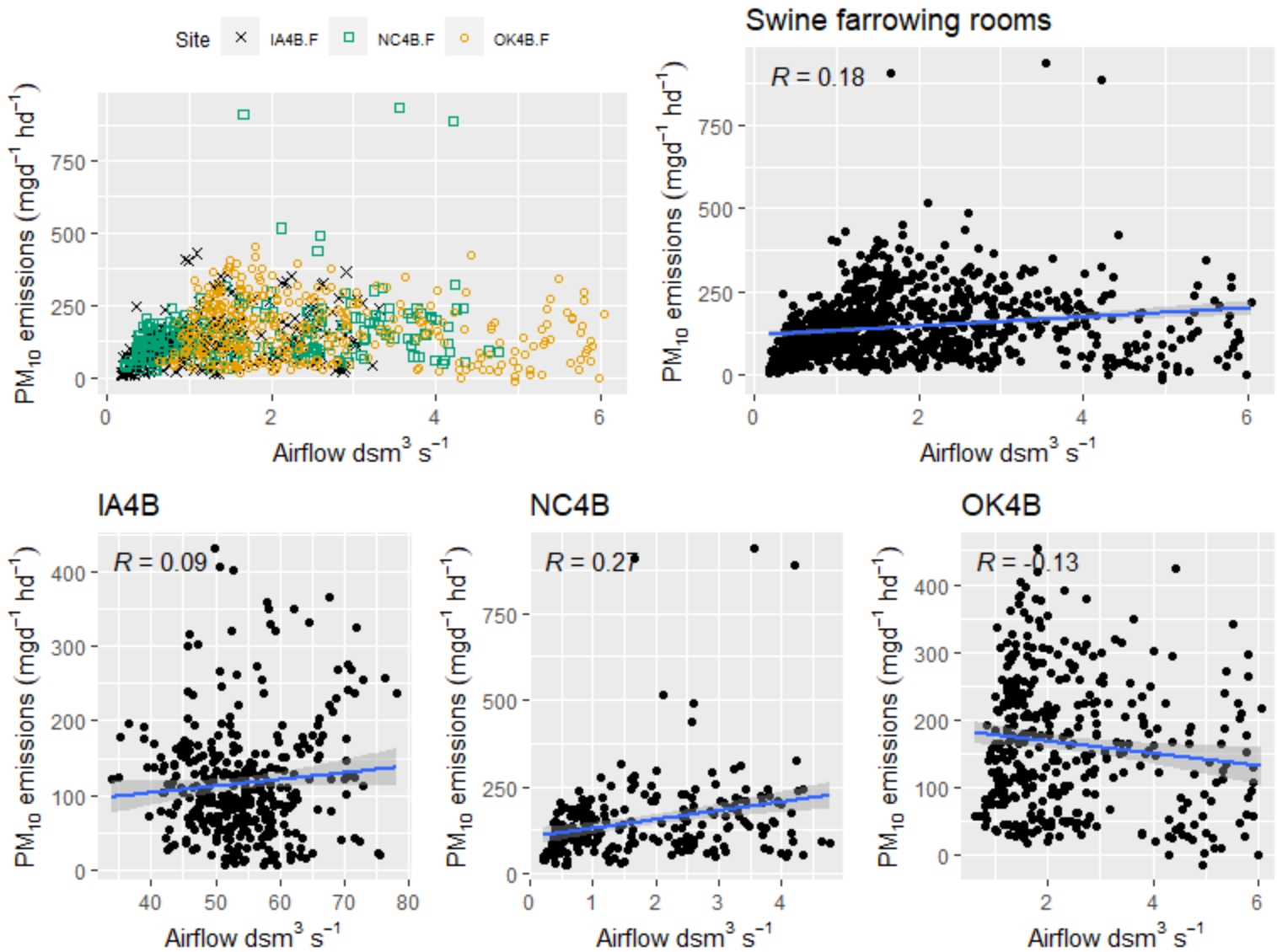


**Figure F.3-36. Scatter plot of swine farrowing rooms $PM_{10}$ emissions (mg $d^{-1}hd^{-1}$) versus airflow.**

### *F.3.1.4 Particulate Matter ($PM_{2.5}$)*

F.3.1.4.1 Inventory

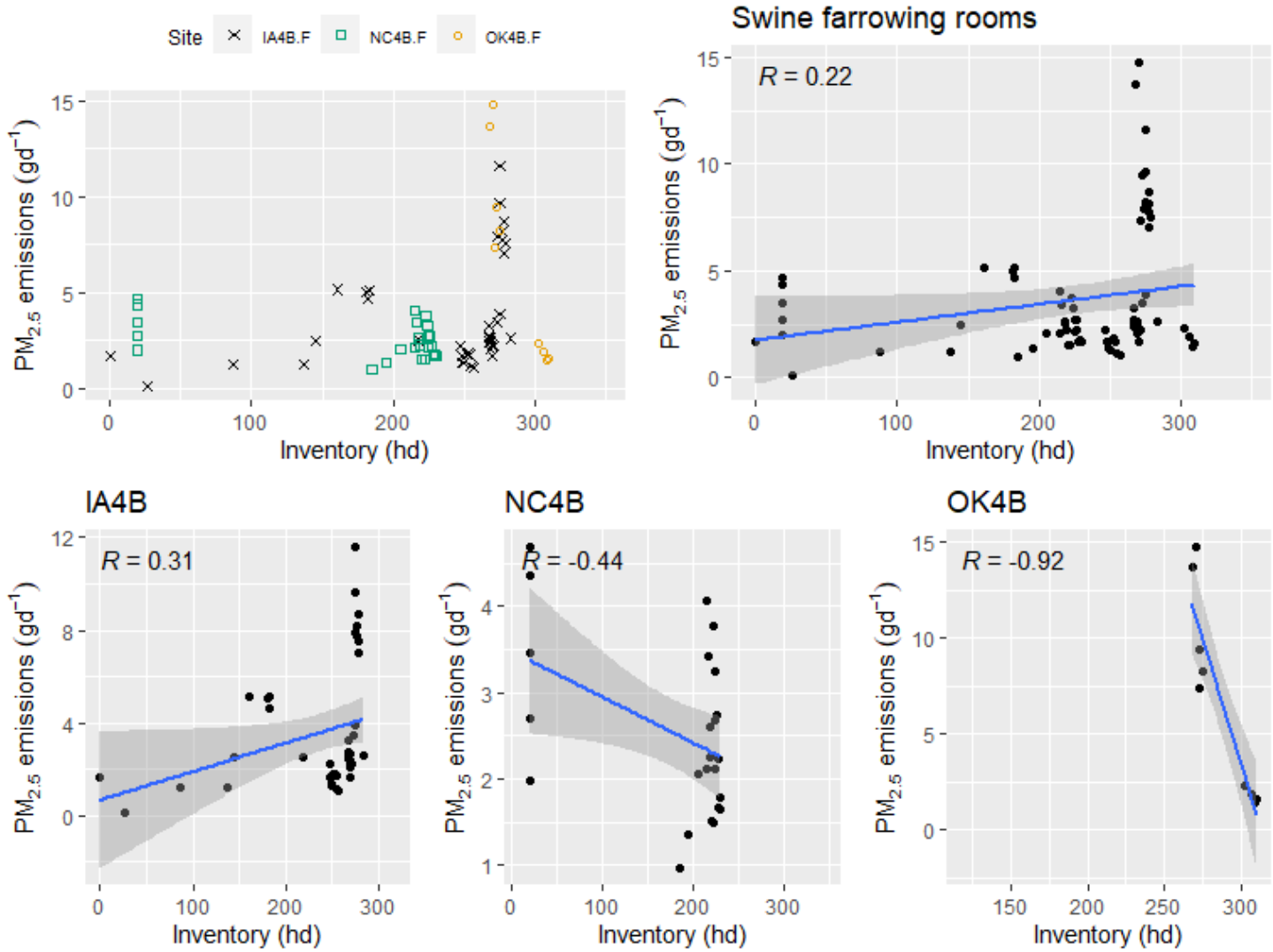


**Figure F.3-37. Scatter plot of swine farrowing rooms $PM_{2.5}$ emissions (g $d^{-1}$) versus Inventory.**

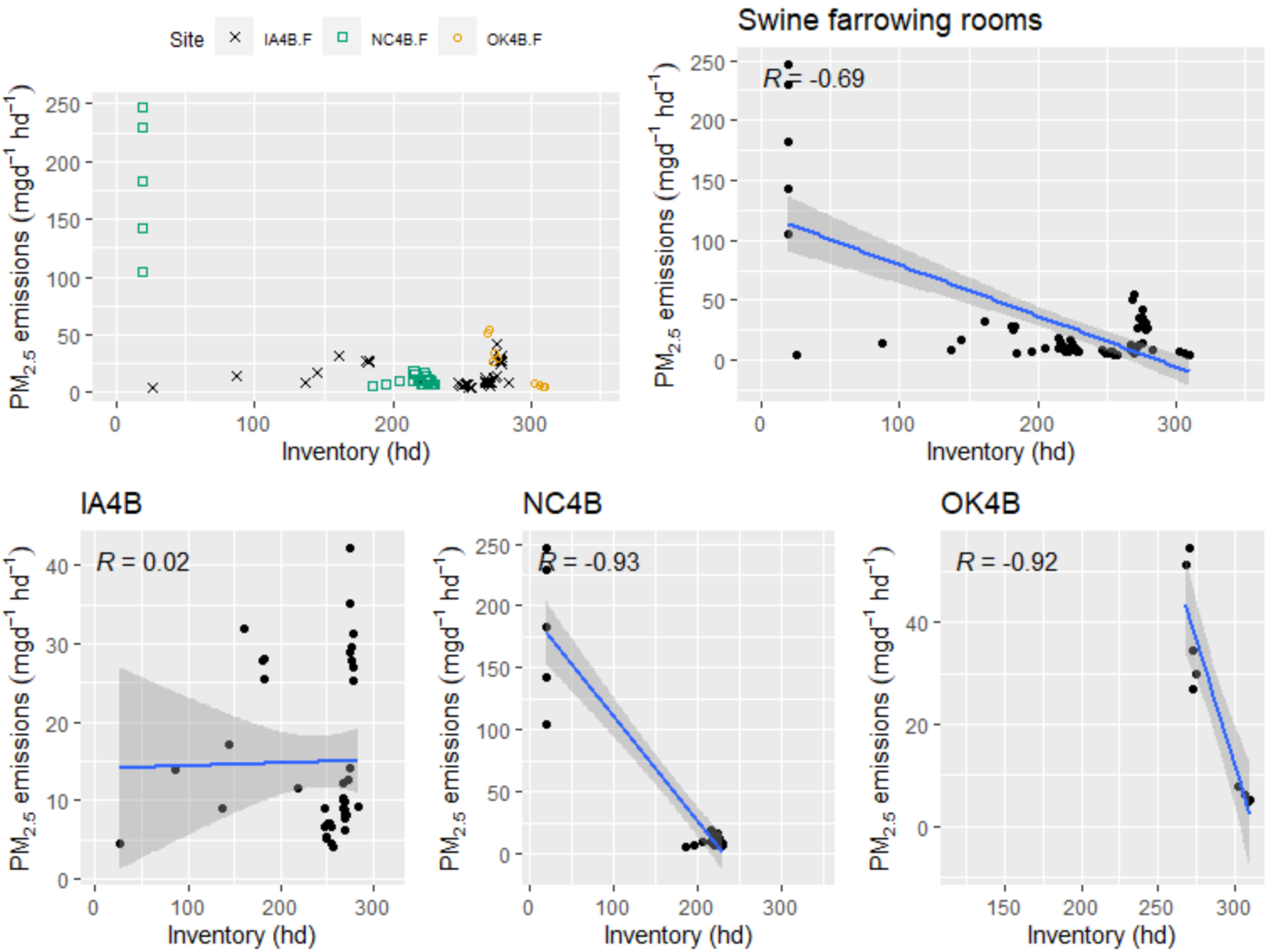


**Figure F.3-38. Scatter plot of swine farrowing rooms $PM_{2.5}$ emissions (mg $d^{-1}hd^{-1}$) versus Inventory.**

F.3.1.4.2 Average animal weight

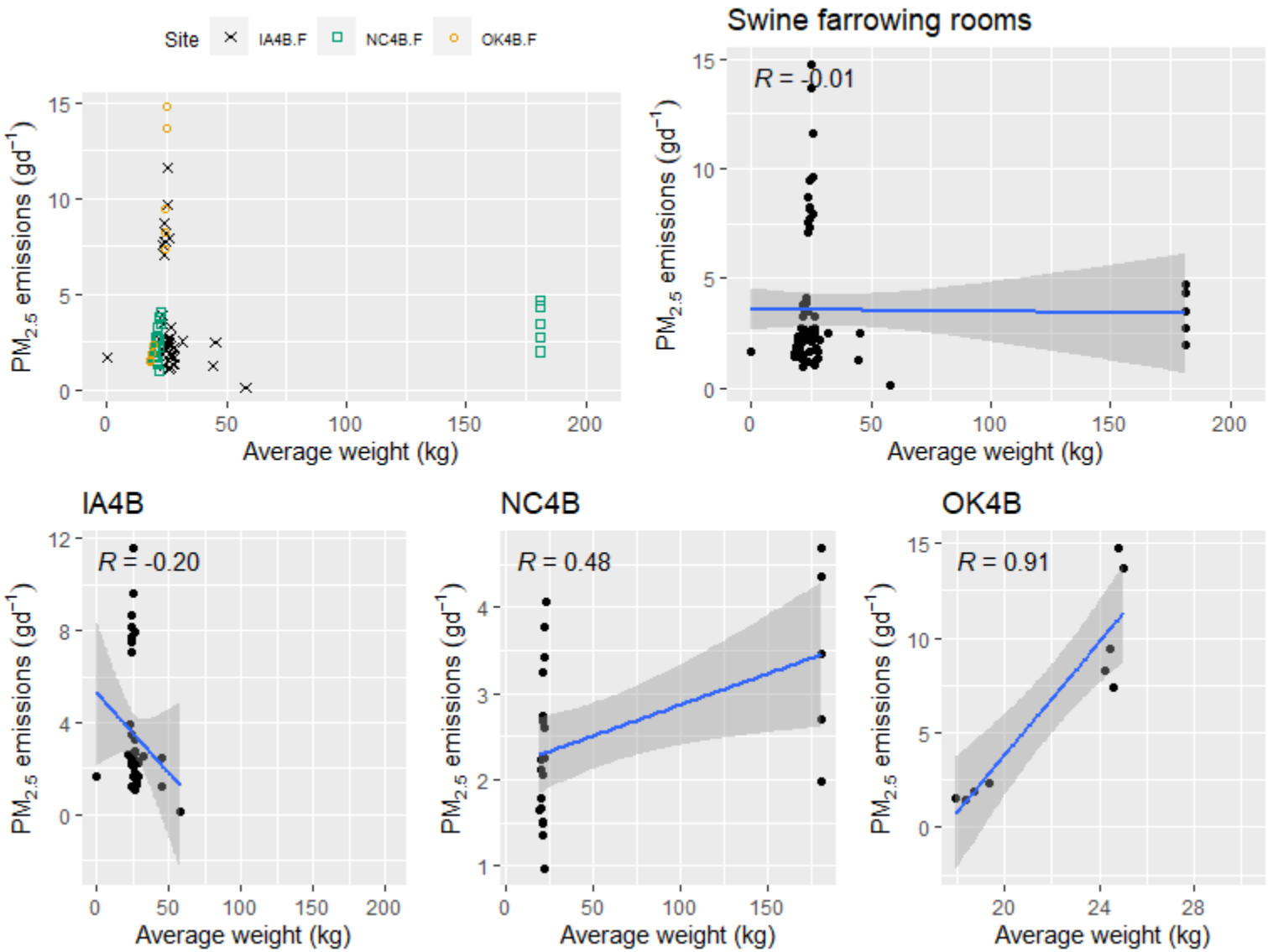


**Figure F.3-39. Scatter plot of swine farrowing rooms $PM_{2.5}$ emissions (g $d^{-1}$) versus average animal weight.**

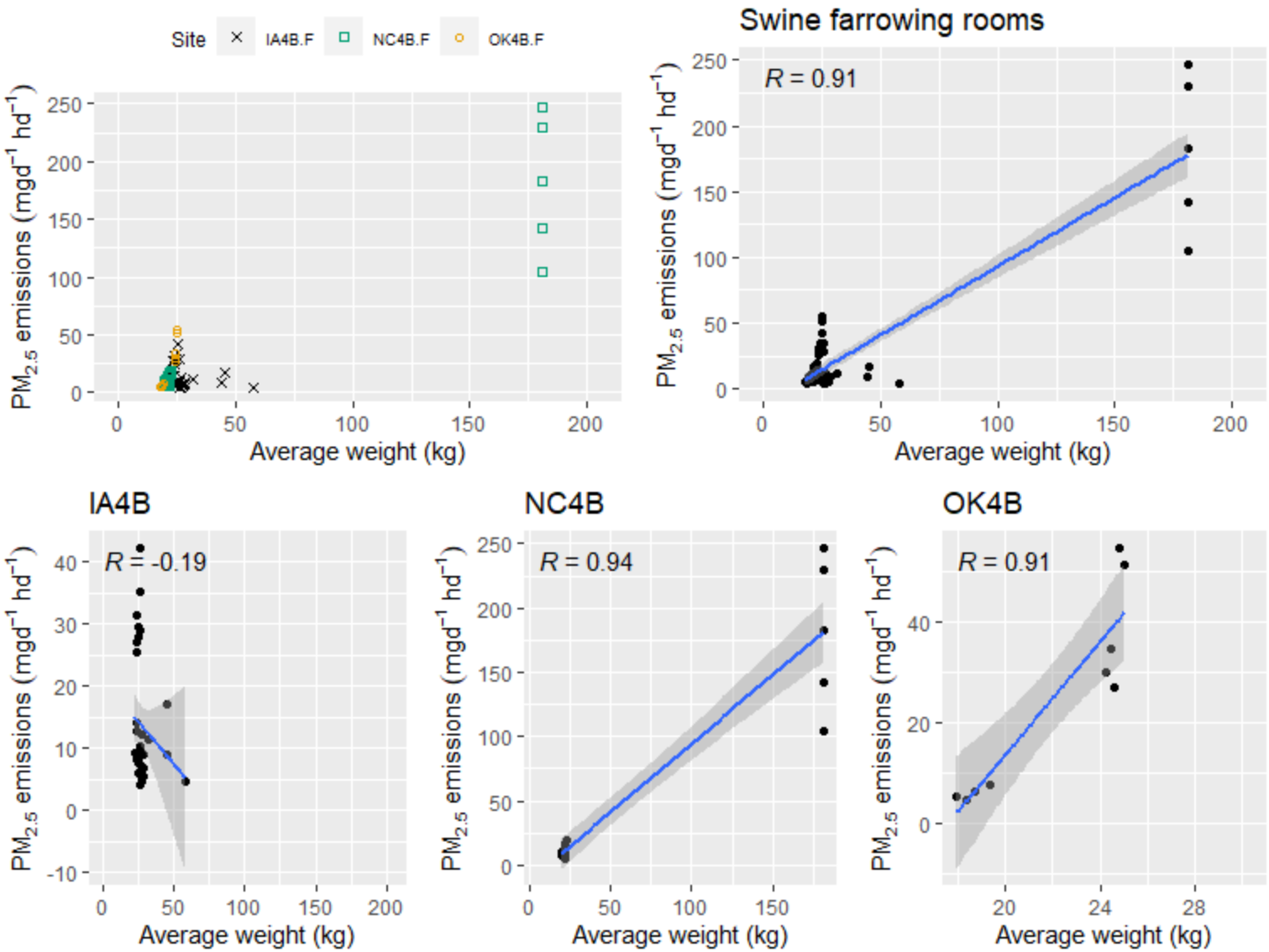


**Figure F.3-40. Scatter plot of swine farrowing rooms $PM_{2.5}$ emissions (mg $d^{-1}hd^{-1}$) versus average animal weight.**

F.3.1.4.3 Live animal weight

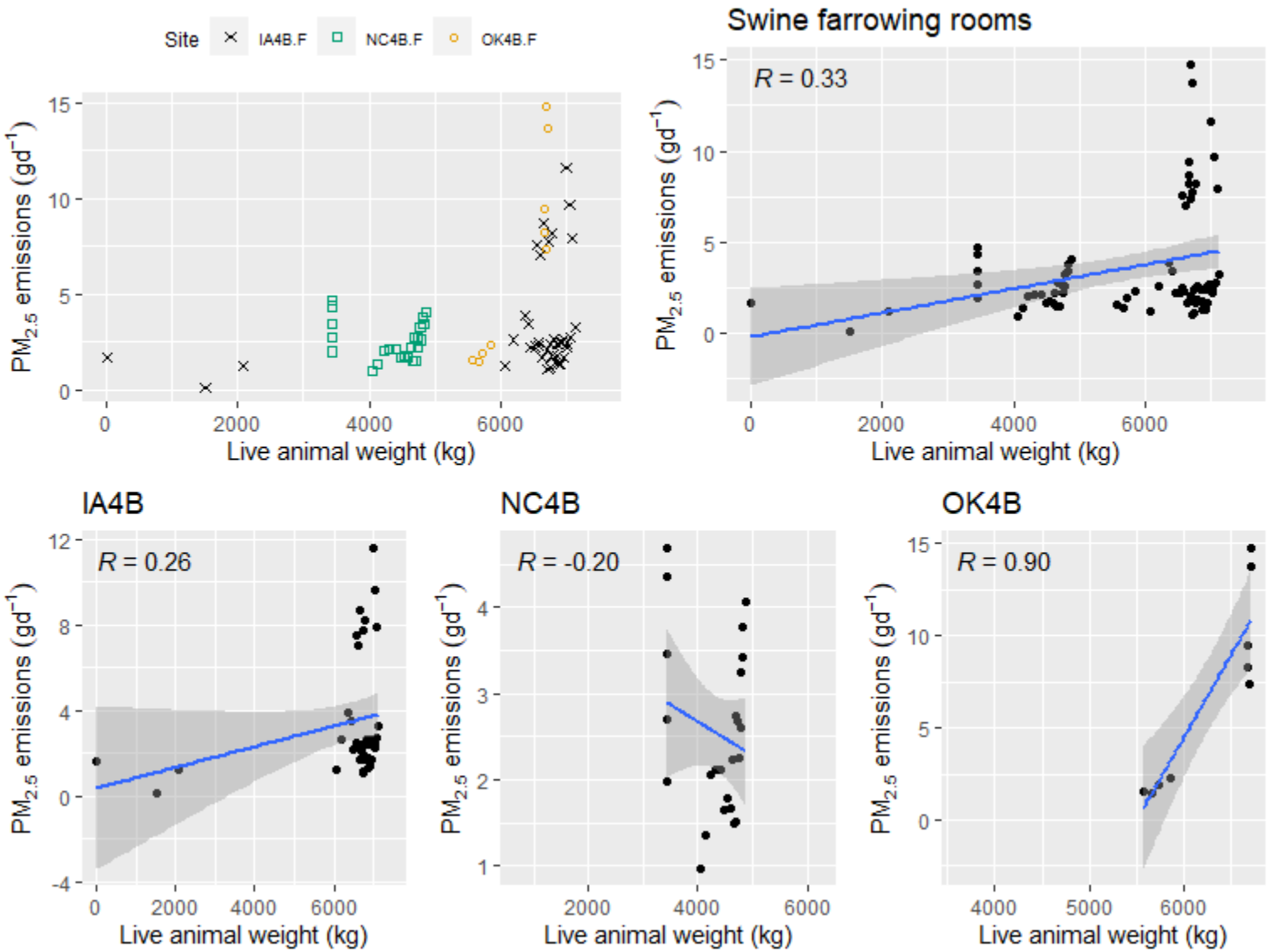


**Figure F.3-41. Scatter plot of swine farrowing rooms $PM_{2.5}$ emissions (g $d^{-1}$)versus live animal weight.**

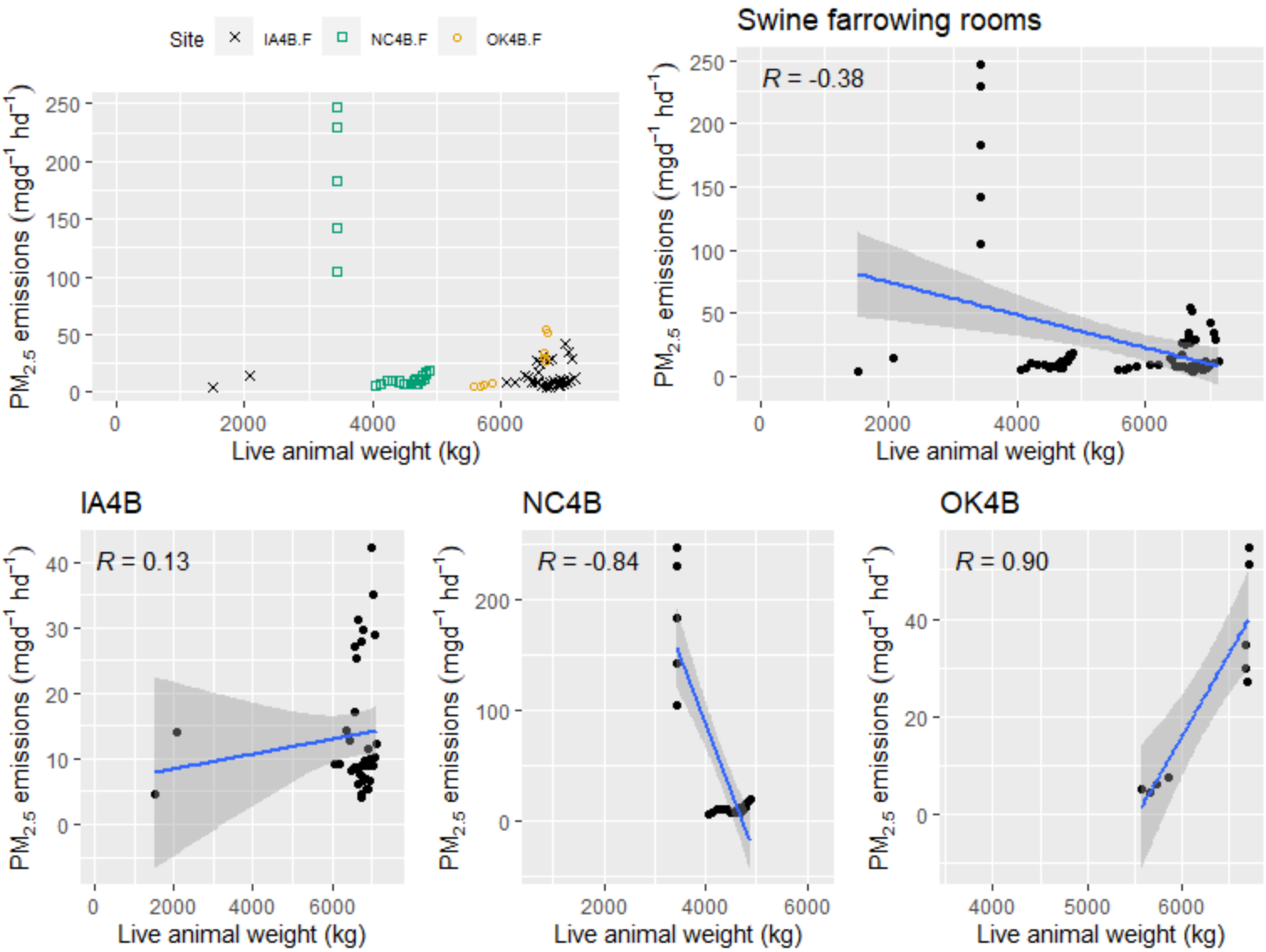


**Figure F.3-42. Scatter plot of swine farrowing rooms $PM_{2.5}$ emissions (mg $d^{-1}hd^{-1}$) versus live animal weight.**

F.3.1.4.4 Exhaust temperature

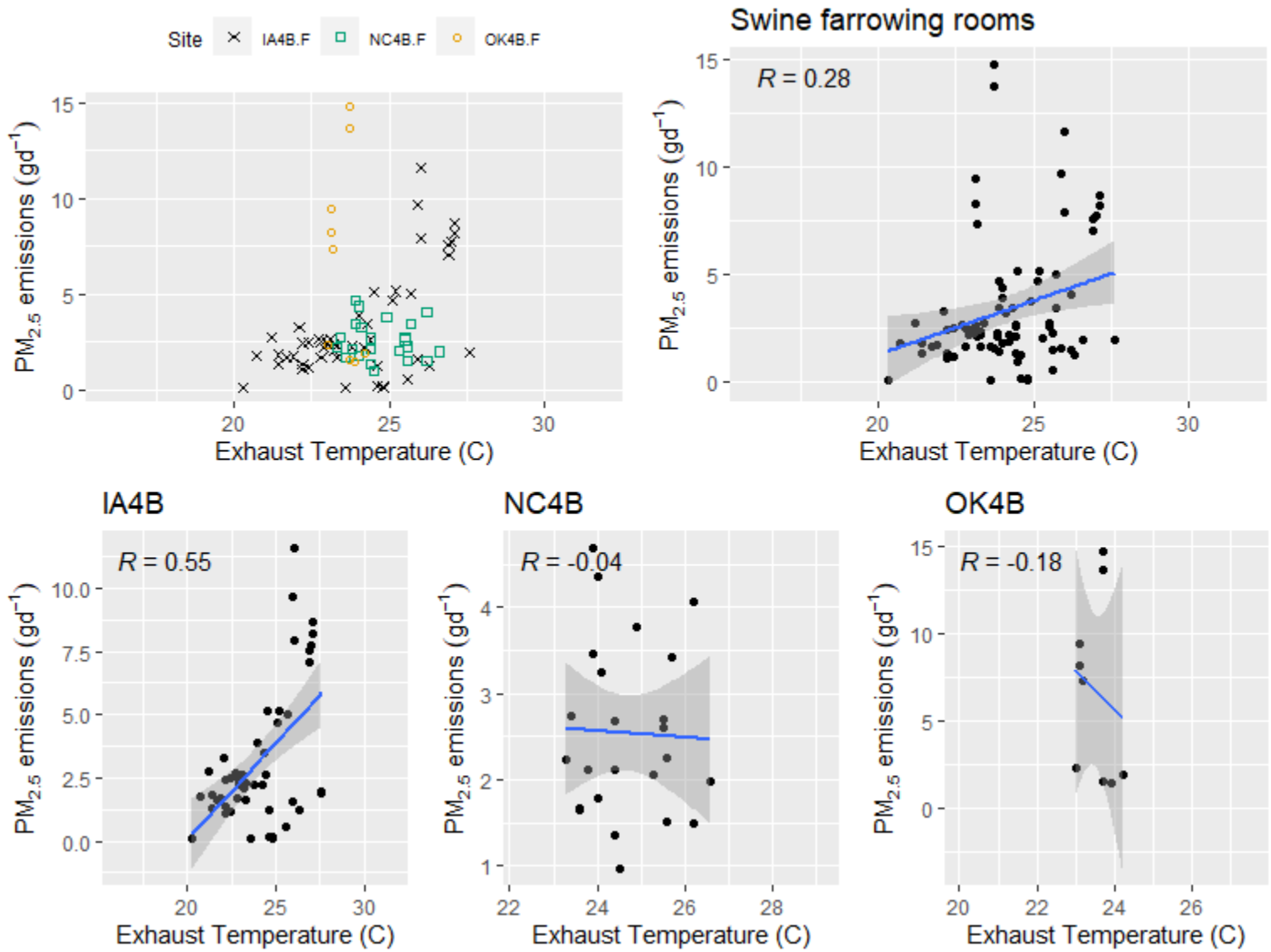


**Figure F.3-43. Scatter plot of swine farrowing rooms $PM_{2.5}$ emissions (g $d^{-1}$) versus exhaust temperature.**

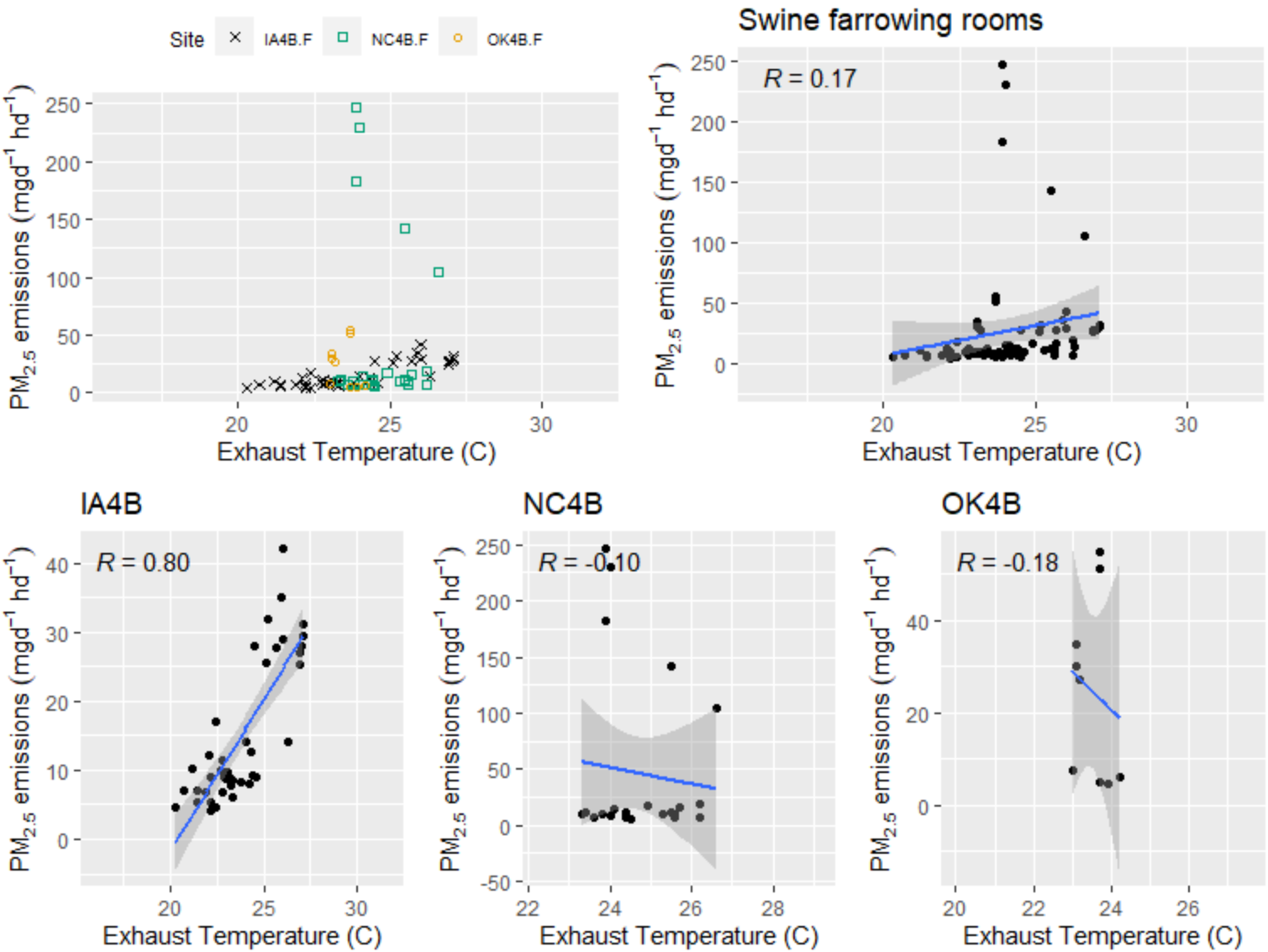


**Figure F.3-44. Scatter plot of swine farrowing rooms $PM_{2.5}$ emissions (mg $d^{-1}hd^{-1}$) versus exhaust temperature.**

F.3.1.4.5 Exhaust relative humidity

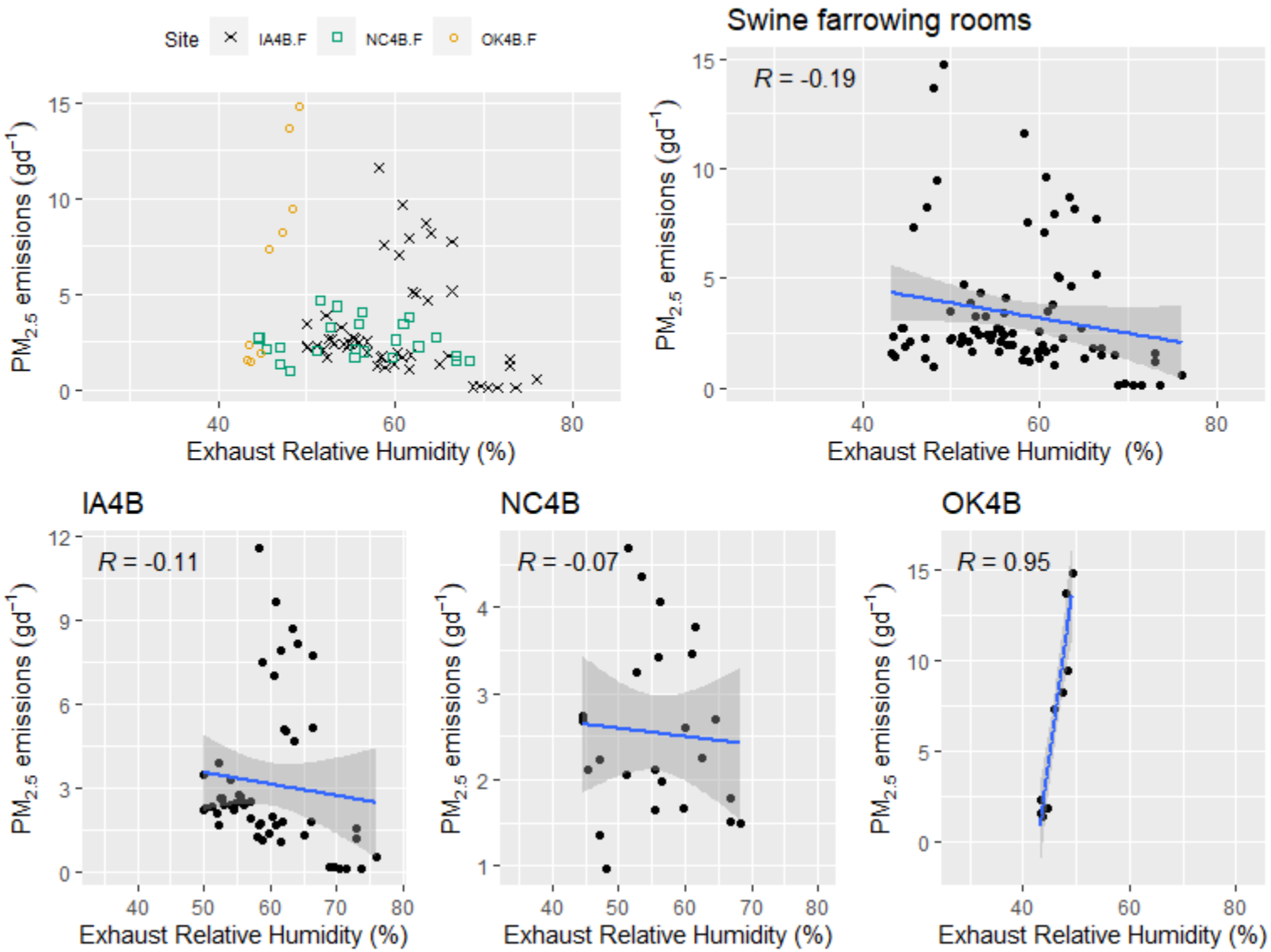


**Figure F.3-45. Scatter plot of swine farrowing rooms $PM_{2.5}$ emissions (g $d^{-1}$) versus exhaust relative humidity.**

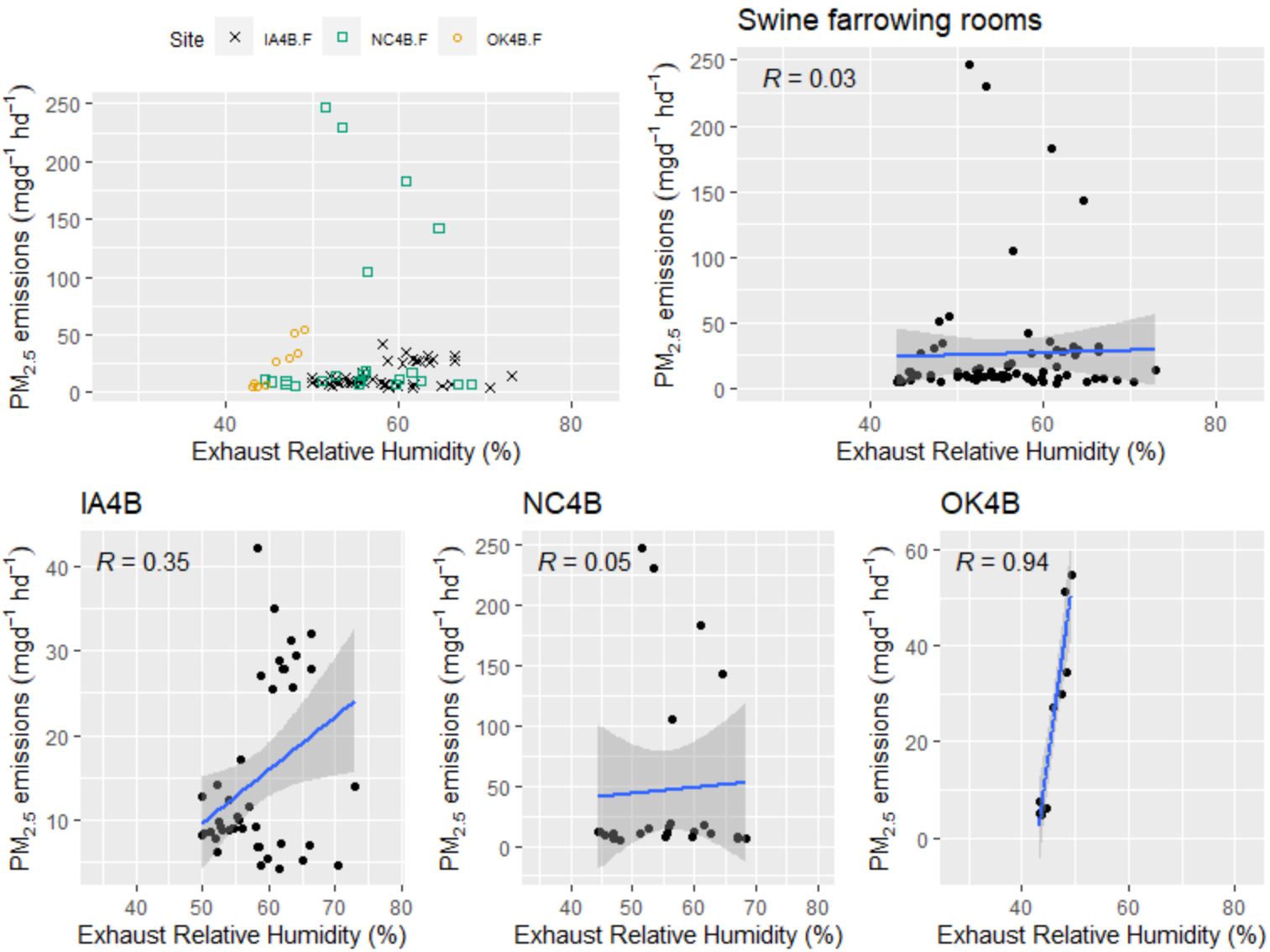


**Figure F.3-46. Scatter plot of swine farrowing rooms $PM_{2.5}$ emissions (mg $d^{-1}hd^{-1}$) versus exhaust relative humidity.**

F.3.1.4.6 Airflow

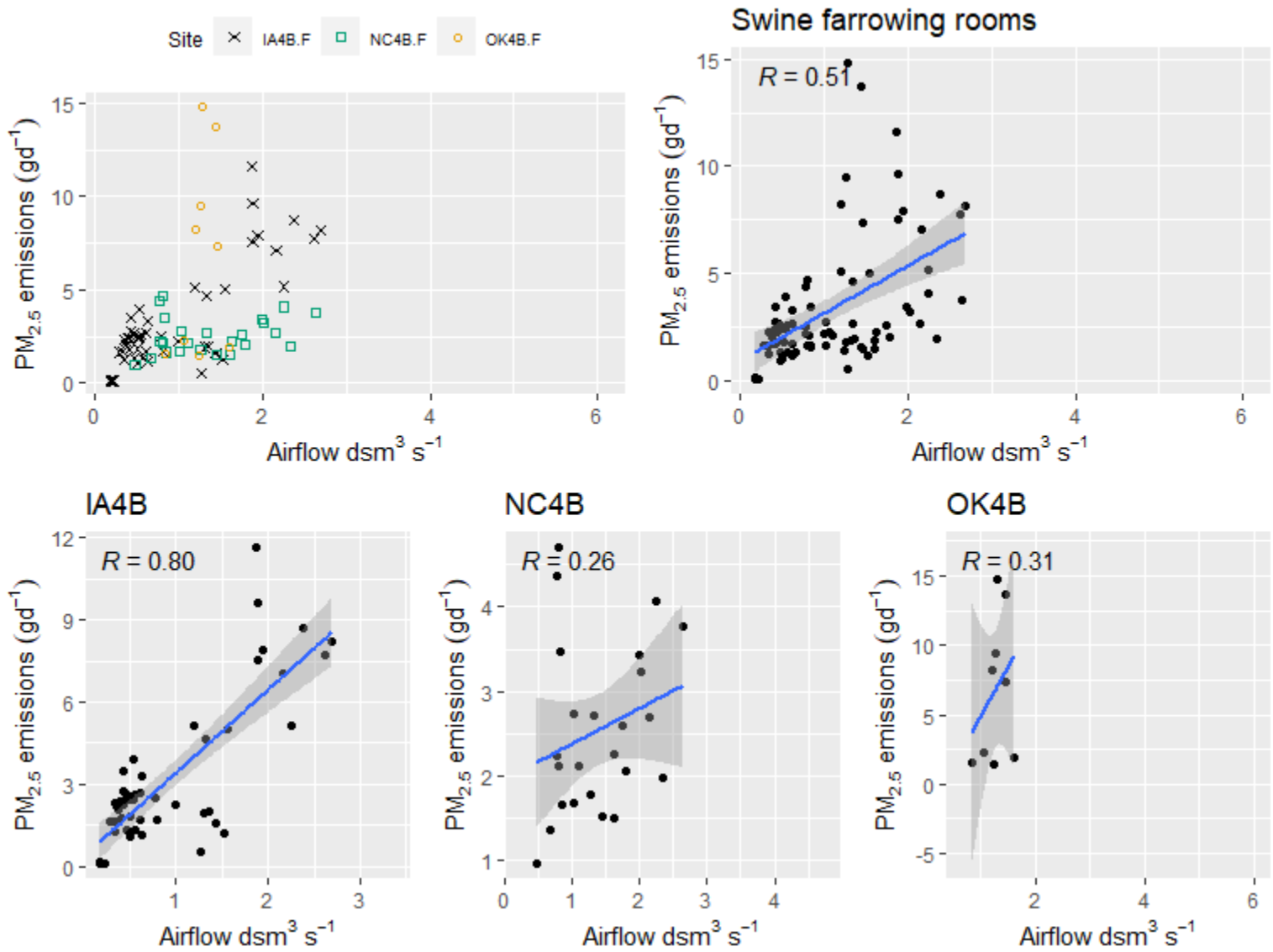


**Figure F.3-47. Scatter plot of swine farrowing rooms $PM_{2.5}$ emissions (g $d^{-1}$) versus airflow.**

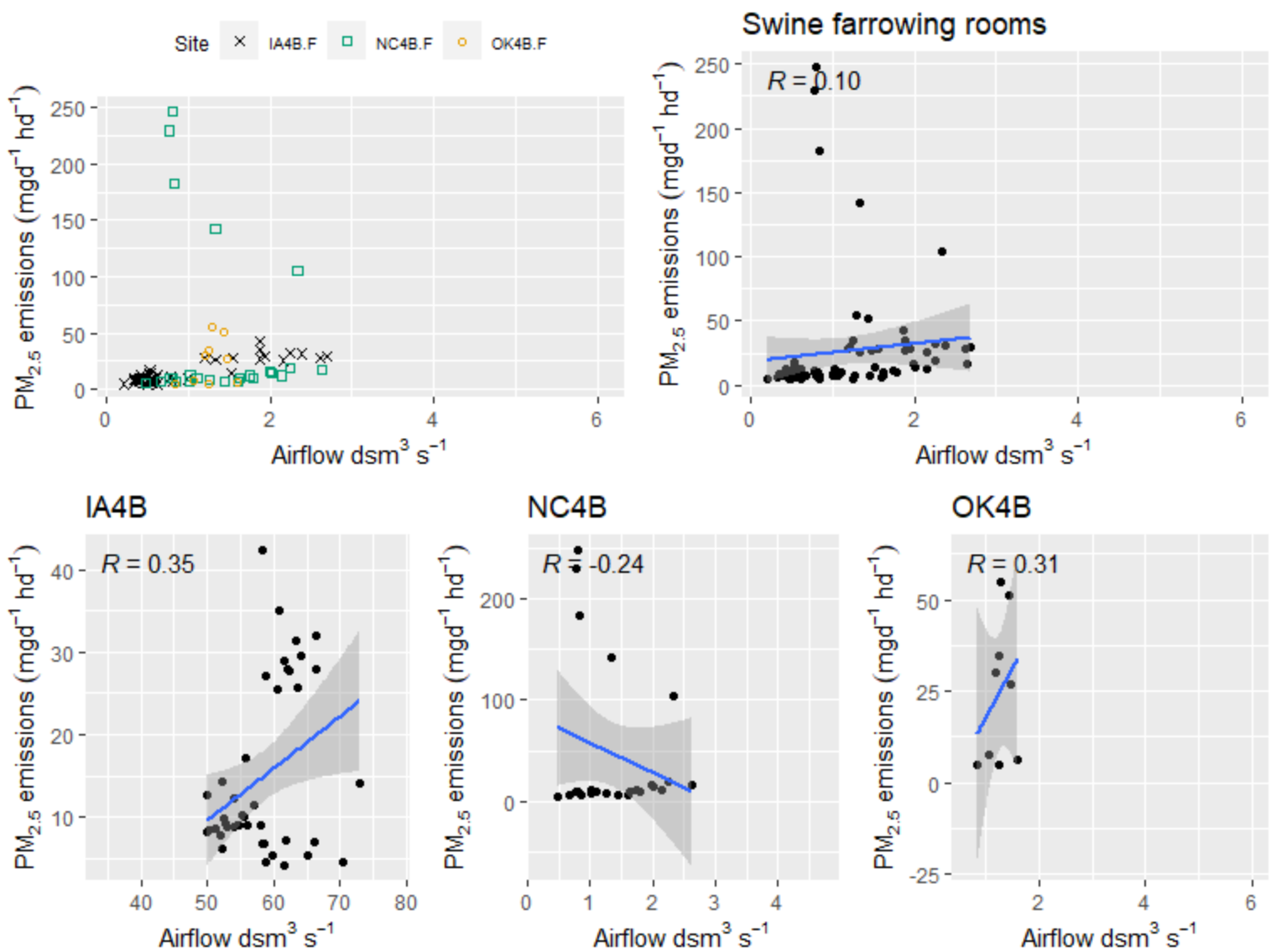


**Figure F.3-48. Scatter plot of swine farrowing rooms $PM_{2.5}$ emissions (mg $d^{-1}hd^{-1}$) versus airflow.**

### *F.3.1.5 Total Suspended Particulates (TSP)*

F.3.1.5.1 Inventory

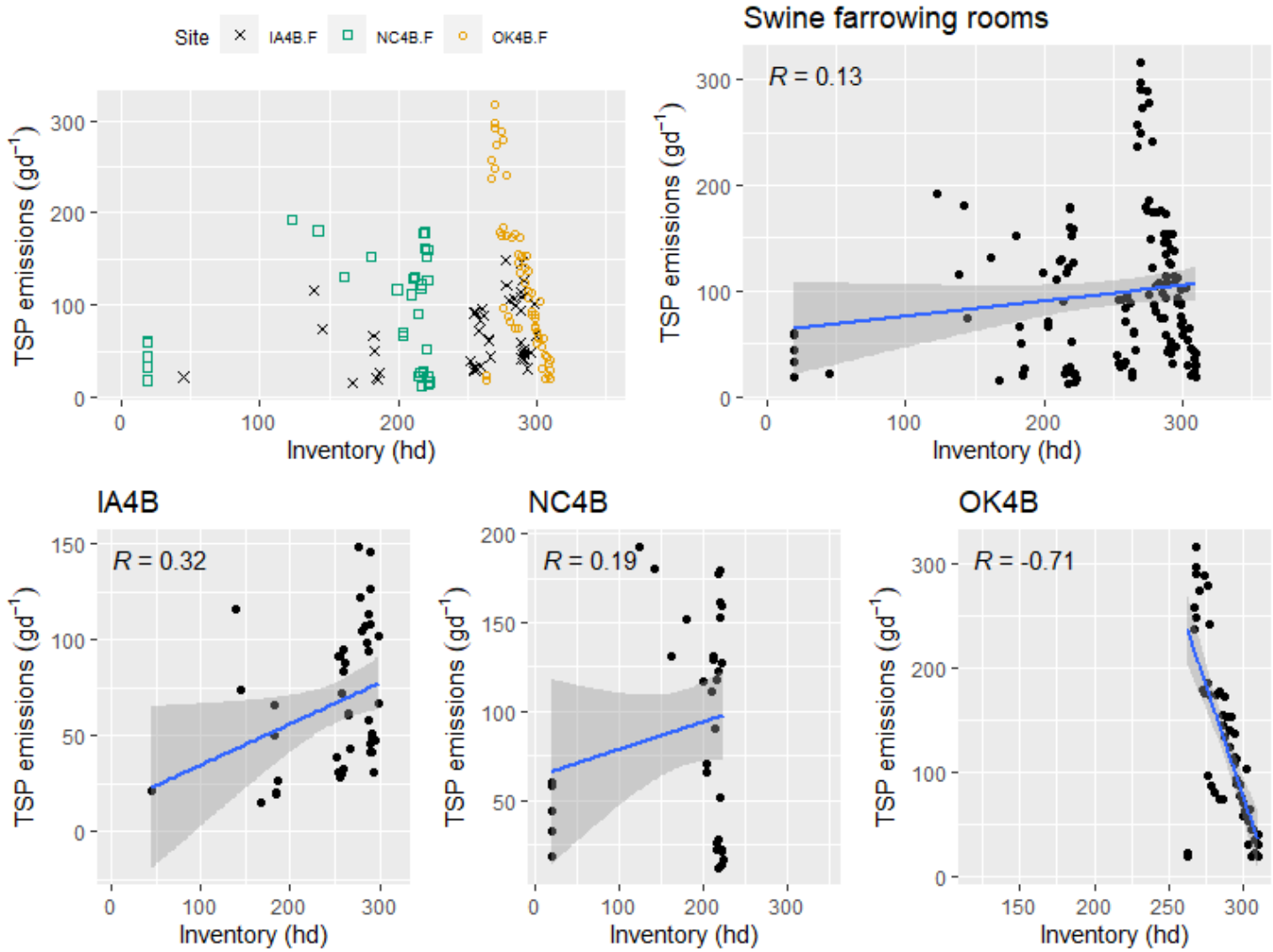


**Figure F.3-49. Scatter plot of swine farrowing rooms TSP emissions (g d$^{-1}$) versus Inventory.**

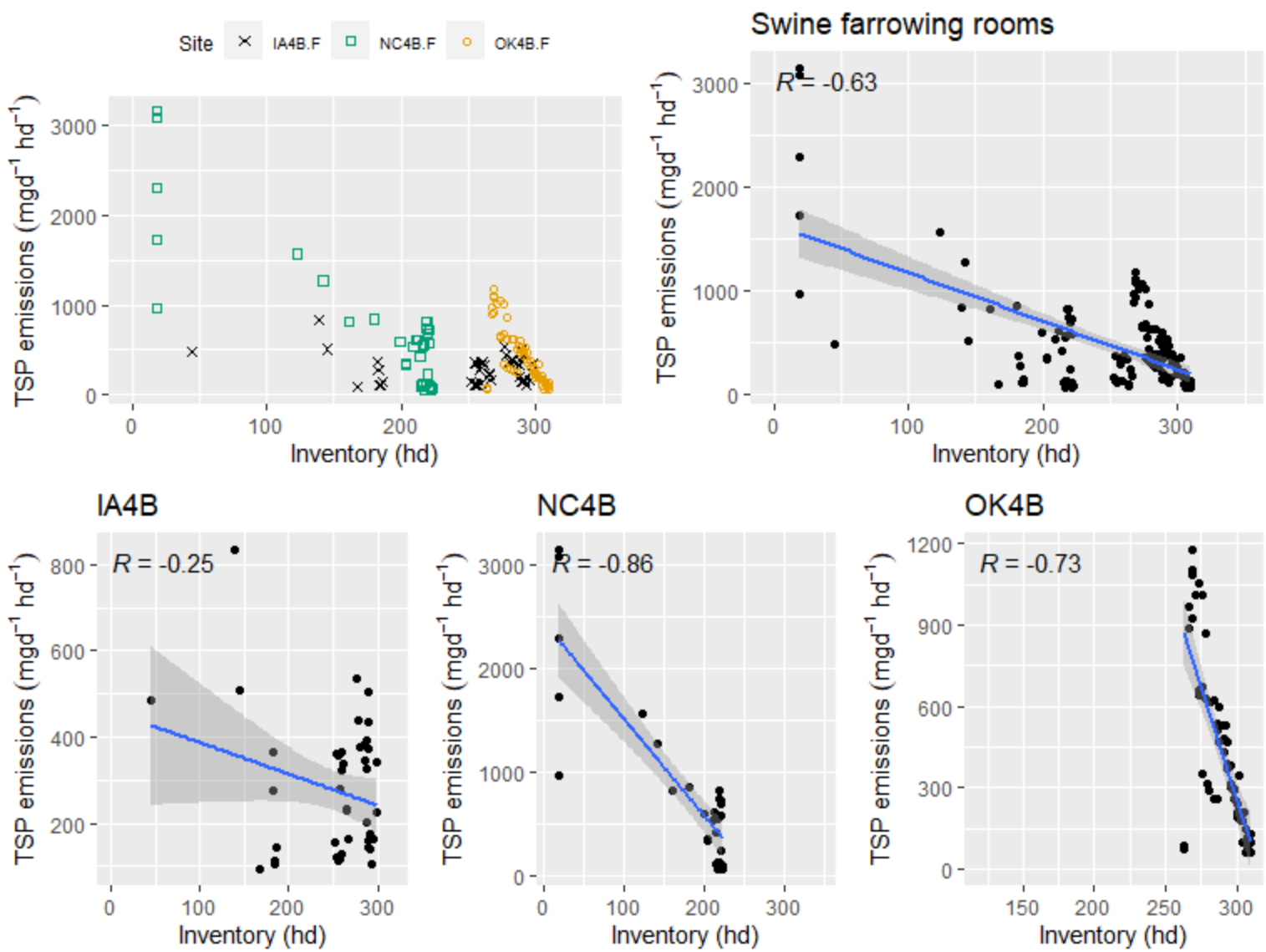


**Figure F.3-50. Scatter plot of swine farrowing rooms TSP emissions (mg d$^{-1}$hd$^{-1}$) versus Inventory.**

F.3.1.5.2 Average animal weight

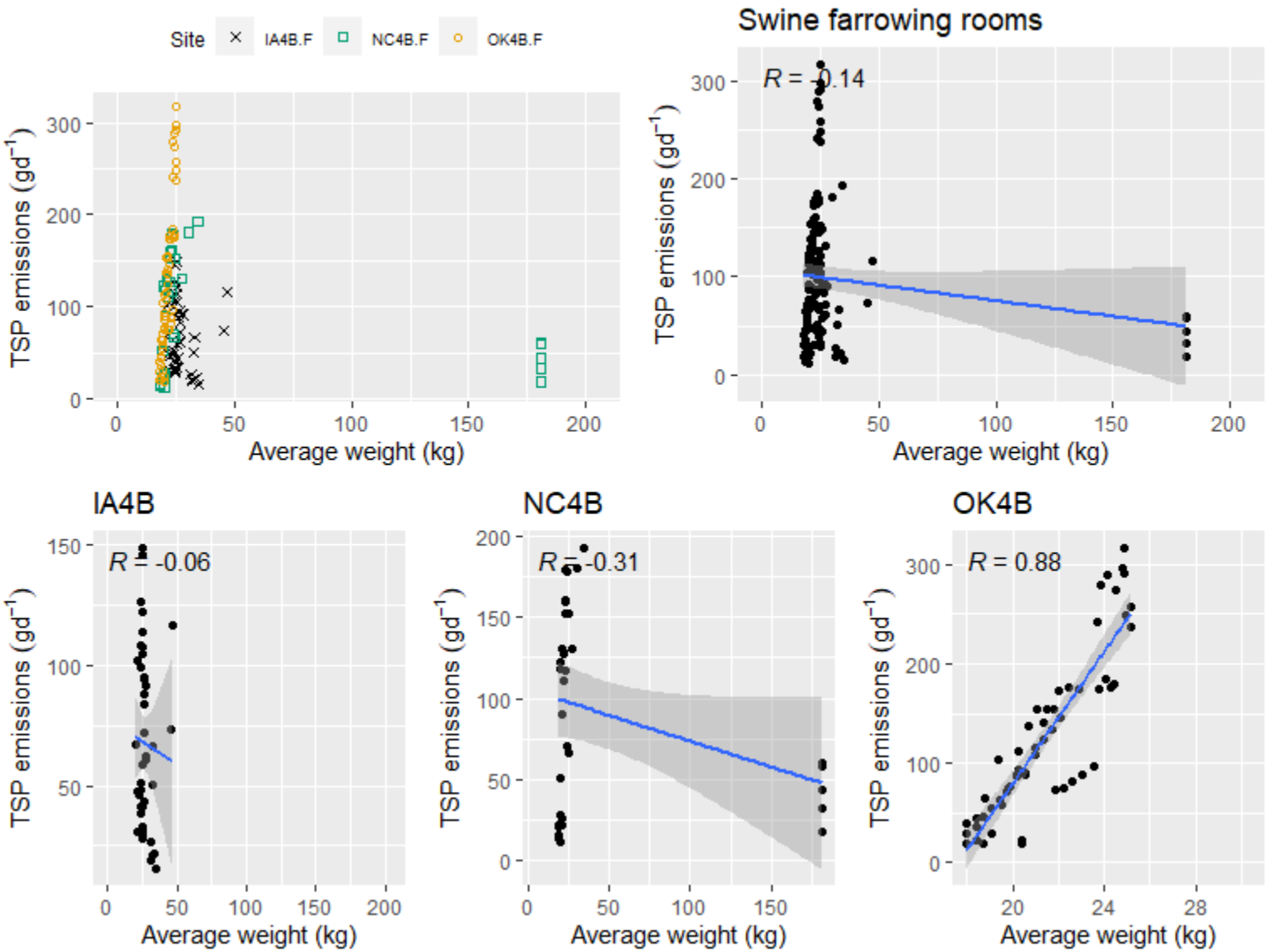


**Figure F.3-51. Scatter plot of swine farrowing rooms TSP emissions (g d$^{-1}$) versus average animal weight.**

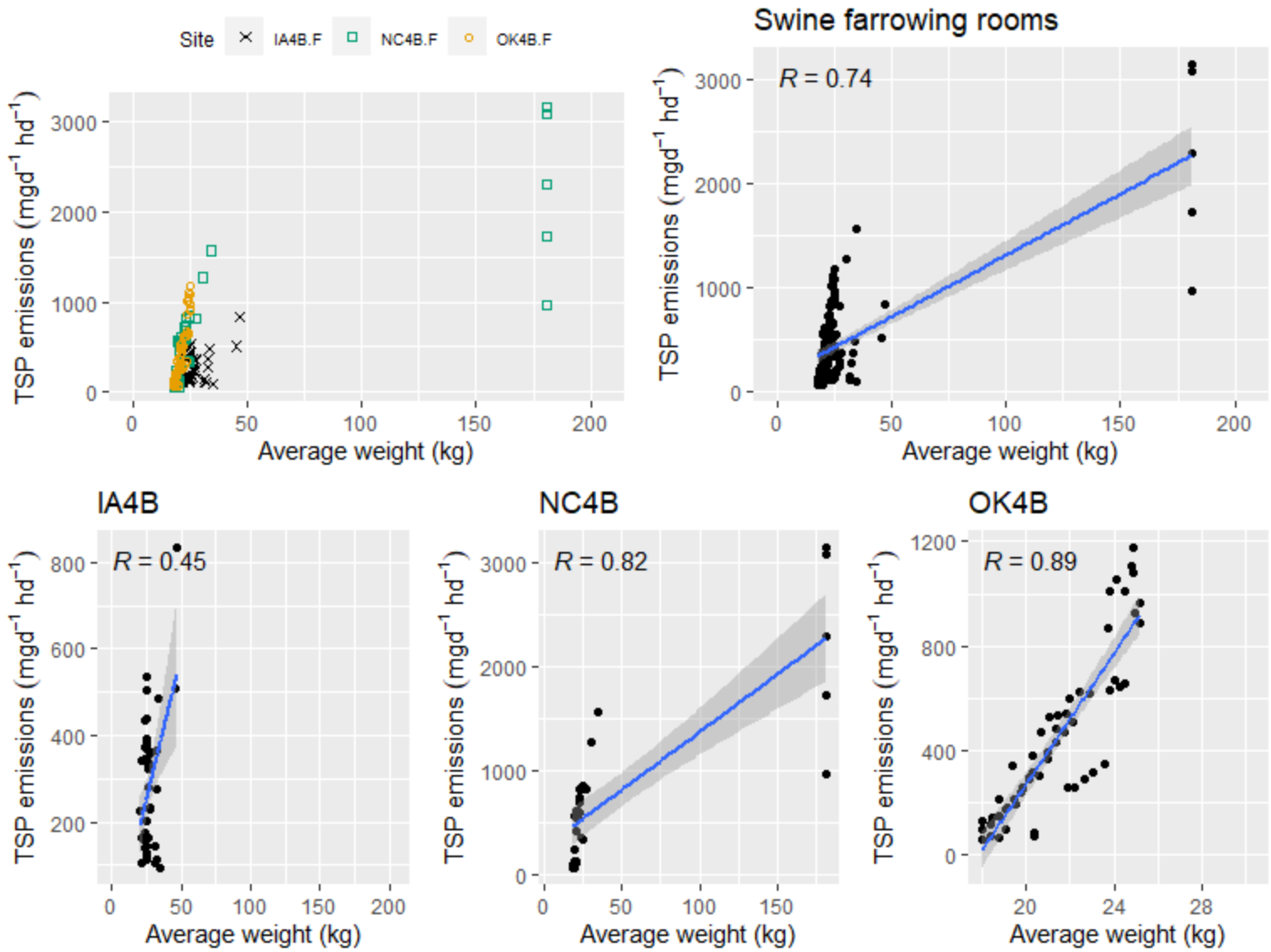


**Figure F.3-52. Scatter plot of swine farrowing rooms TSP emissions (mg d$^{-1}$hd$^{-1}$) versus average animal weight.**

F.3.1.5.3 Live animal weight

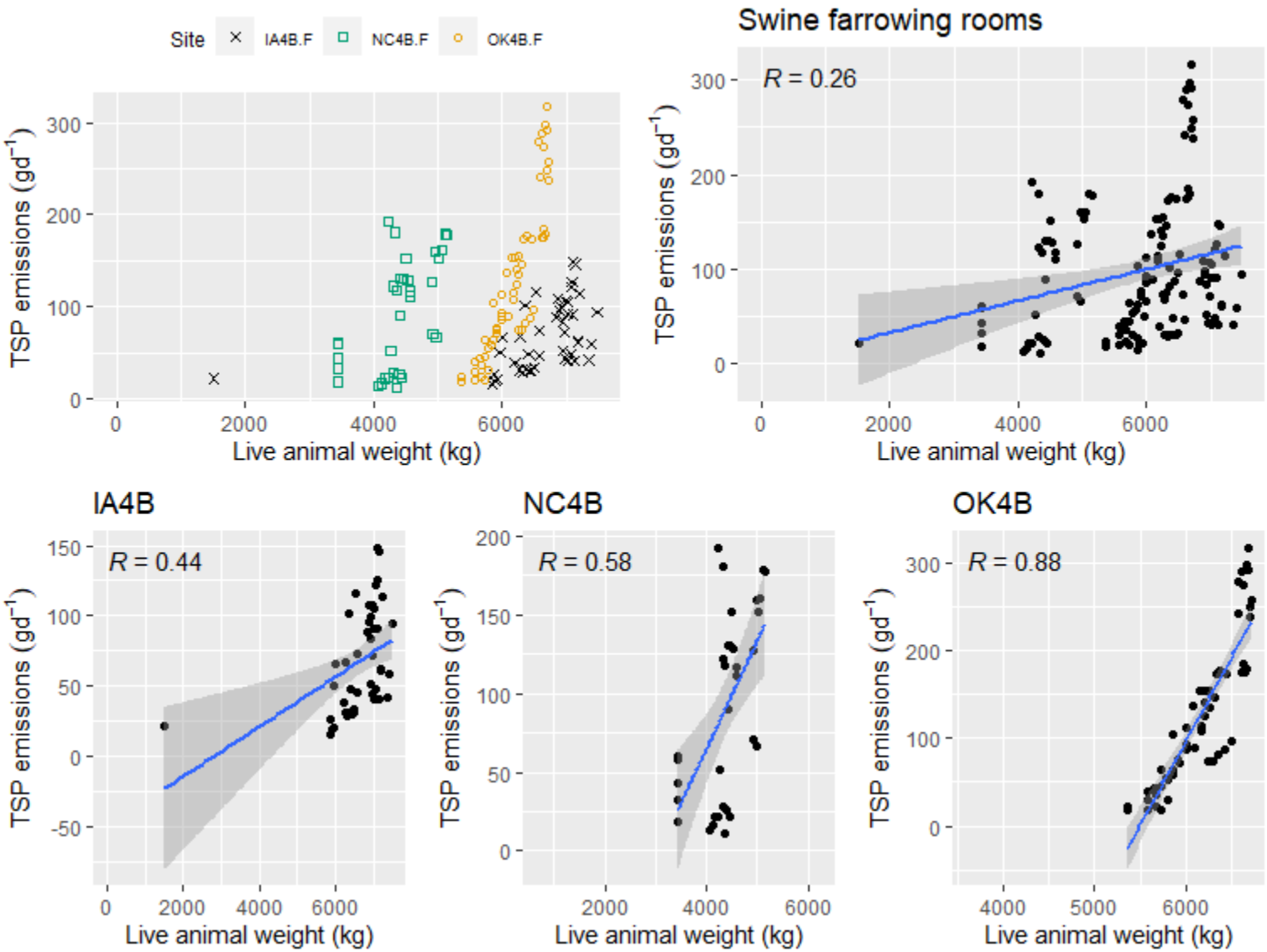


**Figure F.3-53. Scatter plot of swine farrowing rooms TSP emissions (g d$^{-1}$)versus live animal weight.**

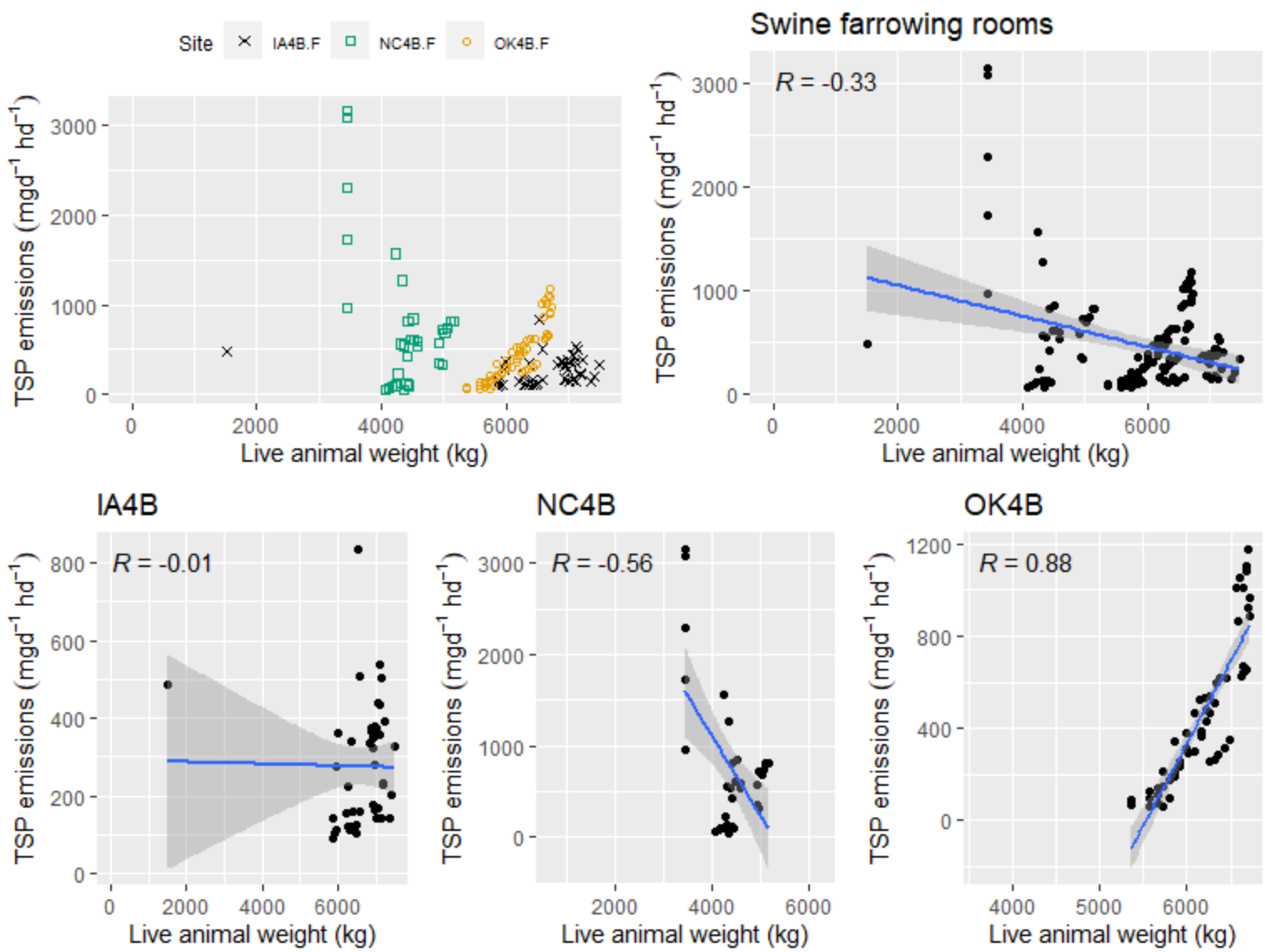


**Figure F.3-54. Scatter plot of swine farrowing rooms TSP emissions (mg $d^{-1}hd^{-1}$) versus live animal weight.**

F.3.1.5.4 Exhaust temperature

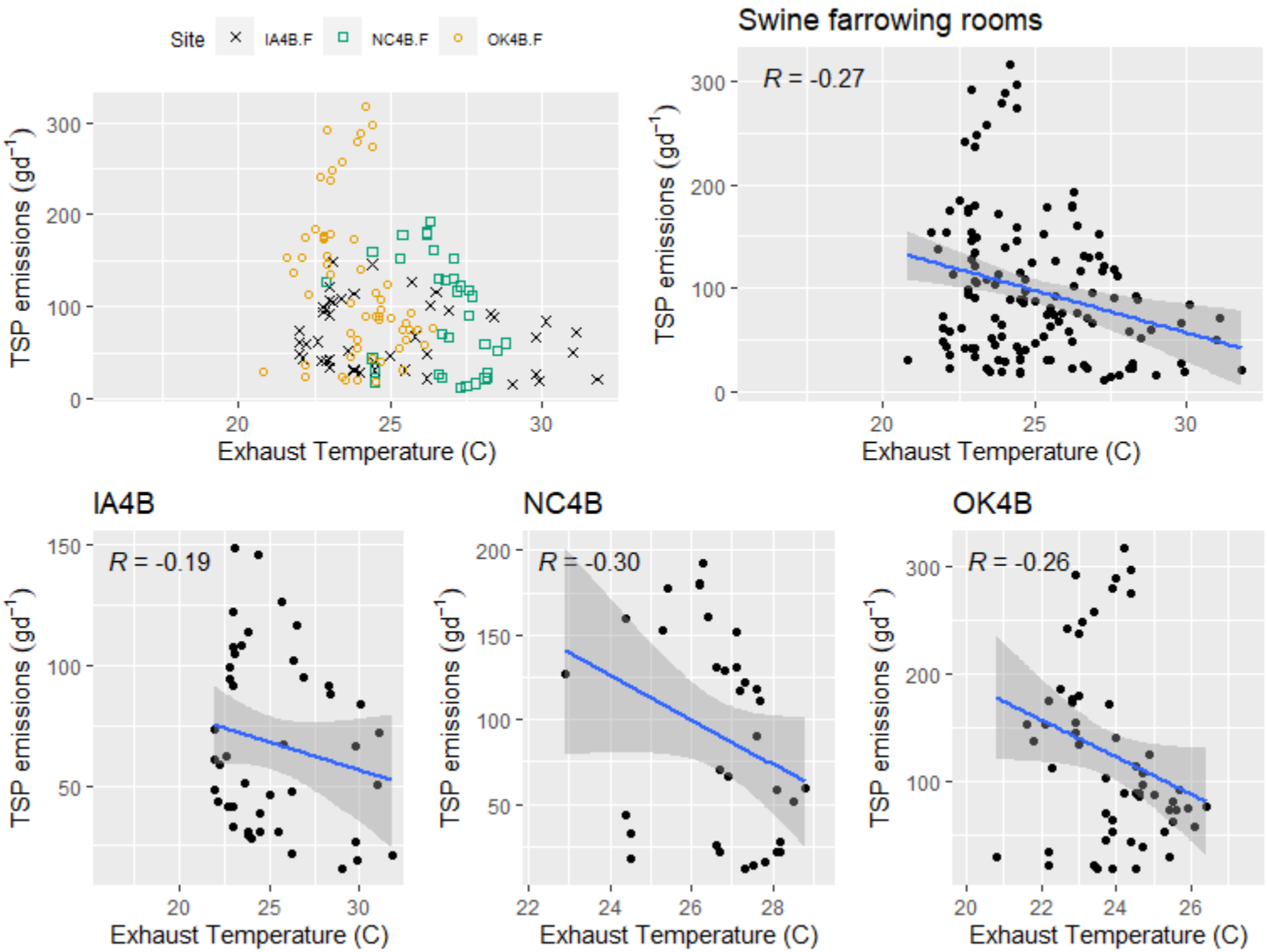


**Figure F.3-55. Scatter plot of swine farrowing rooms TSP emissions (g d$^{-1}$) versus exhaust temperature.**

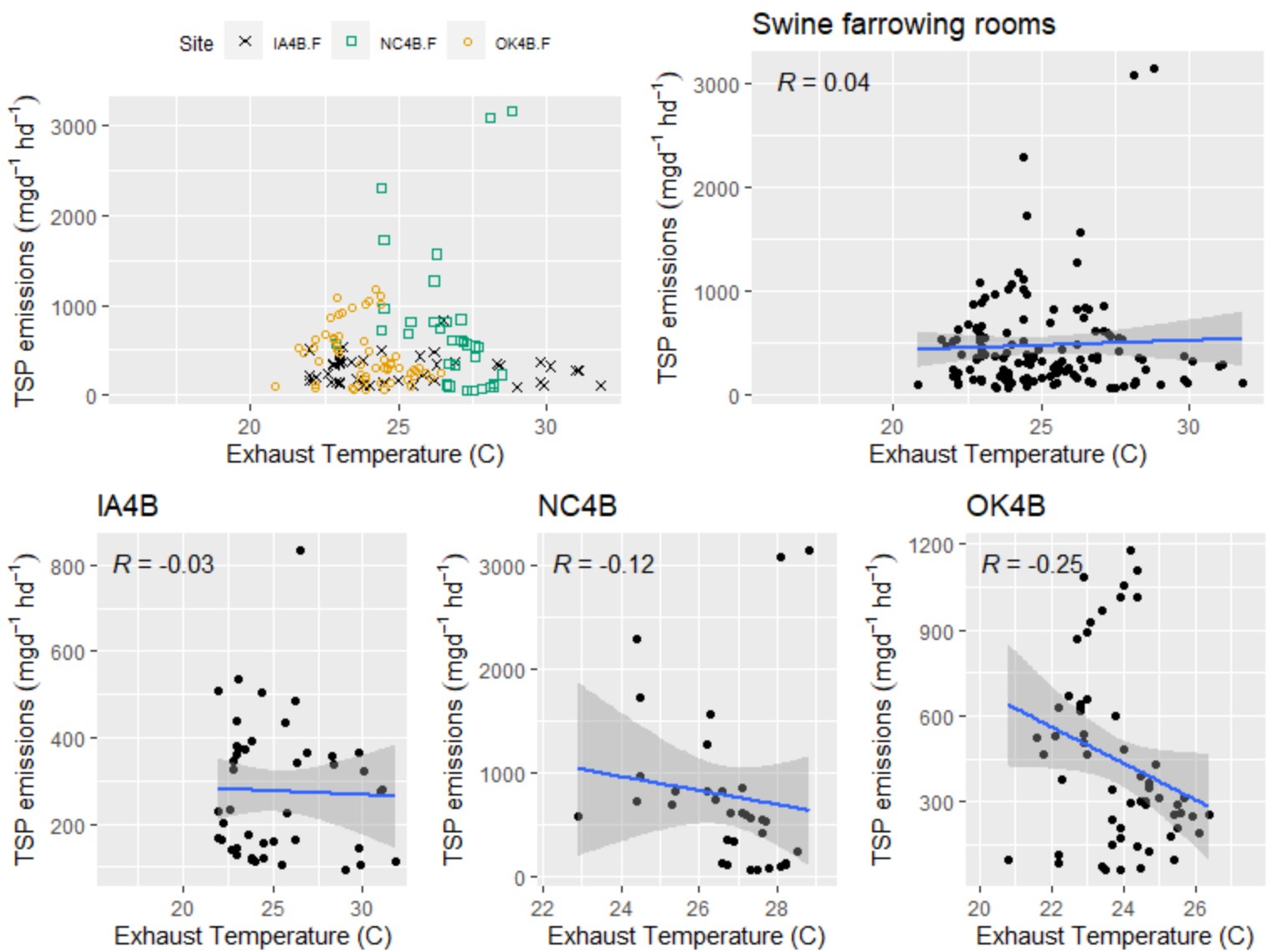


**Figure F.3-56. Scatter plot of swine farrowing rooms TSP emissions (mg d$^{-1}$hd$^{-1}$) versus exhaust temperature.**

F.3.1.5.5 Exhaust relative humidity

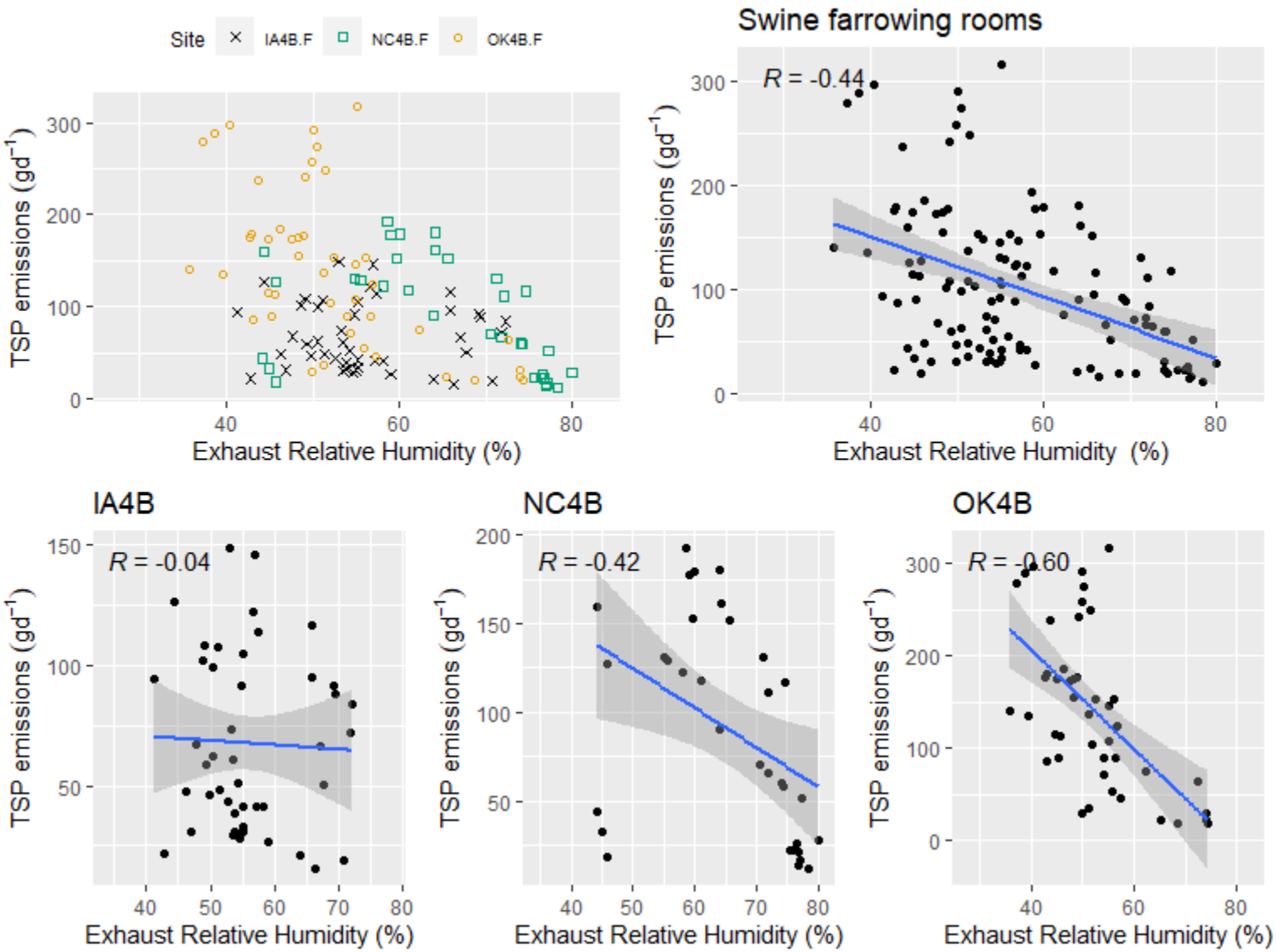


**Figure F.3-57. Scatter plot of swine farrowing rooms TSP emissions (g d$^{-1}$) versus exhaust relative humidity.**

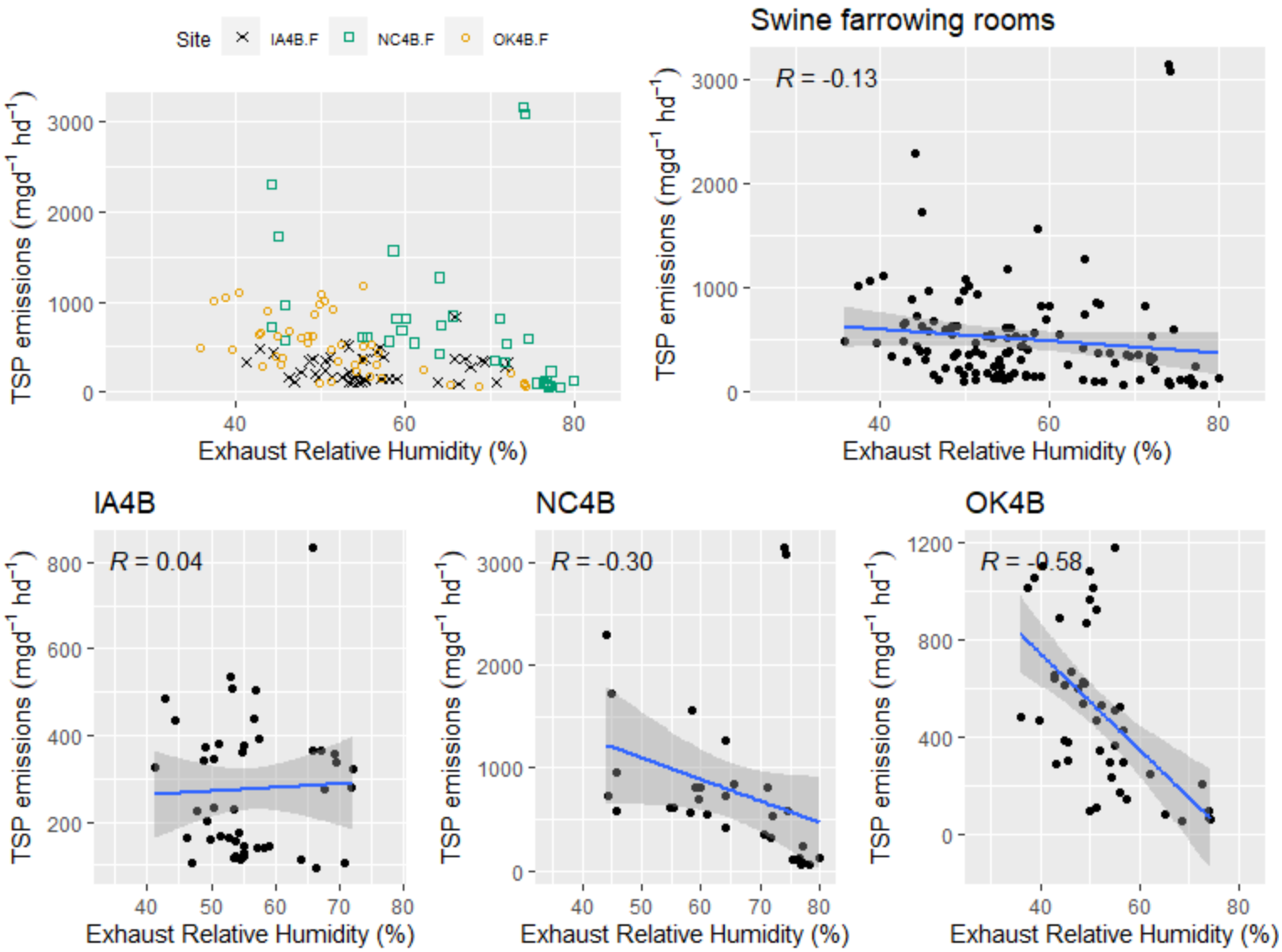


**Figure F.3-58. Scatter plot of swine farrowing rooms TSP emissions (mg d$^{-1}$hd$^{-1}$) versus exhaust relative humidity.**

F.3.1.5.6 Airflow

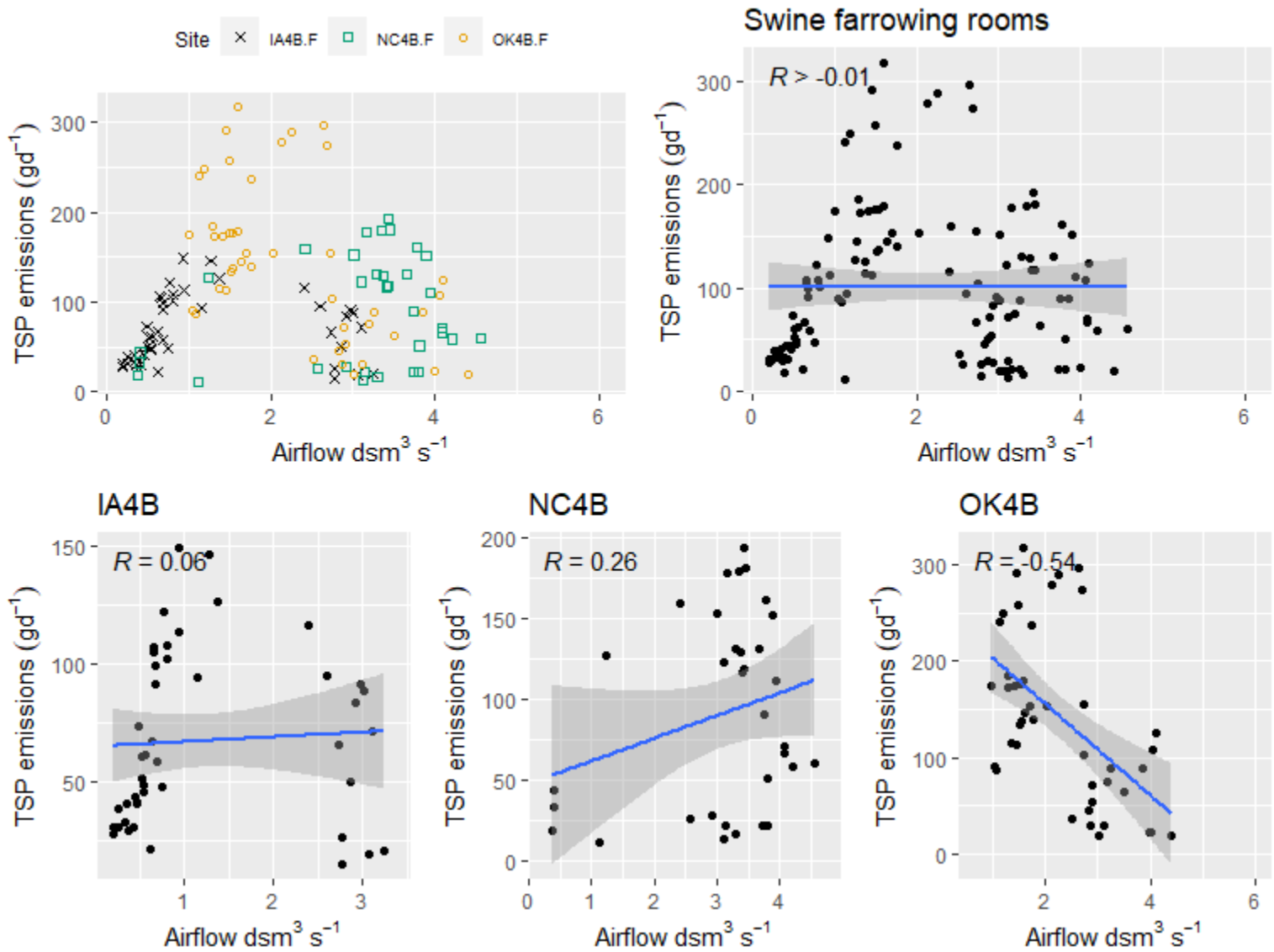


**Figure F.3-59. Scatter plot of swine farrowing rooms TSP emissions (g d$^{-1}$) versus airflow.**

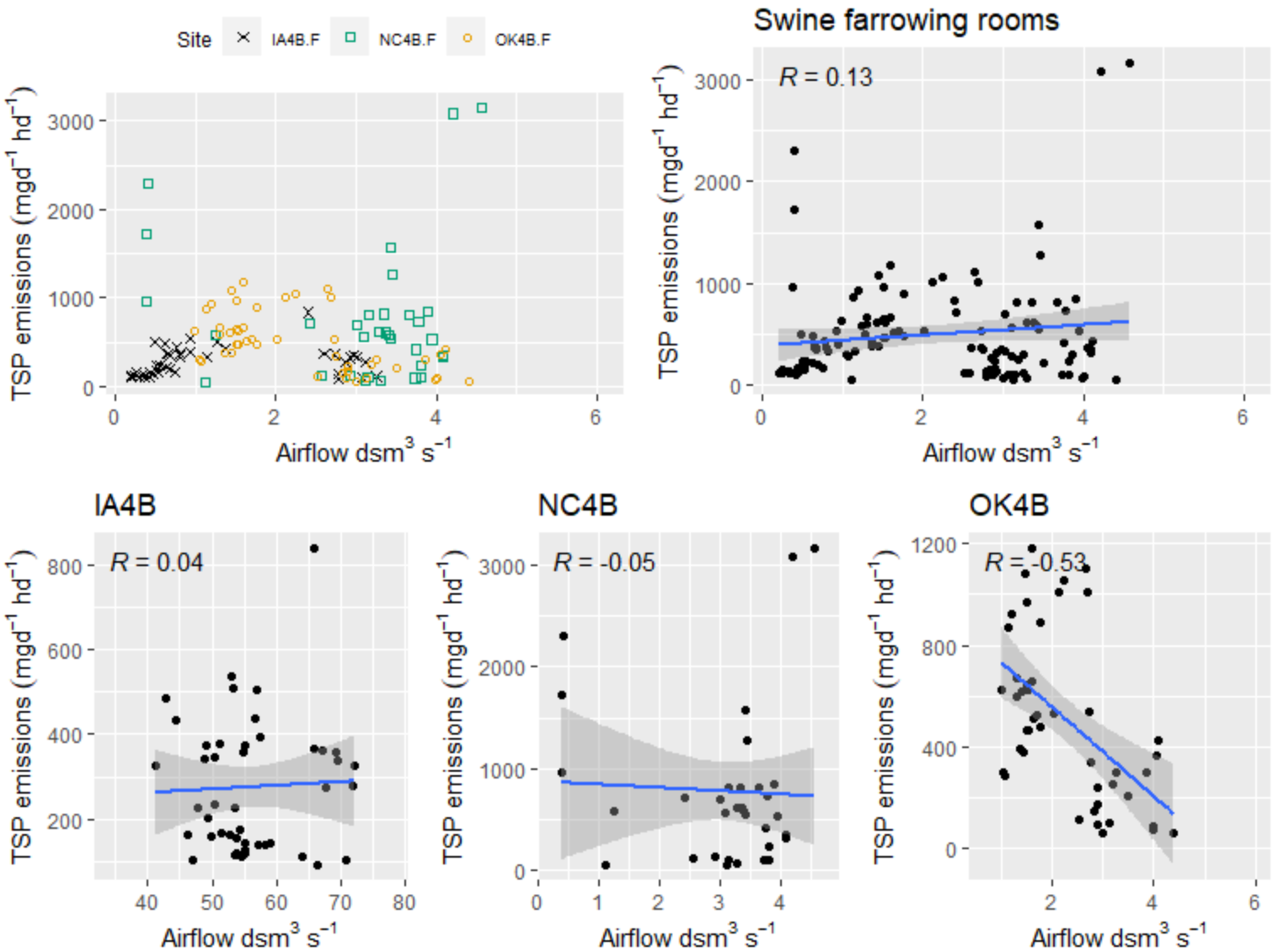


**Figure F.3-60. Scatter plot of swine farrowing rooms TSP emissions (mg d$^{-1}$hd$^{-1}$) versus airflow.**

### *F.3.2 Ambient*

**Table F.3.2. Summary of swine farrowing rooms $R^2$ values for ambient parameters.**

| Pollutant | Parameter | R | $R^2$ | Strength | Figure |
|---|---|---|---|---|---|
| $NH_3$ ($kgd^{-1}$) | Ambient Temperature (°C) | 0.18 | 0.03 | slight or weak | F.3-61 |
| $NH_3$ ($gd^{-1}hd^{-1}$) | Ambient Temperature (°C) | 0.17 | 0.03 | slight or weak | F.3-62 |
| $NH_3$ ($kgd^{-1}$) | Ambient Relative humidity (%) | -0.42 | 0.18 | slight or weak | F.3-63 |
| $NH_3$ ($gd^{-1}hd^{-1}$) | Ambient Relative humidity (%) | -0.18 | 0.03 | slight or weak | F.3-64 |
| $NH_3$ ($kgd^{-1}$) | Barometric Pressure (kPa) | -0.69 | 0.48 | moderate | F.3-65 |
| $NH_3$ ($gd^{-1}hd^{-1}$) | Barometric Pressure (kPa) | -0.25 | 0.06 | slight or weak | F.3-66 |
| $H_2S$ ($gd^{-1}$) | Ambient Temperature (°C) | 0.23 | 0.05 | slight or weak | F.3-67 |
| $H_2S$ ($mgd^{-1}hd^{-1}$) | Ambient Temperature (°C) | 0.13 | 0.02 | slight or weak | F.3-68 |
| $H_2S$ ($gd^{-1}$) | Ambient Relative humidity (%) | 0.02 | 0 | slight or weak | F.3-69 |
| $H_2S$ ($mgd^{-1}hd^{-1}$) | Ambient Relative humidity (%) | 0.04 | 0 | slight or weak | F.3-70 |
| $H_2S$ ($gd^{-1}$) | Barometric Pressure (kPa) | 0.08 | 0.01 | slight or weak | F.3-71 |
| $H_2S$ ($mgd^{-1}hd^{-1}$) | Barometric Pressure (kPa) | 0.16 | 0.02 | slight or weak | F.3-72 |
| $PM_{10}$ ($gd^{-1}$) | Ambient Temperature (°C) | 0.04 | 0 | slight or weak | F.3-73 |
| $PM_{10}$ ($mgd^{-1}hd^{-1}$) | Ambient Temperature (°C) | 0.15 | 0.02 | slight or weak | F.3-74 |
| $PM_{10}$ ($gd^{-1}$) | Ambient Relative humidity (%) | -0.24 | 0.06 | slight or weak | F.3-75 |
| $PM_{10}$ ($mgd^{-1}hd^{-1}$) | Ambient Relative humidity (%) | -0.12 | 0.01 | slight or weak | F.3-76 |
| $PM_{10}$ ($gd^{-1}$) | Barometric Pressure (kPa) | -0.37 | 0.13 | slight or weak | F.3-77 |
| $PM_{10}$ ($mgd^{-1}hd^{-1}$) | Barometric Pressure (kPa) | -0.13 | 0.02 | slight or weak | F.3-78 |
| $PM_{2.5}$ ($gd^{-1}$) | Ambient Temperature (°C) | 0.02 | 0 | slight or weak | F.3-79 |
| $PM_{2.5}$ ($mgd^{-1}hd^{-1}$) | Ambient Temperature (°C) | 0.19 | 0.04 | slight or weak | F.3-80 |
| $PM_{2.5}$ ($gd^{-1}$) | Ambient Relative humidity (%) | -0.11 | 0.01 | slight or weak | F.3-81 |
| $PM_{2.5}$ ($mgd^{-1}hd^{-1}$) | Ambient Relative humidity (%) | -0.04 | 0 | slight or weak | F.3-82 |
| $PM_{2.5}$ ($gd^{-1}$) | Barometric Pressure (kPa) | -0.41 | 0.17 | slight or weak | F.3-83 |
| $PM_{2.5}$ ($mgd^{-1}hd^{-1}$) | Barometric Pressure (kPa) | 0.12 | 0.02 | slight or weak | F.3-84 |
| TSP ($gd^{-1}$) | Ambient Temperature (°C) | -0.12 | 0.02 | slight or weak | F.3-85 |
| TSP ($mgd^{-1}hd^{-1}$) | Ambient Temperature (°C) | 0.1 | 0.01 | slight or weak | F.3-86 |
| TSP ($gd^{-1}$) | Ambient Relative humidity (%) | -0.44 | 0.19 | slight or weak | F.3-87 |
| TSP ($mgd^{-1}hd^{-1}$) | Ambient Relative humidity (%) | -0.19 | 0.04 | slight or weak | F.3-88 |
| TSP ($gd^{-1}$) | Barometric Pressure (kPa) | -0.33 | 0.11 | slight or weak | F.3-89 |
| TSP ($mgd^{-1}hd^{-1}$) | Barometric Pressure (kPa) | 0.09 | 0.01 | slight or weak | F.3-90 |
| $NH_3$ ($kgd^{-1}$) | Ambient Temperature (°C) | 0.18 | 0.03 | slight or weak | F.3-61 |

### *F.3.2.1 Ammonia ($NH_3$)*

F.3.2.1.1 Ambient temperature

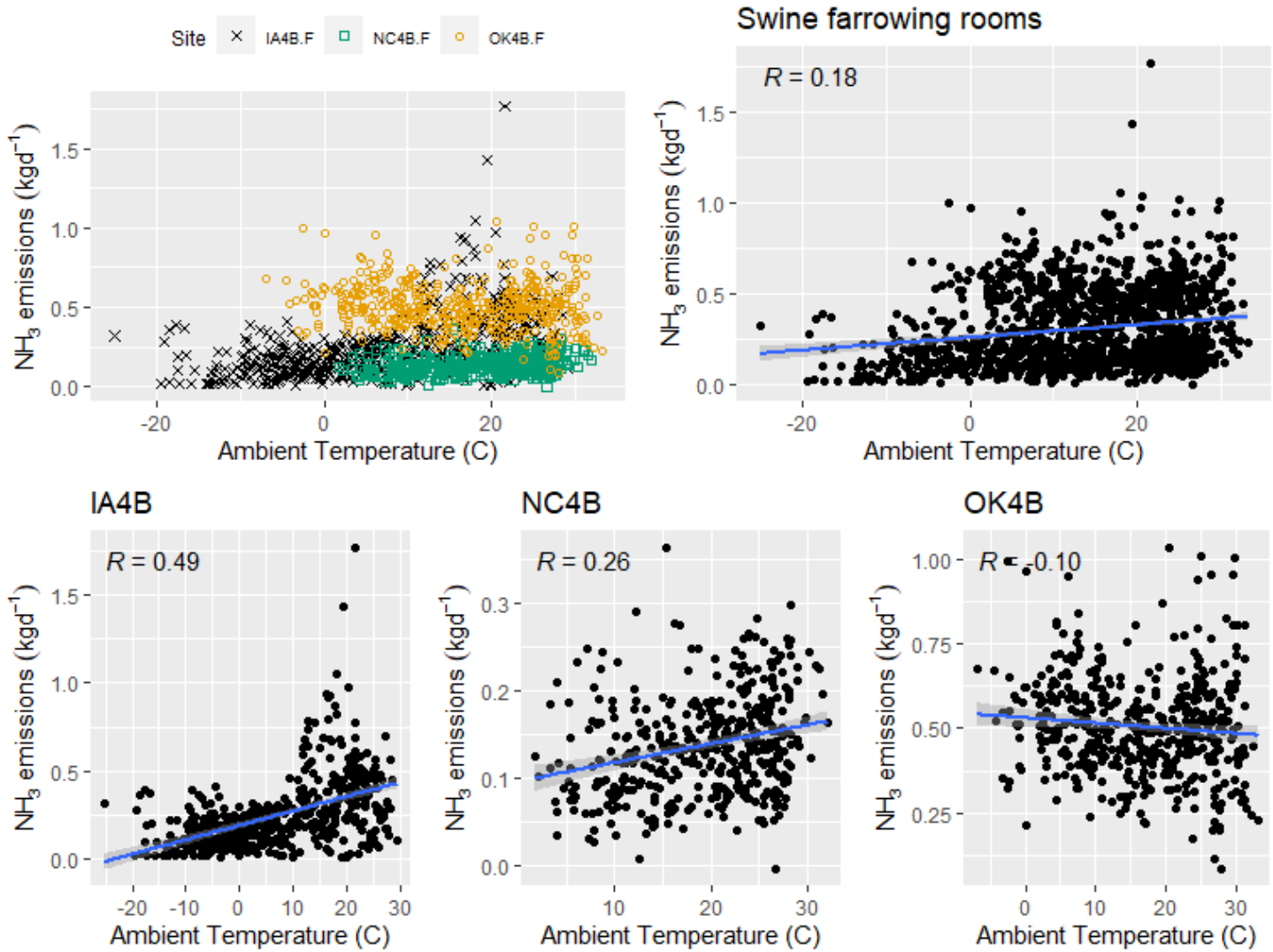


**Figure F.3-61. Scatter plot of swine farrowing rooms $NH_3$ emissions (kg $d^{-1}$) versus ambient temperature.**

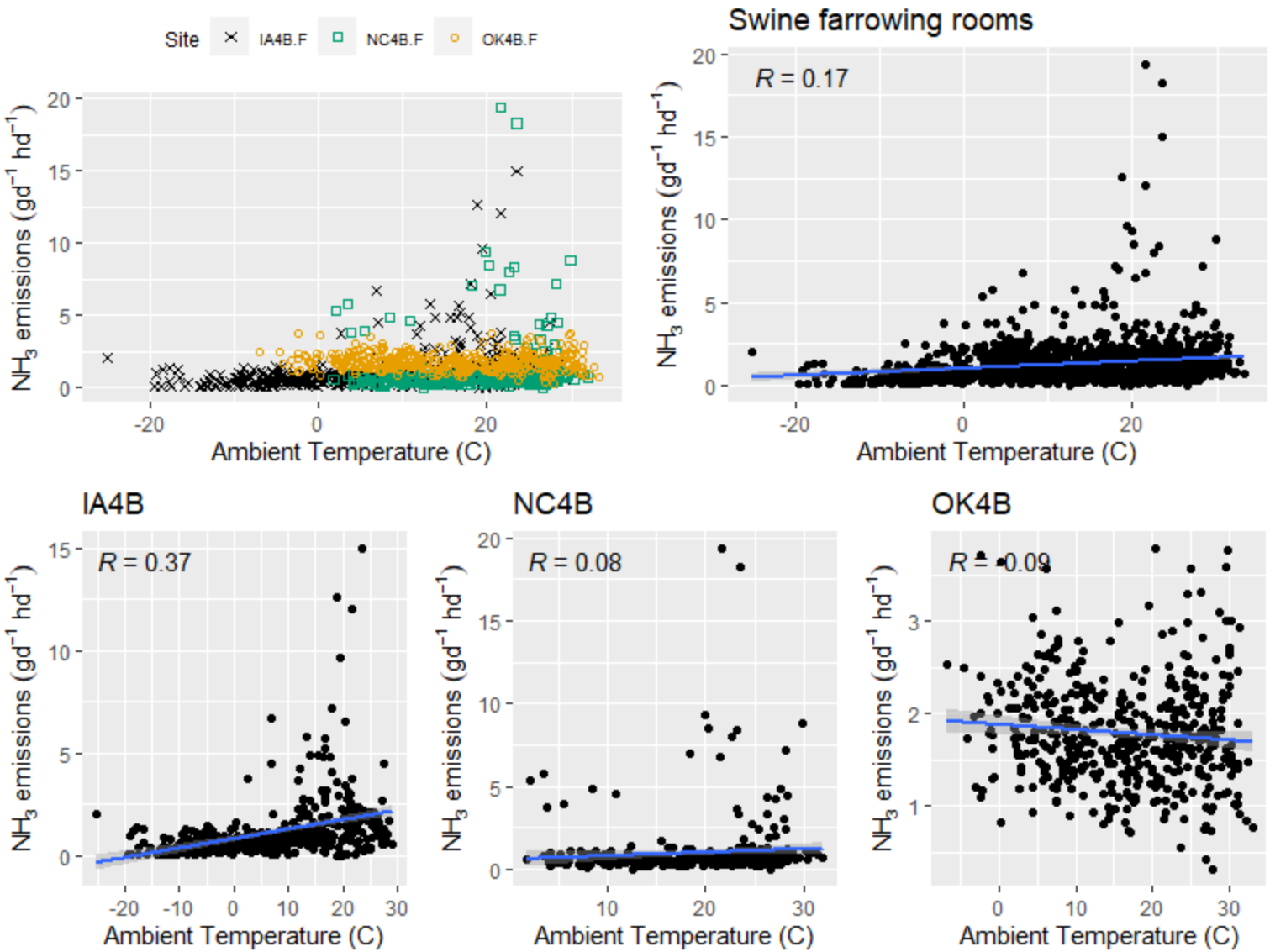


**Figure F.3-62. Scatter plot of swine farrowing rooms $NH_3$ emissions (g $d^{-1}hd^{-1}$) versus ambient temperature.**

F.3.2.1.2 Ambient relative humidity

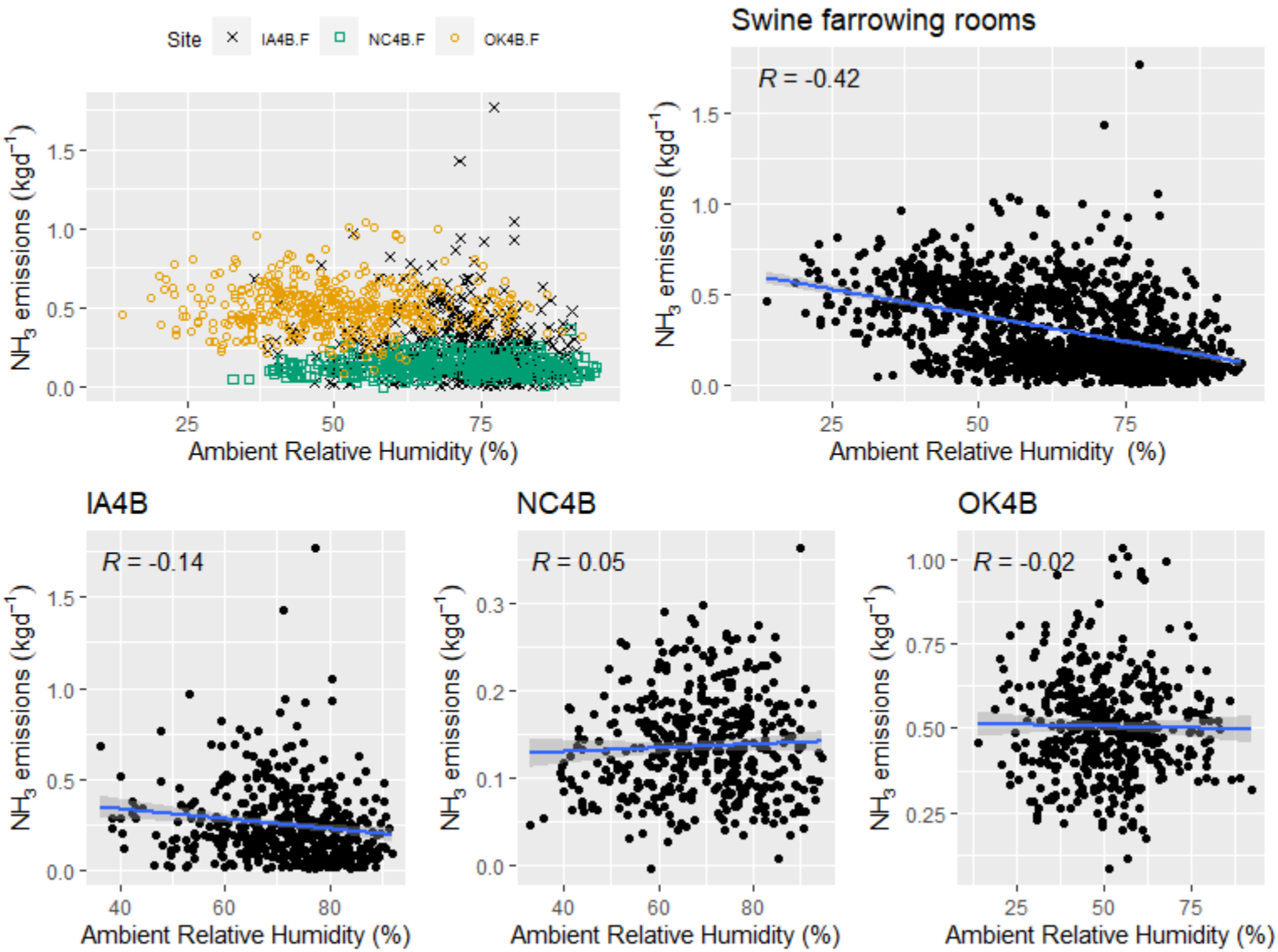


**Figure F.3-63. Scatter plot of swine farrowing rooms $NH_3$ emissions (kg $d^{-1}$) versus ambient relative humidity.**

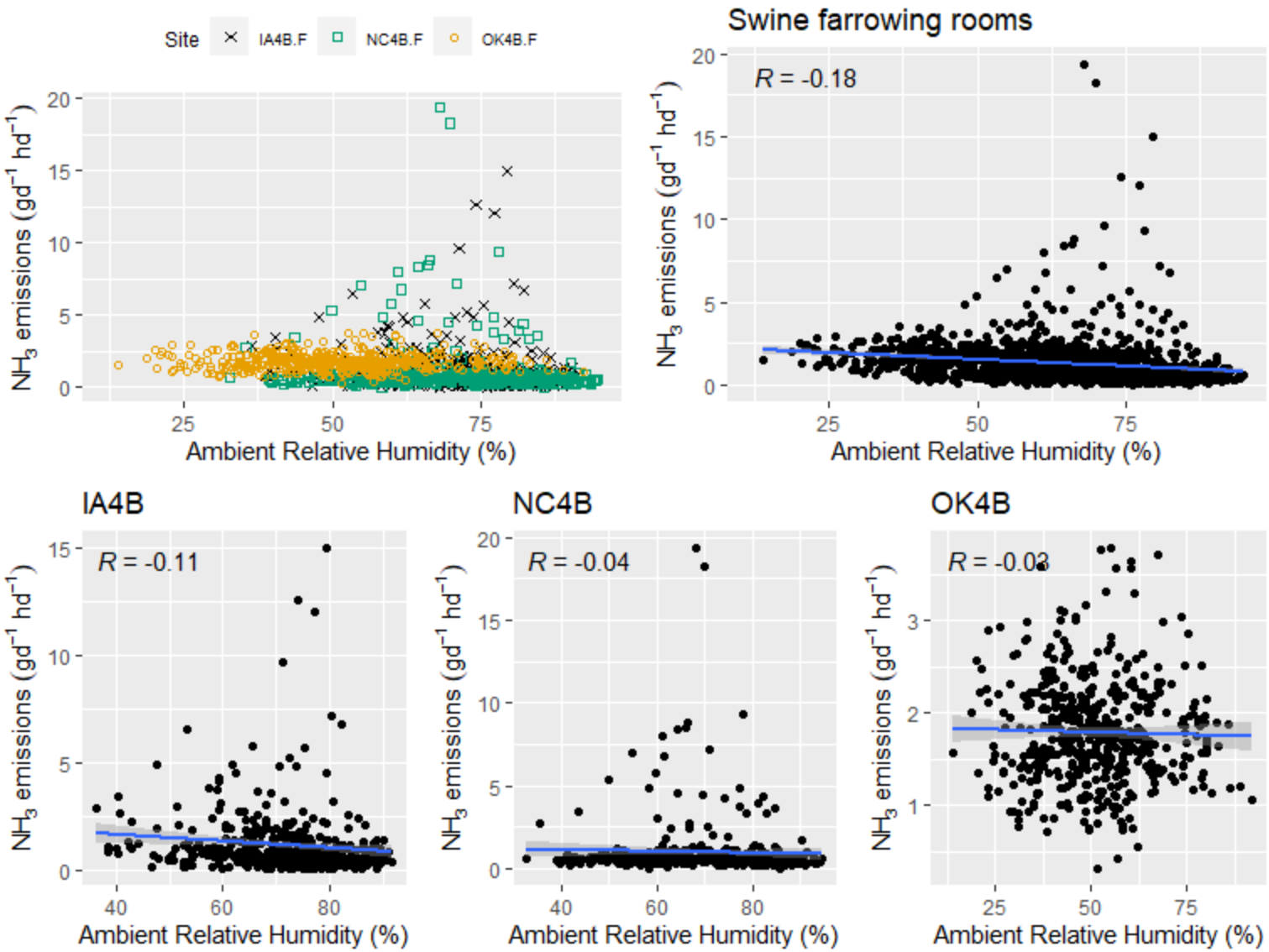


**Figure F.3-64. Scatter plot of swine farrowing rooms $NH_3$ emissions (g $d^{-1}hd^{-1}$) versus ambient relative humidity.**

F.3.2.1.3 Air pressure

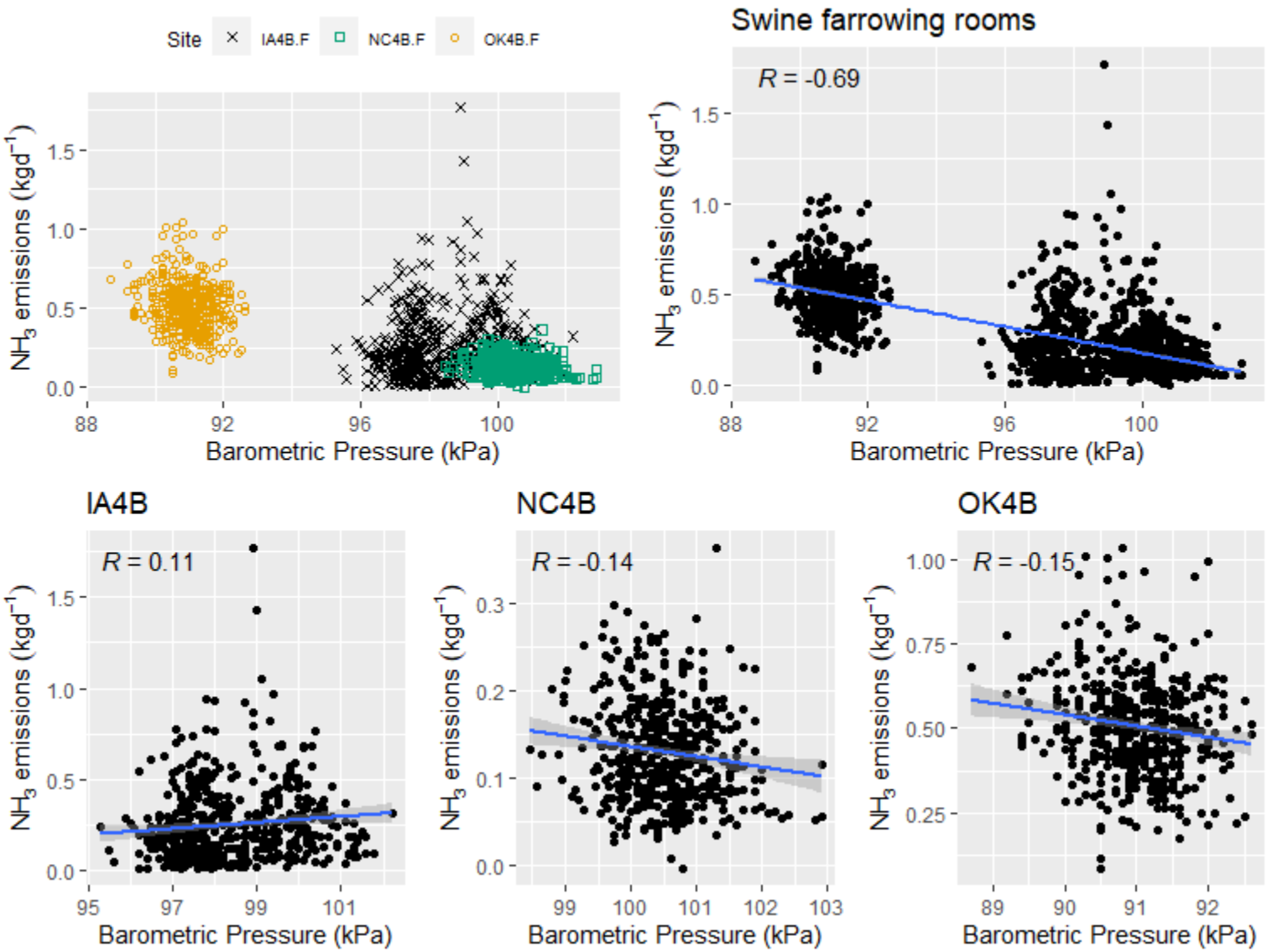


**Figure F.3-65. Scatter plot of swine farrowing rooms $NH_3$ emissions (kg $d^{-1}$) versus air pressure.**

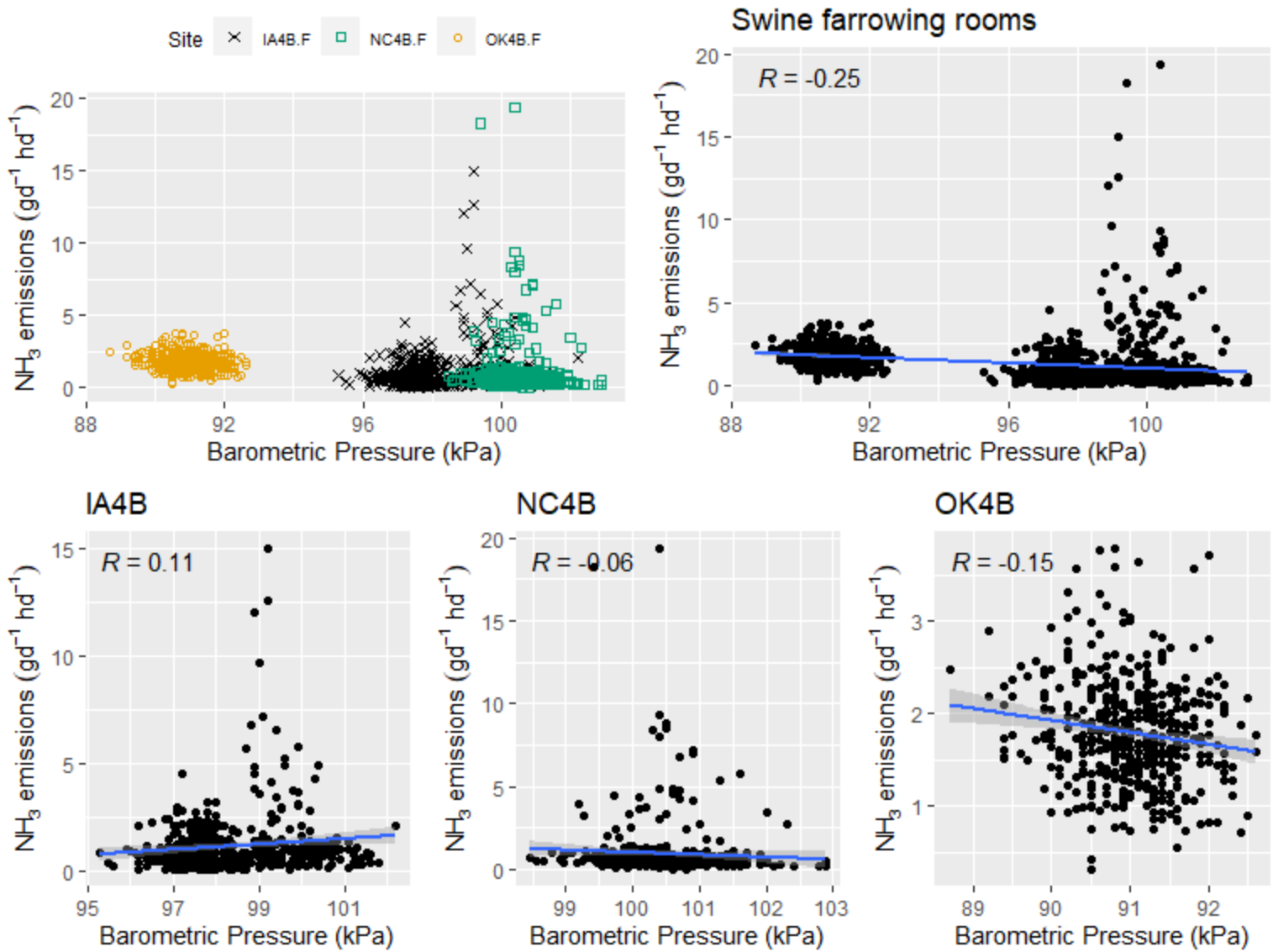


**Figure F.3-66. Scatter plot of swine farrowing rooms $NH_3$ emissions (g $d^{-1}hd^{-1}$) versus air pressure.**

### *F.3.2.2 Hydrogen Sulfide ($H_2S$)*

F.3.2.2.1 Ambient temperature

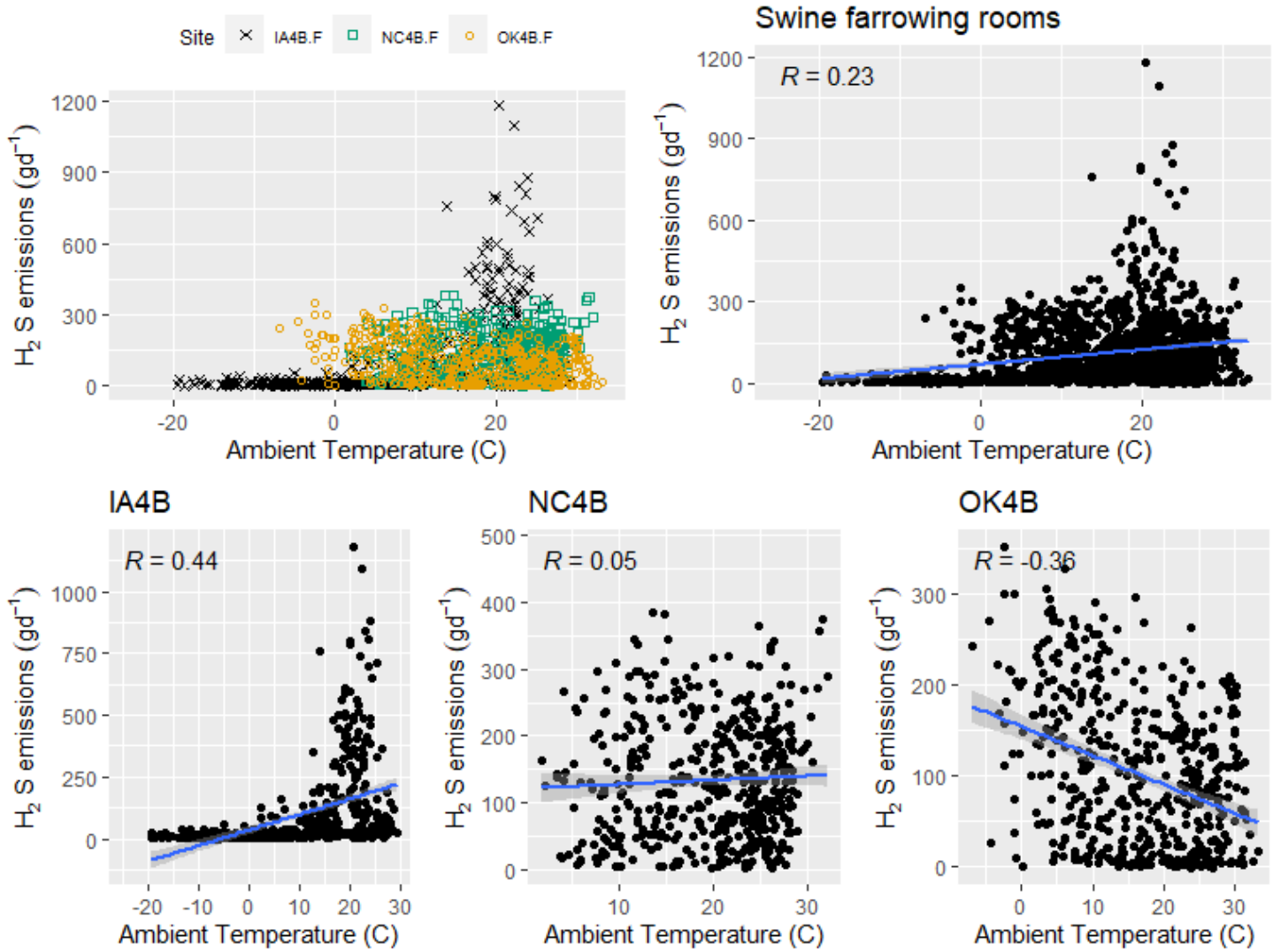


**Figure F.3-67. Scatter plot of swine farrowing rooms $H_2S$ emissions (g $d^{-1}$) versus ambient temperature.**

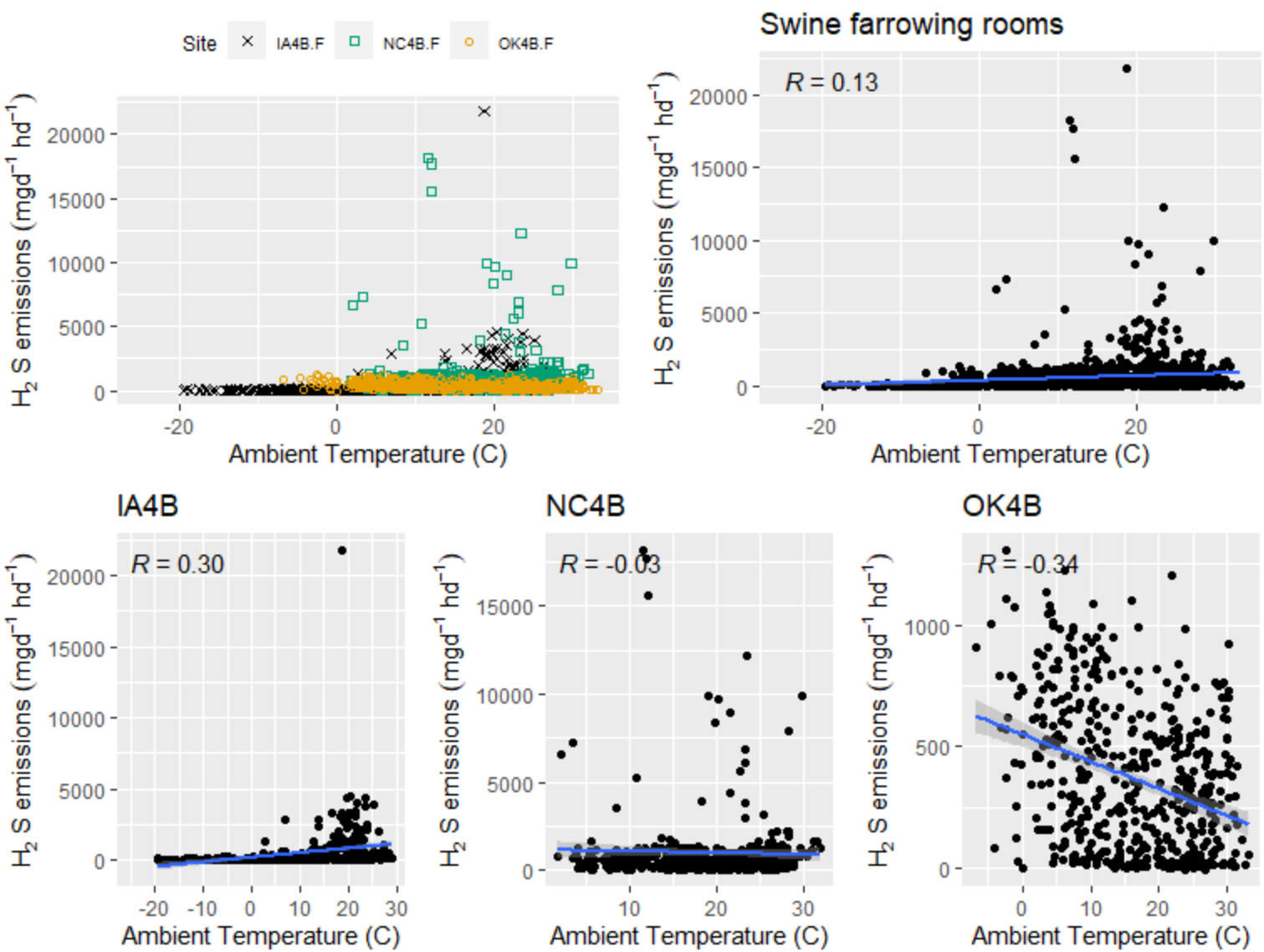


**Figure F.3-68. Scatter plot of swine farrowing rooms $H_2S$ emissions (mg $d^{-1}hd^{-1}$) versus ambient temperature.**

F.3.2.2.2 Ambient relative humidity

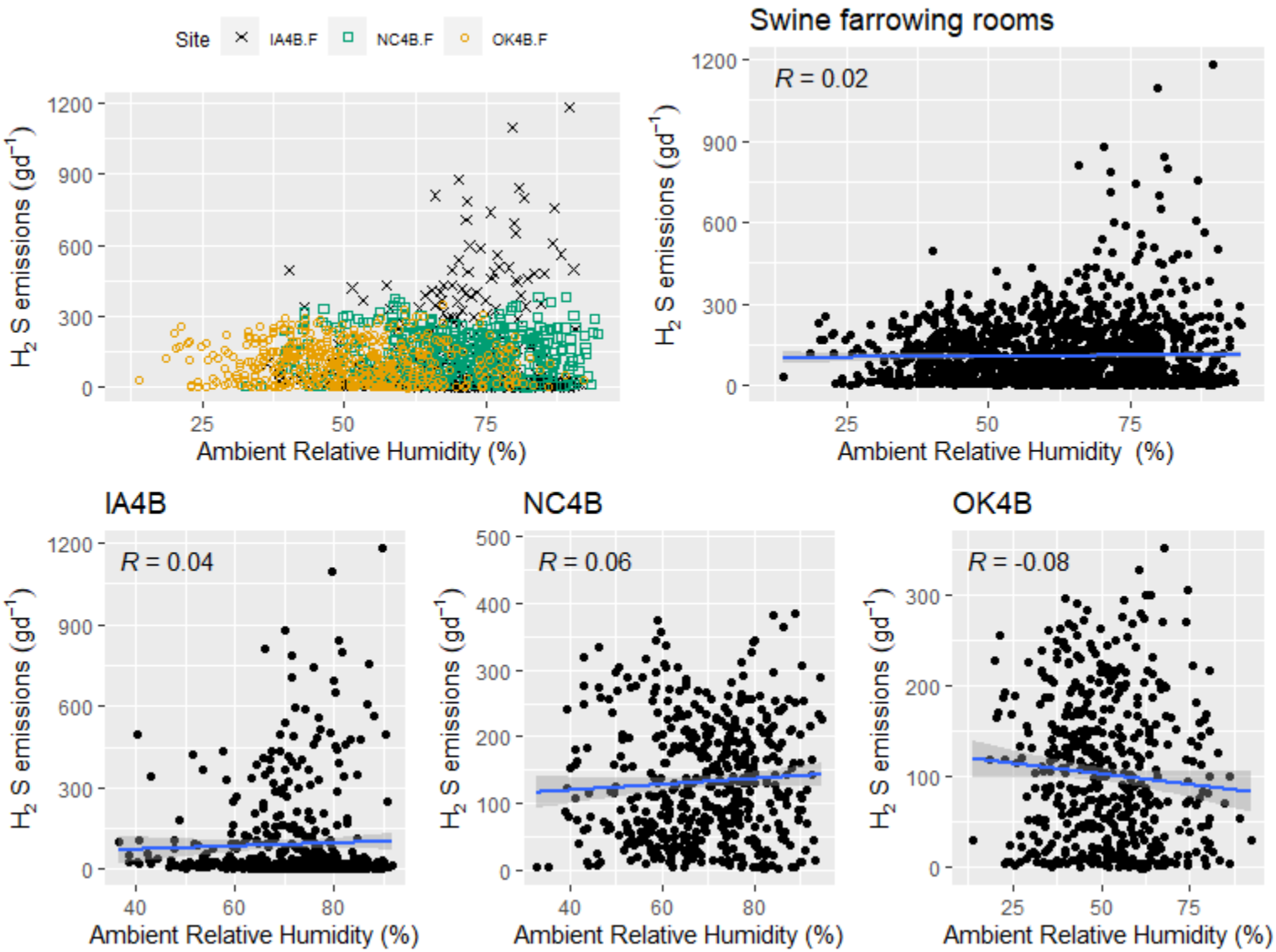


**Figure F.3-69. Scatter plot of swine farrowing rooms $H_2S$ emissions (g $d^{-1}$) versus ambient relative humidity.**

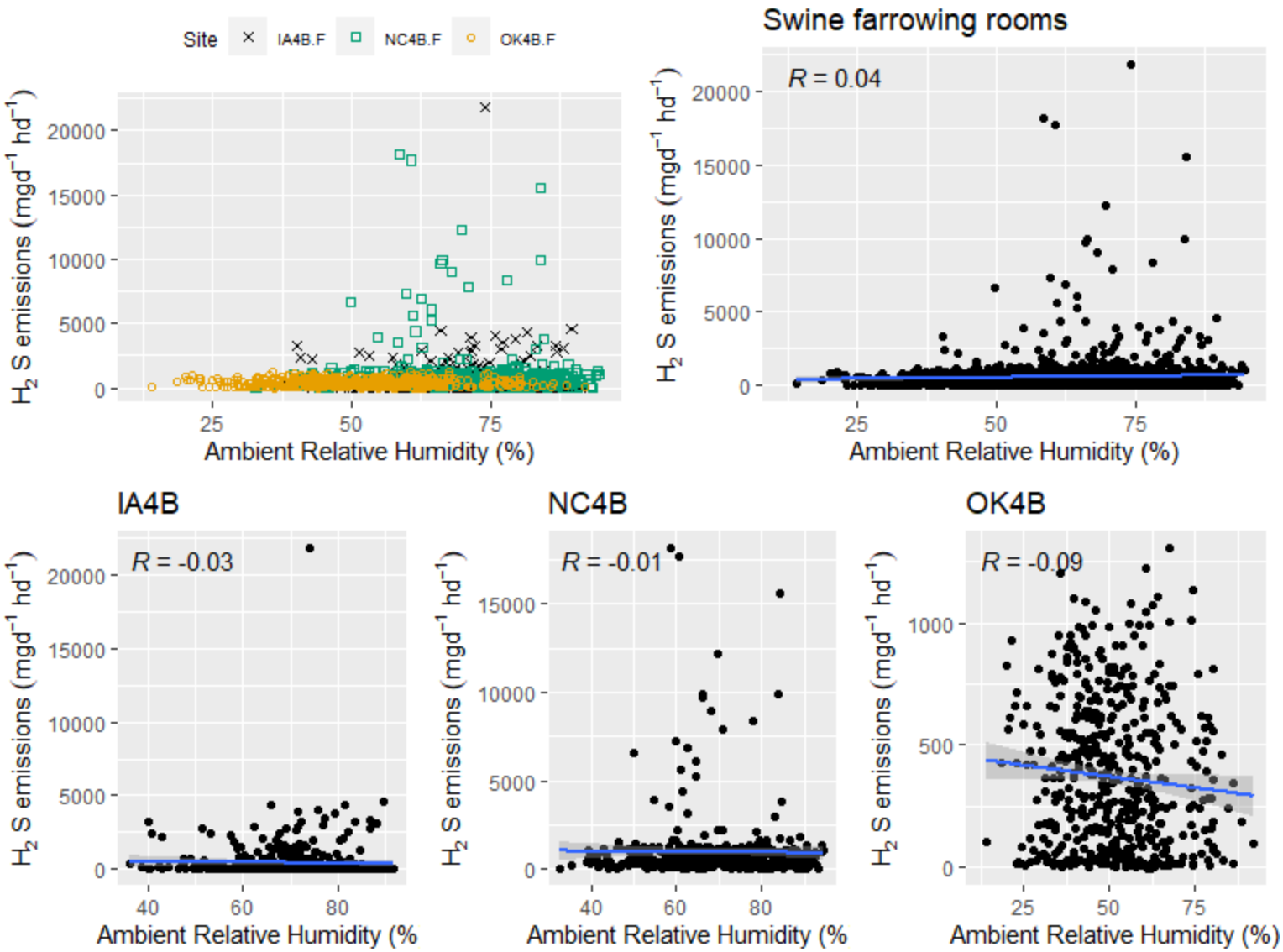


**Figure F.3-70. Scatter plot of swine farrowing rooms $H_2S$ emissions (mg $d^{-1}hd^{-1}$) versus ambient relative humidity.**

F.3.2.2.3 Air pressure

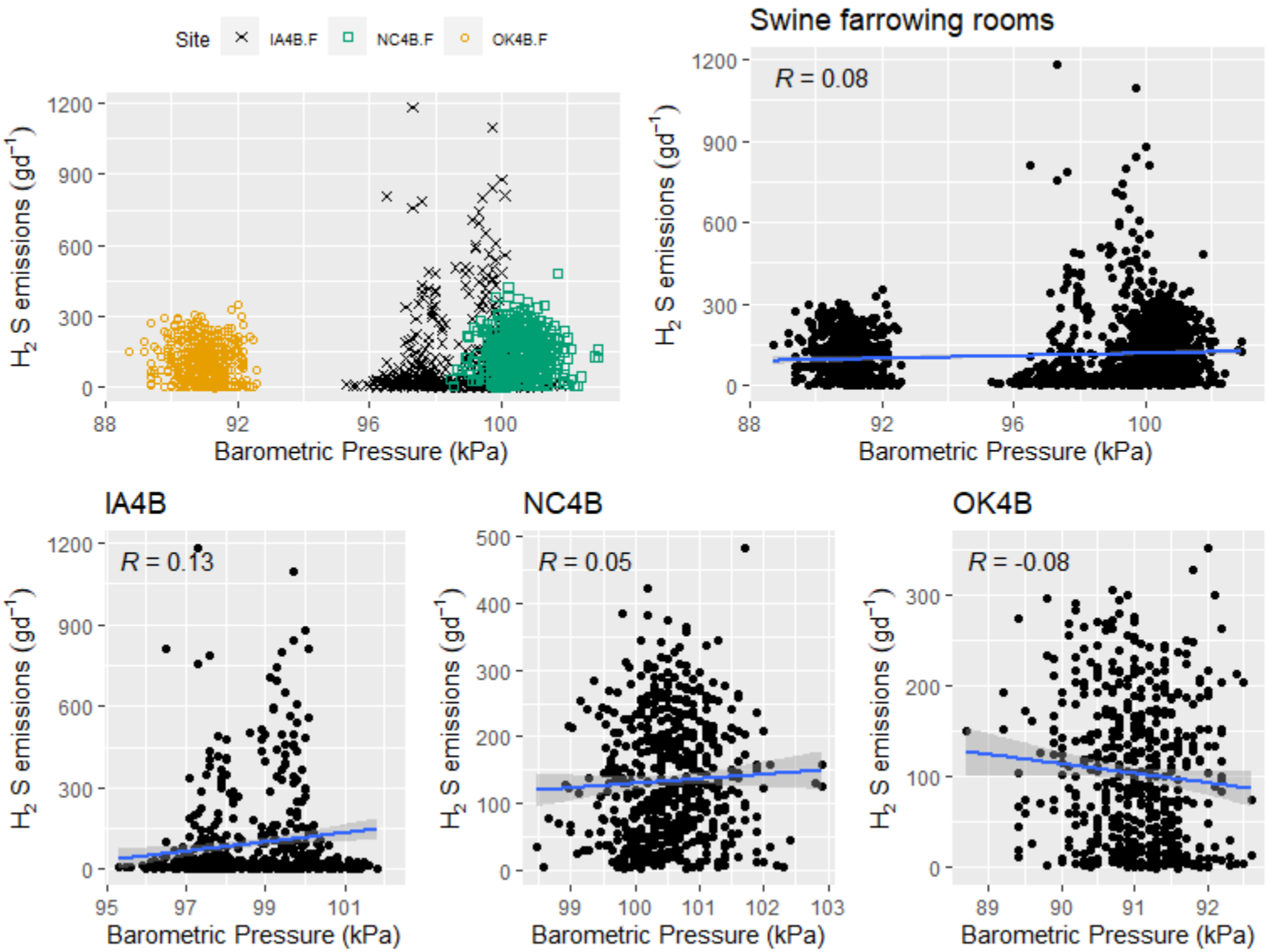


**Figure F.3-71. Scatter plot of swine farrowing rooms $H_2S$ emissions (g $d^{-1}$) versus air pressure.**

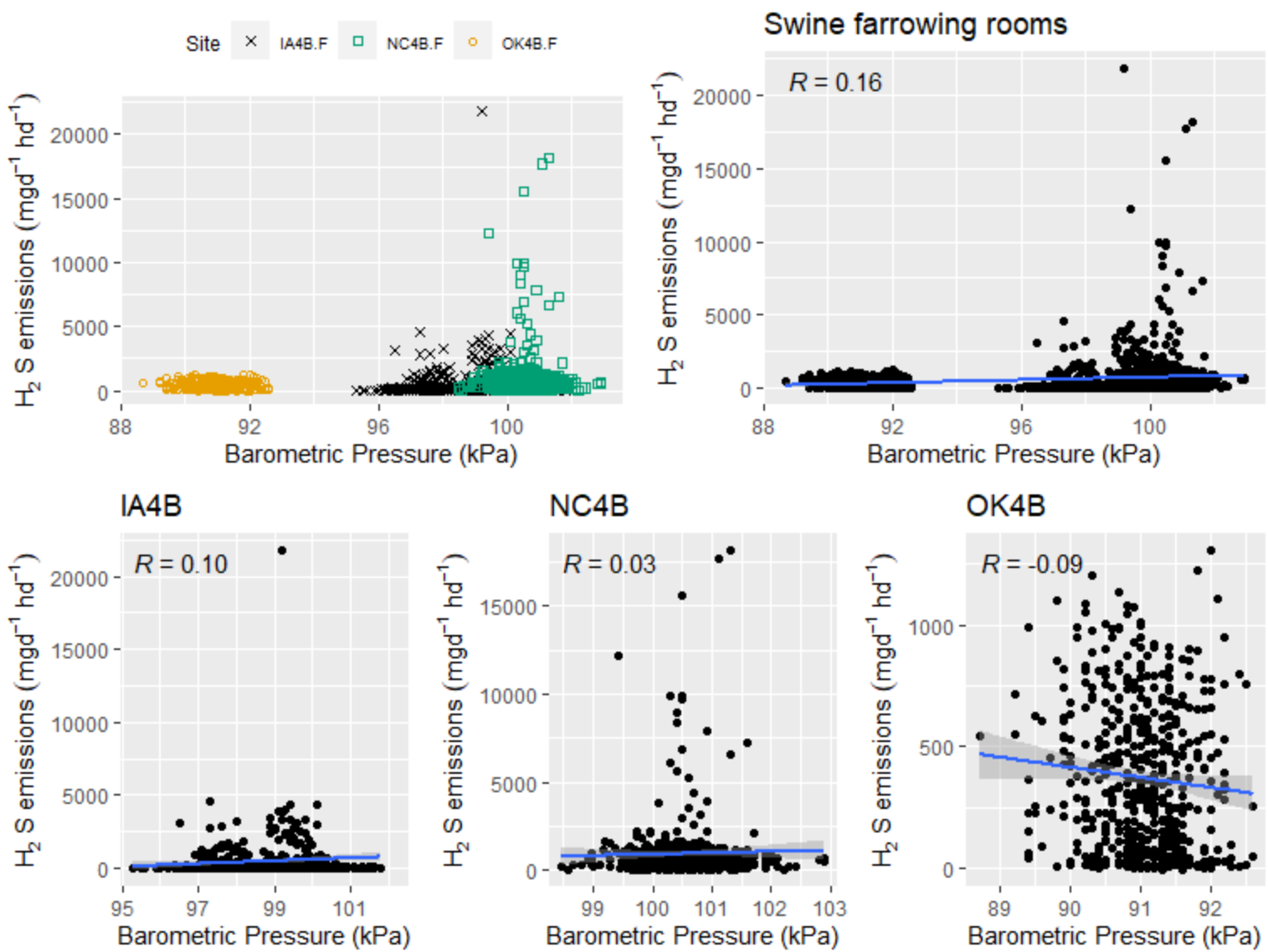


**Figure F.3-72. Scatter plot of swine farrowing rooms $H_2S$ emissions (mg $d^{-1}hd^{-1}$) versus air pressure.**

### *F.3.2.3 Particulate Matter ($PM_{10}$)*

F.3.2.3.1 Ambient temperature

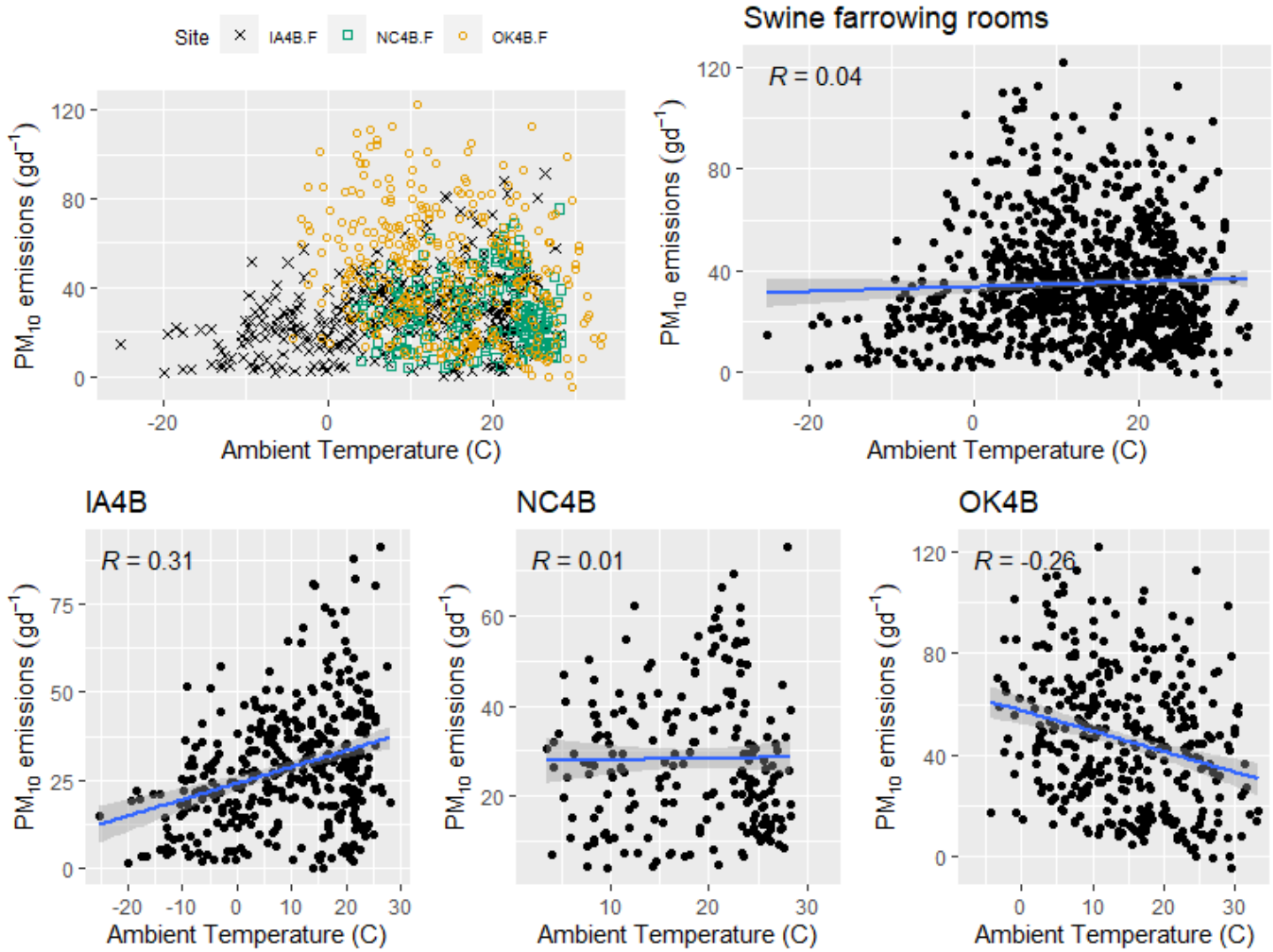


**Figure F.3-73. Scatter plot of swine farrowing rooms $PM_{10}$ emissions (g $d^{-1}$) versus ambient temperature.**

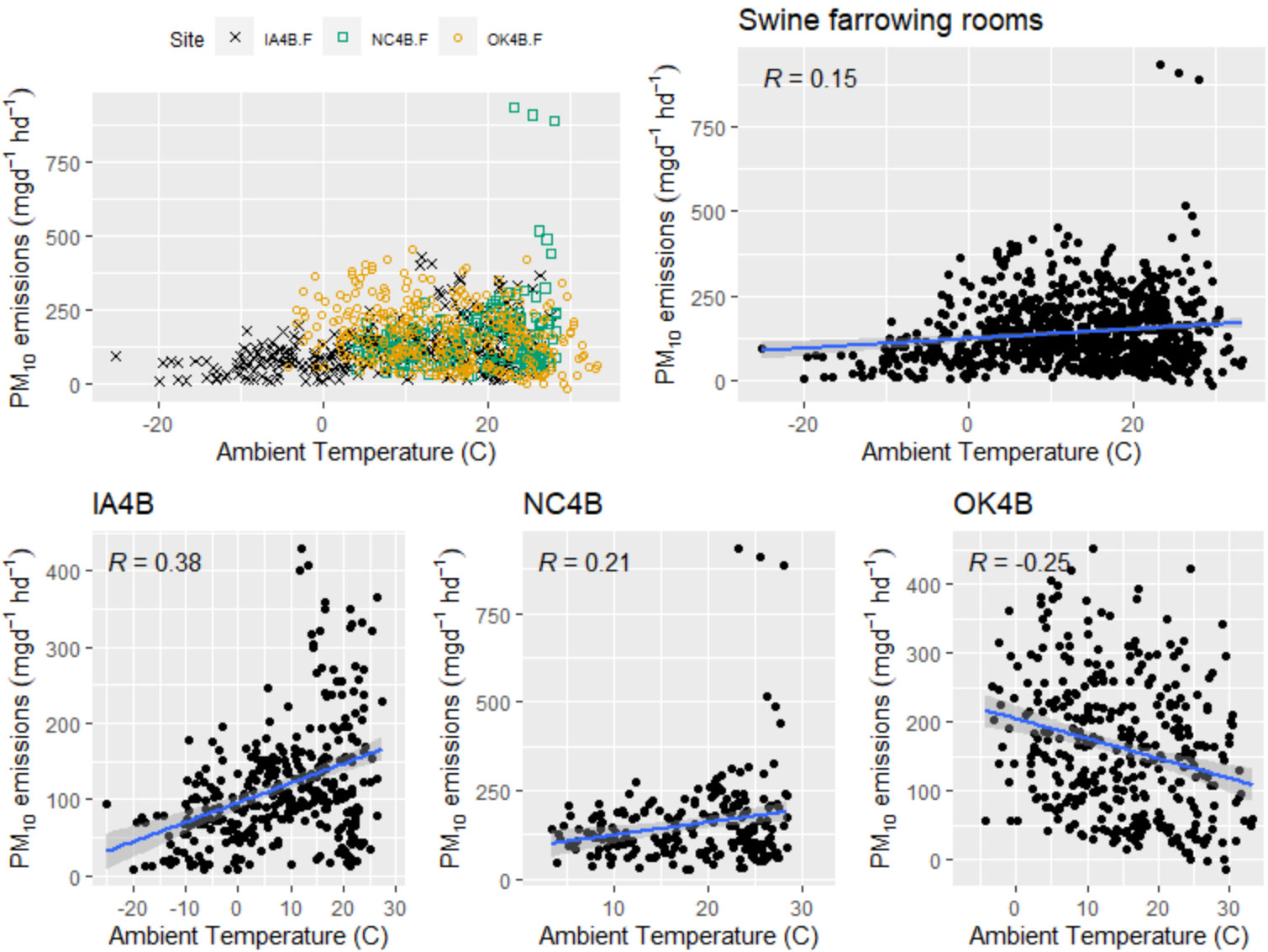


**Figure F.3-74. Scatter plot of swine farrowing rooms $PM_{10}$ emissions (mg $d^{-1}hd^{-1}$) versus ambient temperature.**

F.3.2.3.2 Ambient relative humidity

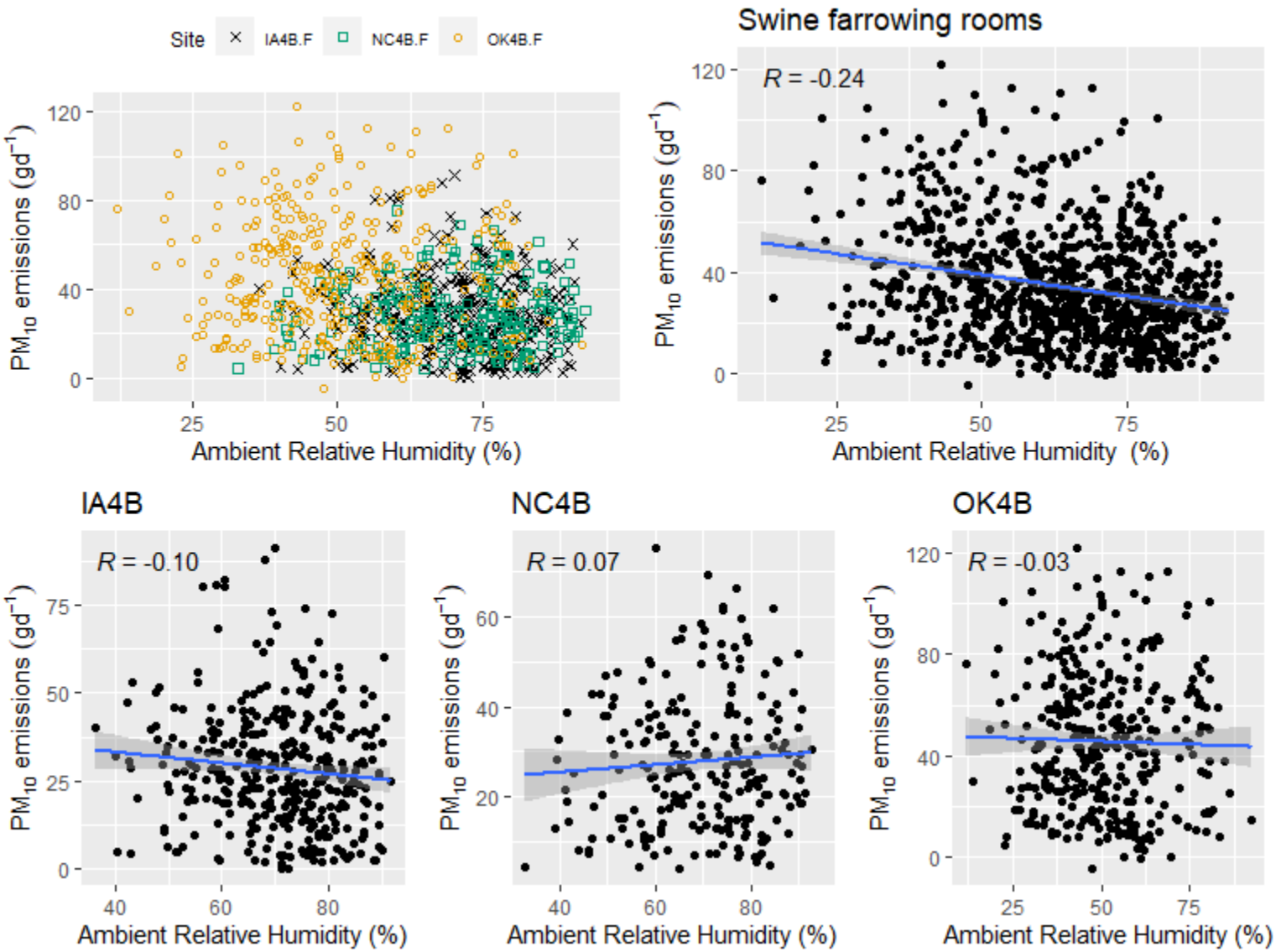


**Figure F.3-75. Scatter plot of swine farrowing rooms $PM_{10}$ emissions (g $d^{-1}$) versus ambient relative humidity.**

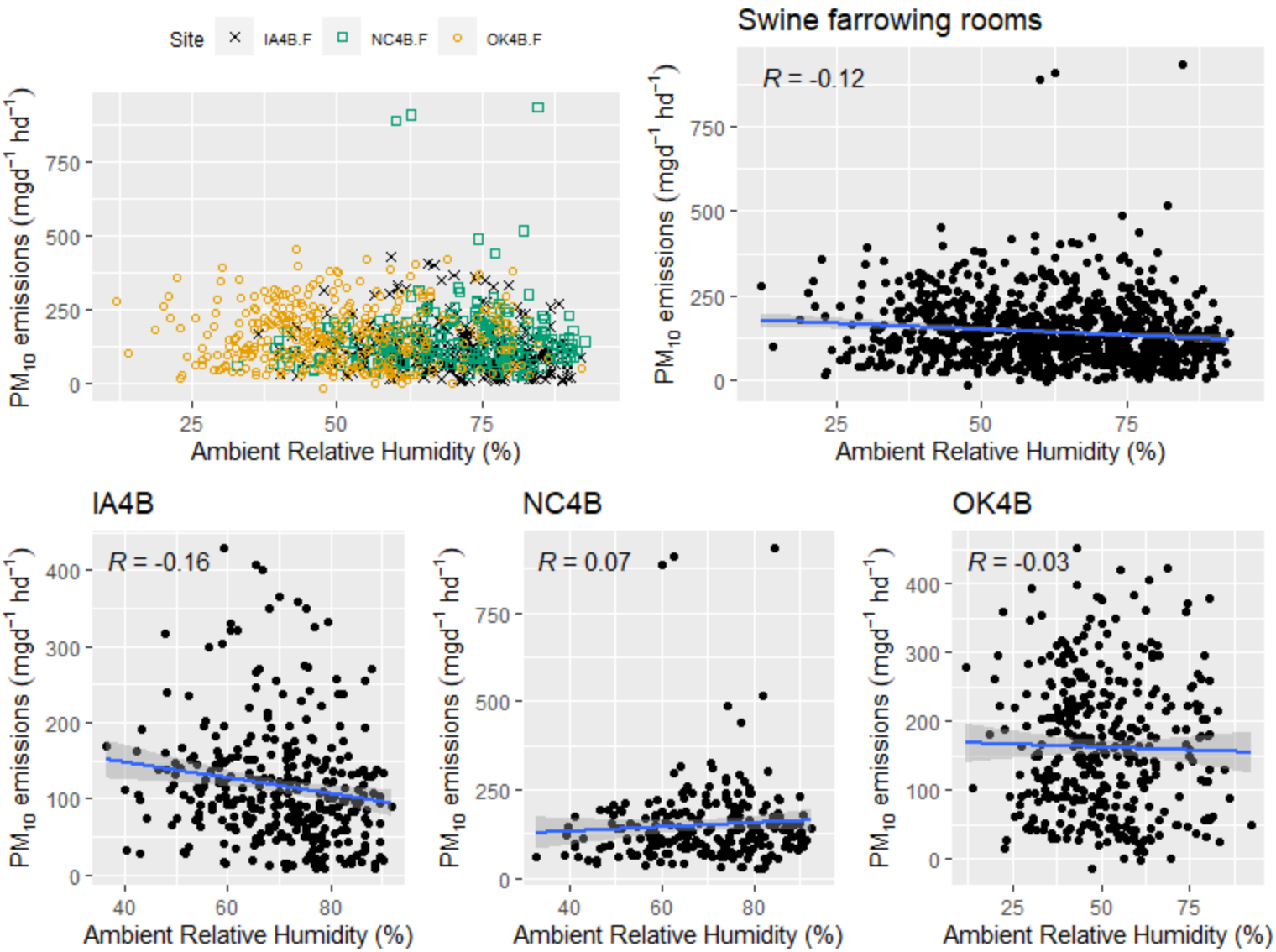


**Figure F.3-76. Scatter plot of swine farrowing rooms $PM_{10}$ emissions (mg $d^{-1}hd^{-1}$) versus ambient relative humidity.**

F.3.2.3.3 Air pressure

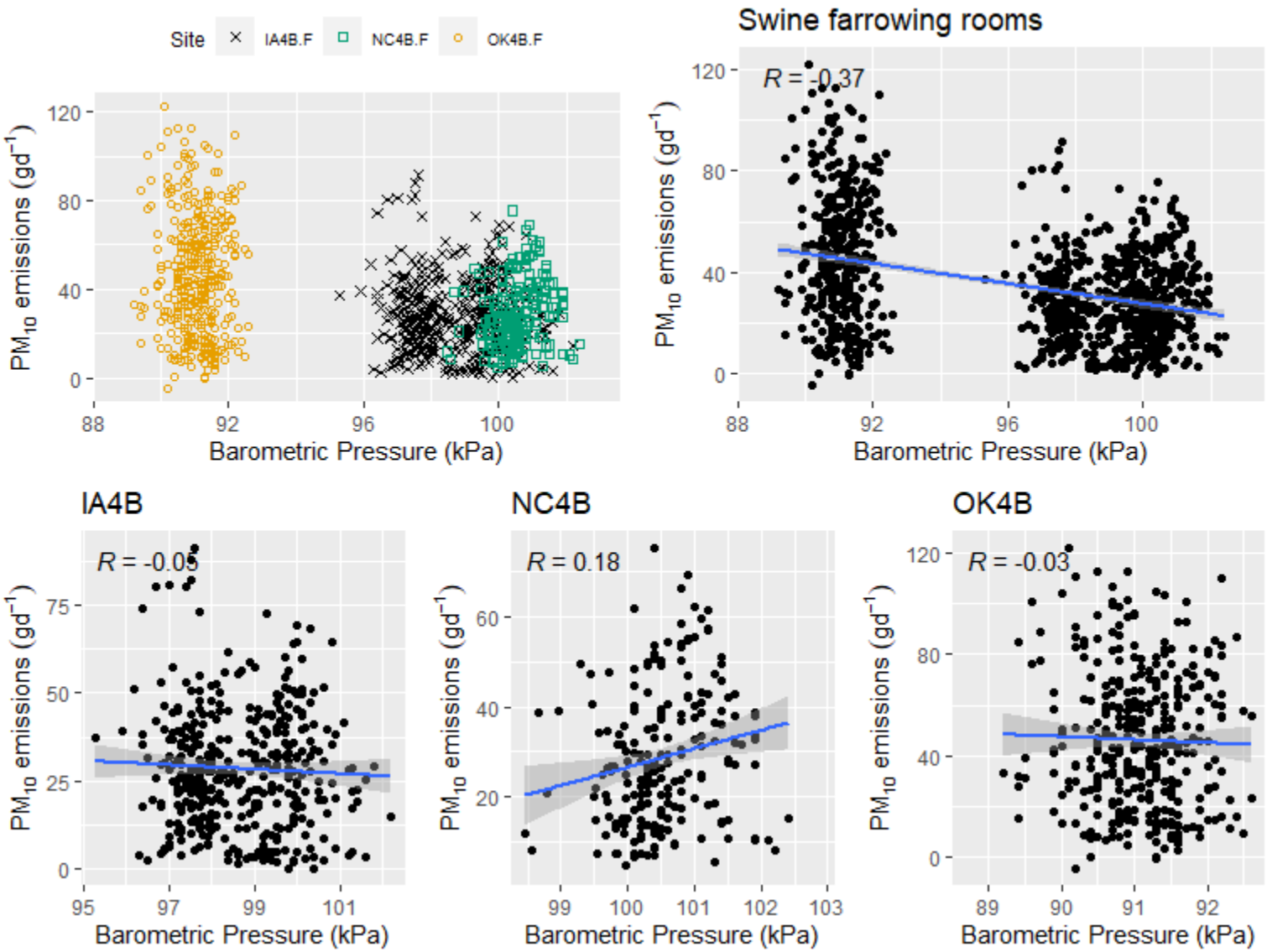


**Figure F.3-77. Scatter plot of swine farrowing rooms $PM_{10}$ emissions (g $d^{-1}$) versus air pressure.**

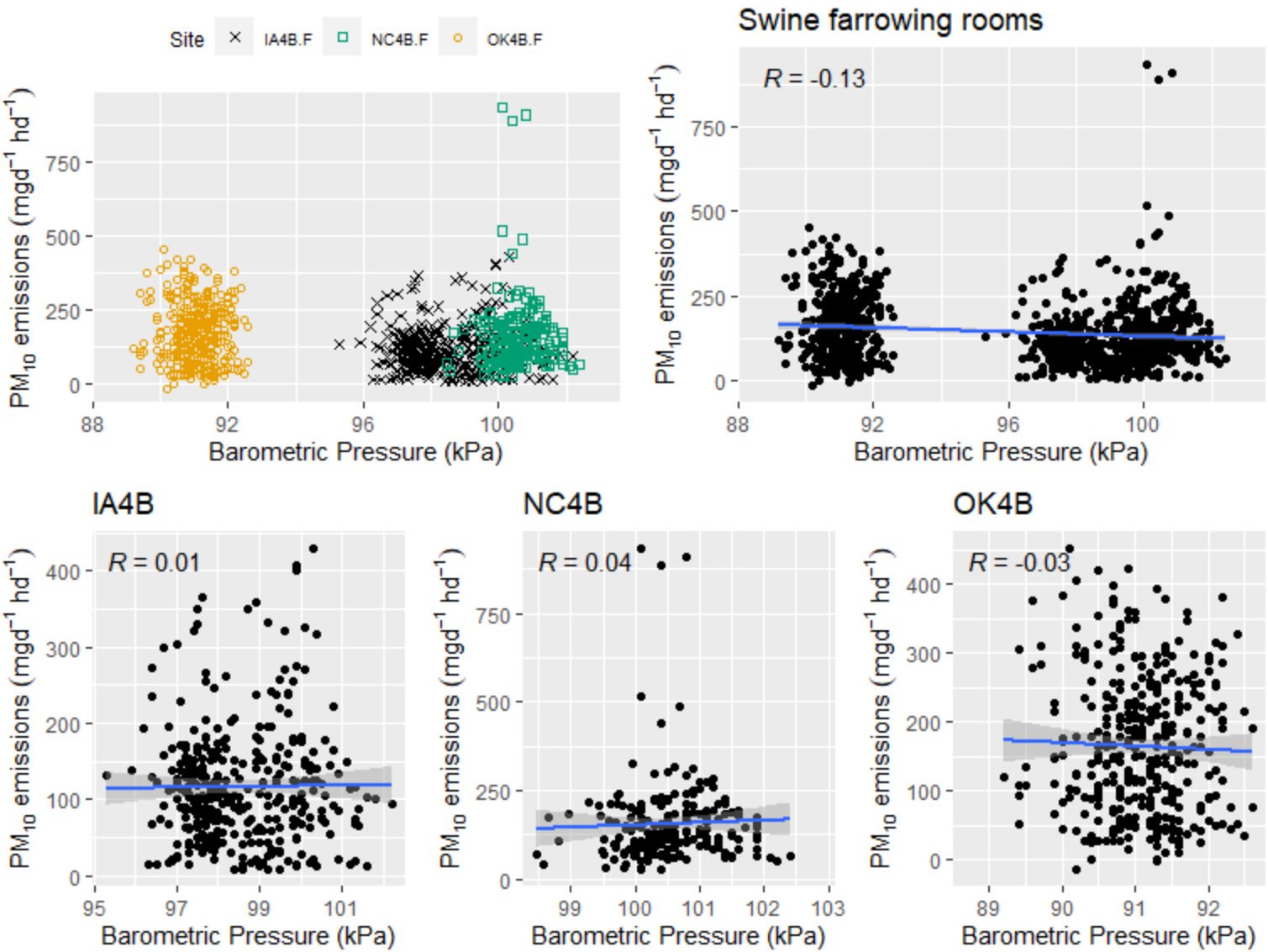


**Figure F.3-78. Scatter plot of swine farrowing rooms $PM_{10}$ emissions (mg $d^{-1}hd^{-1}$) versus air pressure.**

### *F.3.2.4 Particulate Matter ($PM_{2.5}$)*

F.3.2.4.1 Ambient temperature

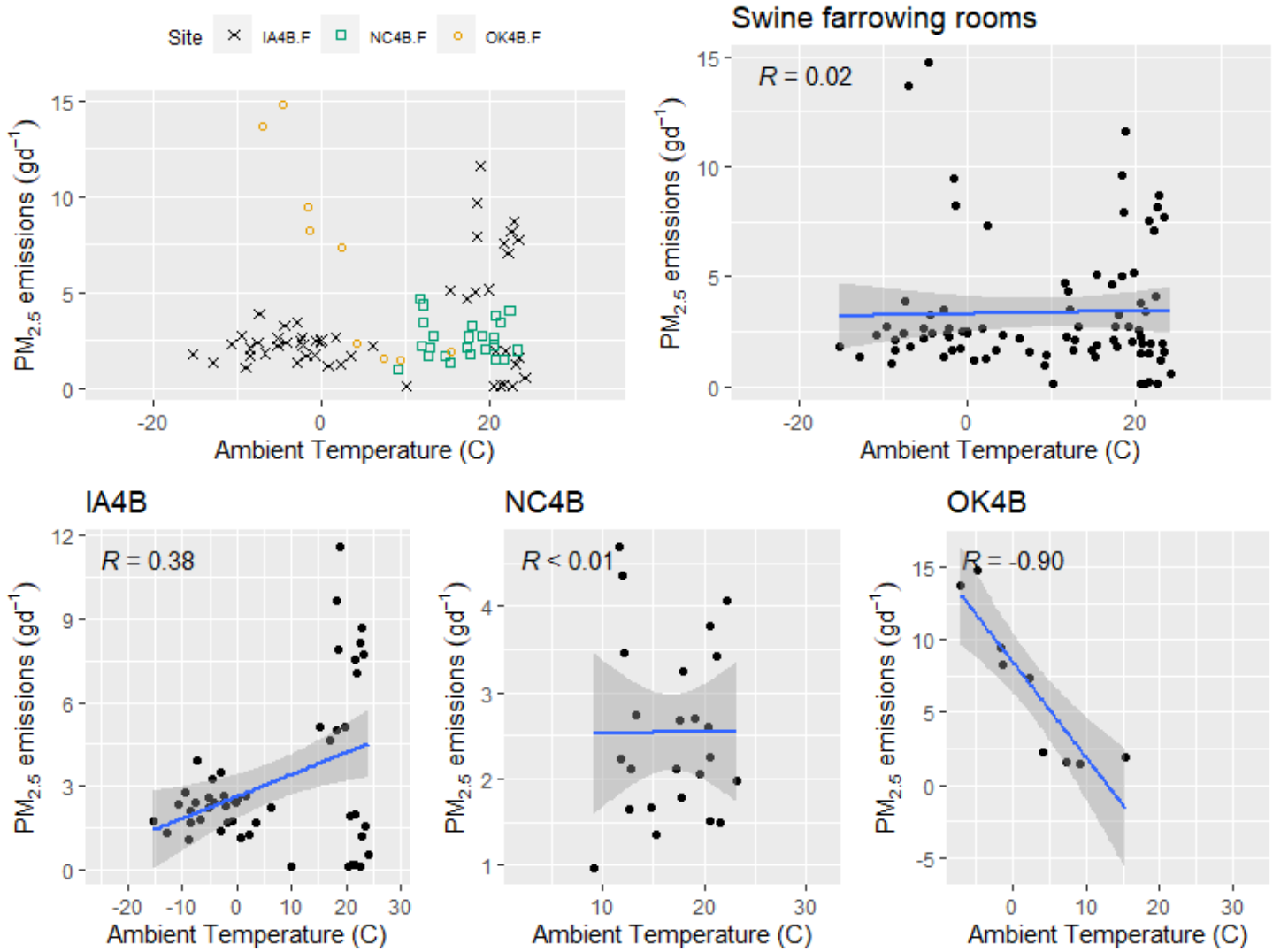


**Figure F.3-79. Scatter plot of swine farrowing rooms $PM_{2.5}$ emissions (g $d^{-1}$) versus ambient temperature.**

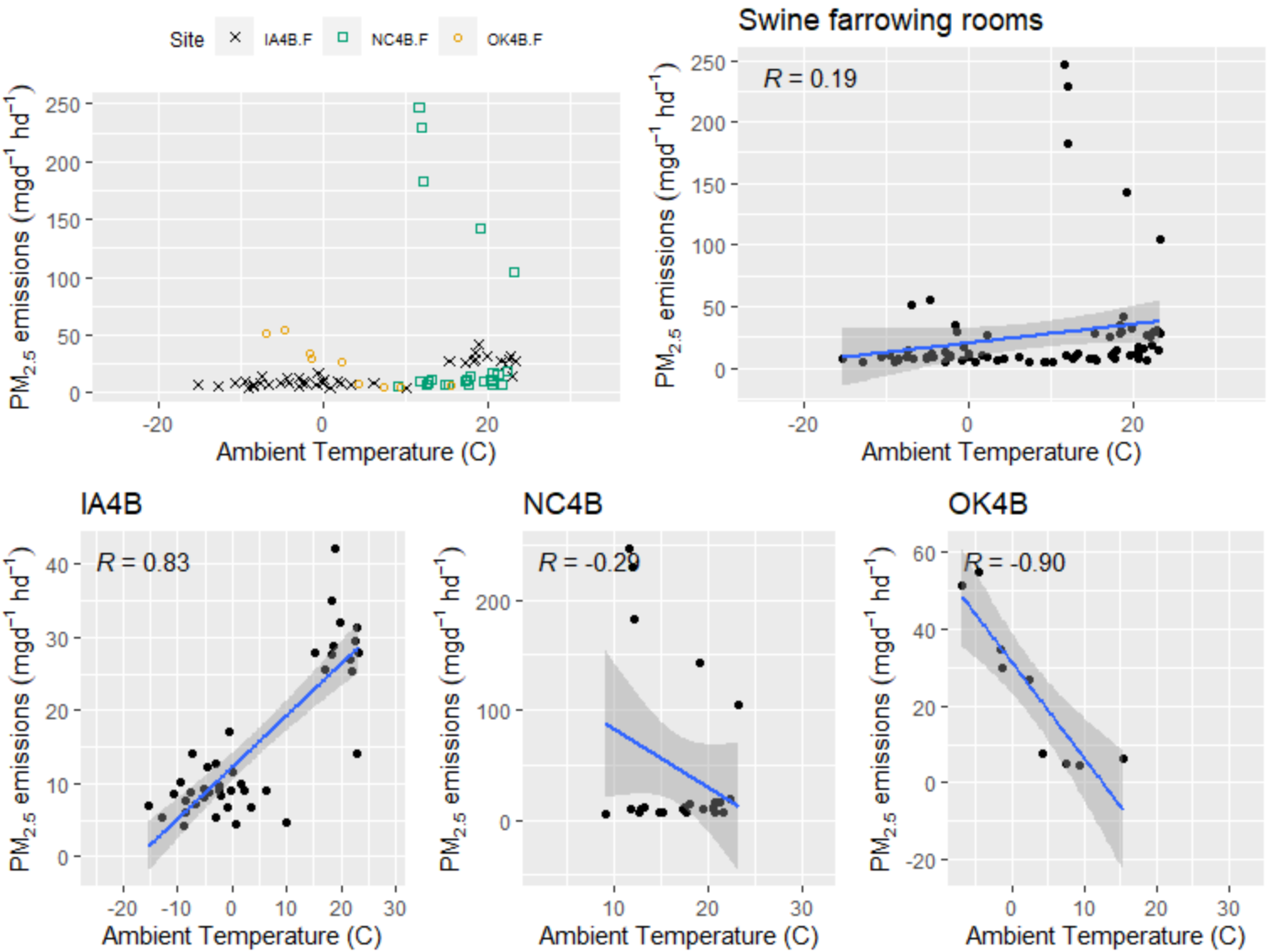


**Figure F.3-80. Scatter plot of swine farrowing rooms $PM_{2.5}$ emissions (mg $d^{-1}hd^{-1}$) versus ambient temperature.**

F.3.2.4.2 Ambient relative humidity

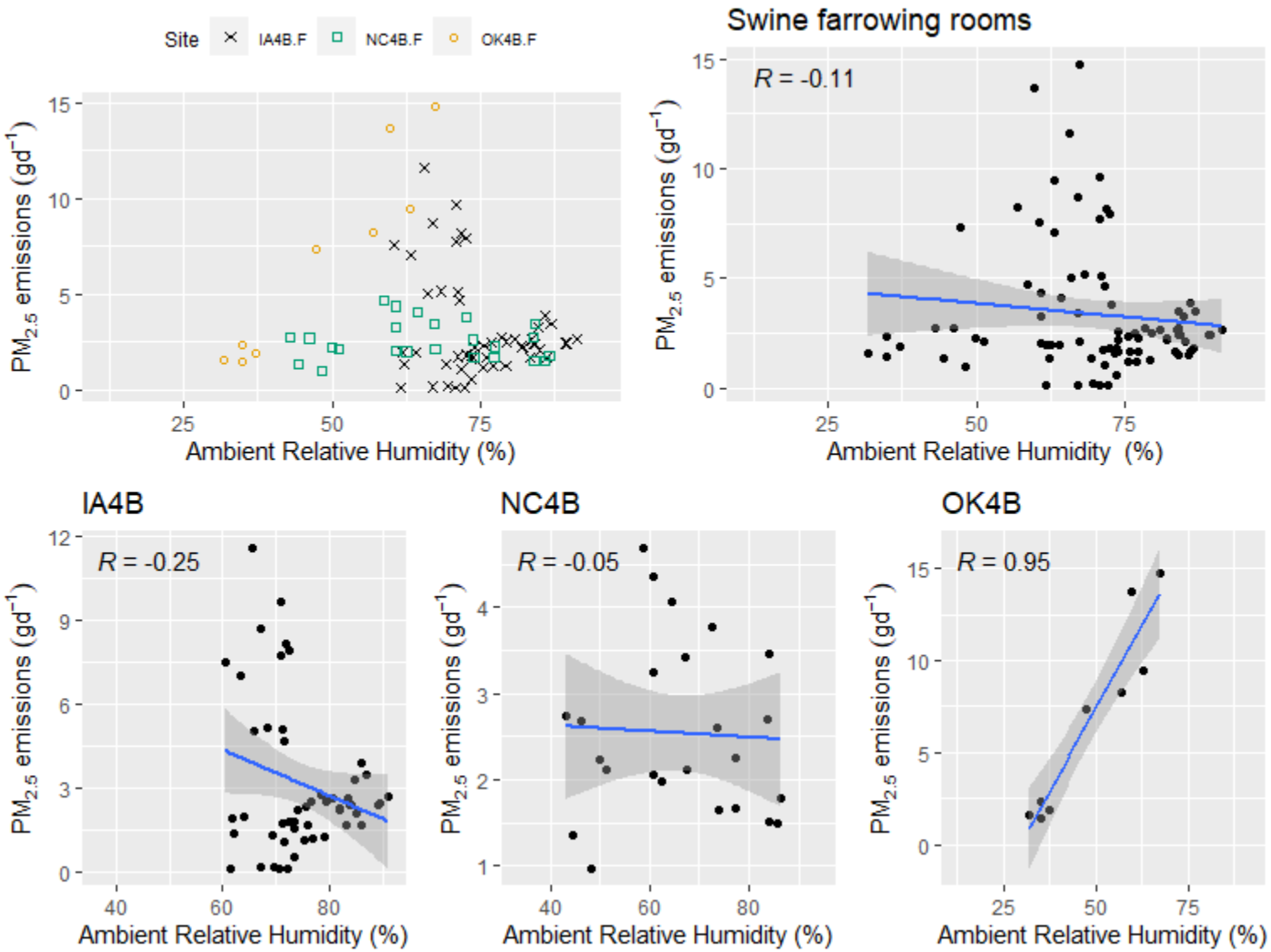


**Figure F.3-81. Scatter plot of swine farrowing rooms $PM_{2.5}$ emissions (g $d^{-1}$) versus ambient relative humidity.**

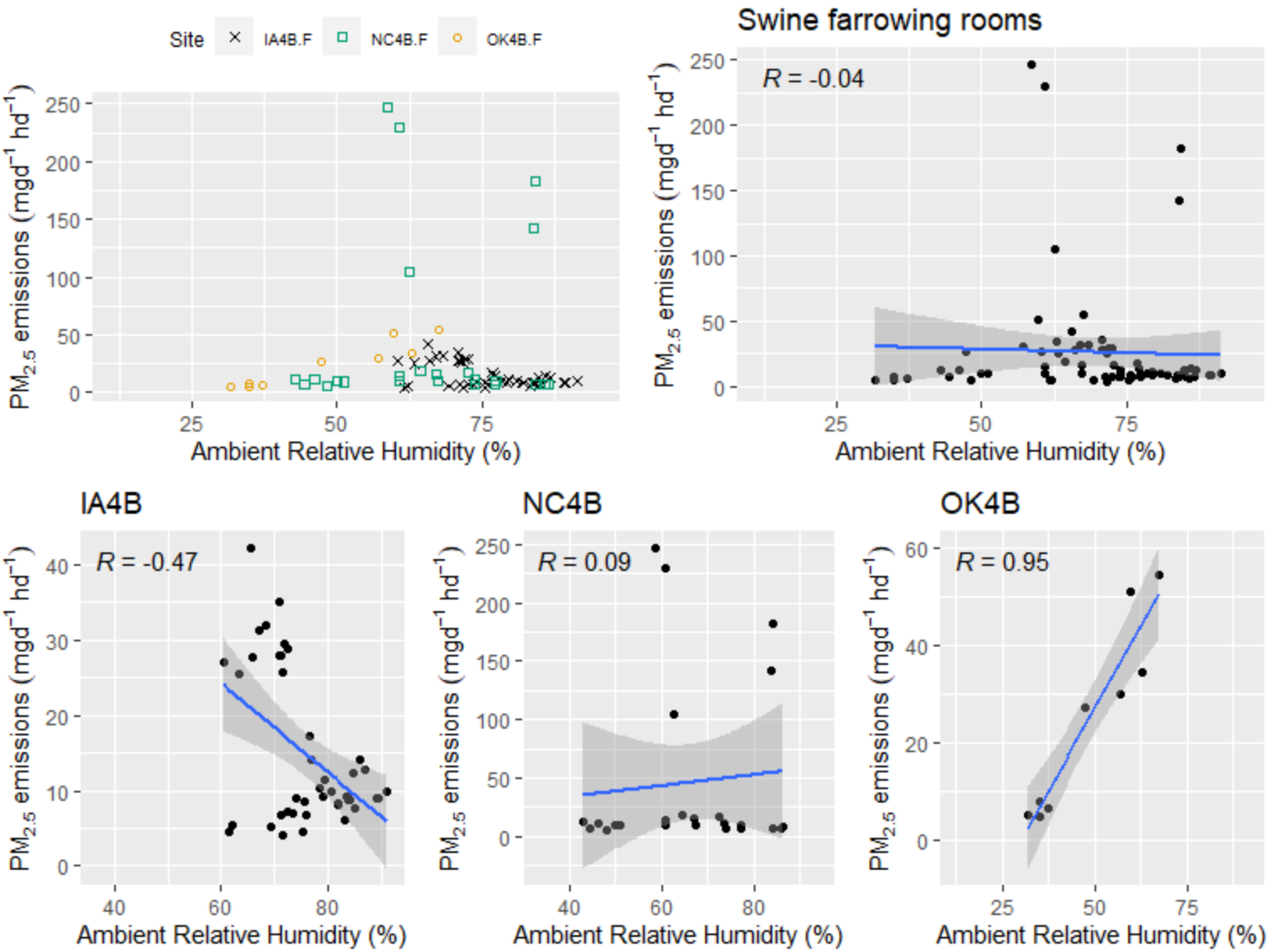


**Figure F.3-82. Scatter plot of swine farrowing rooms $PM_{2.5}$ emissions (mg $d^{-1}hd^{-1}$) versus ambient relative humidity.**

F.3.2.4.3 Air pressure

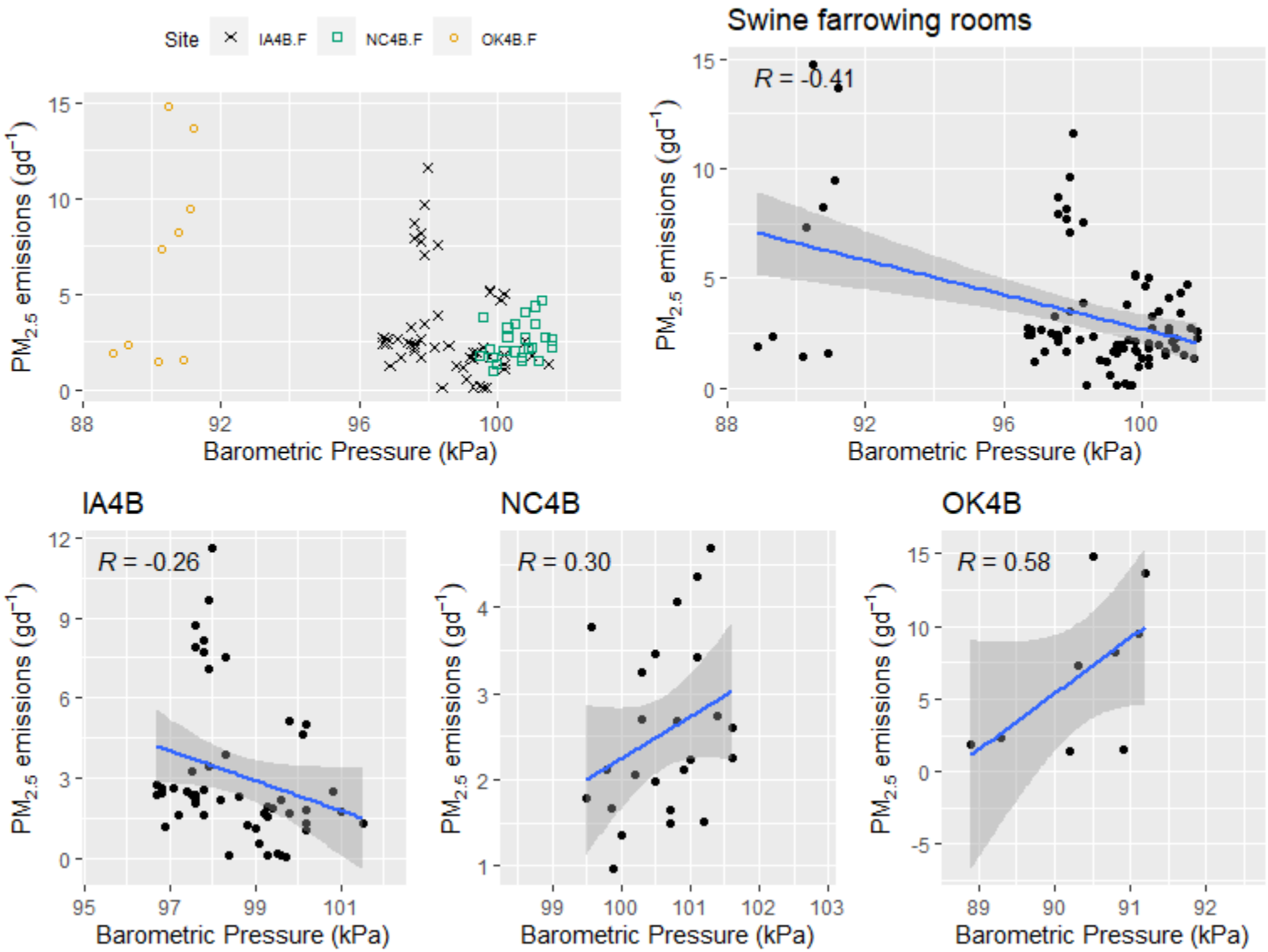


**Figure F.3-83. Scatter plot of swine farrowing rooms $PM_{2.5}$ emissions (g $d^{-1}$) versus air pressure.**

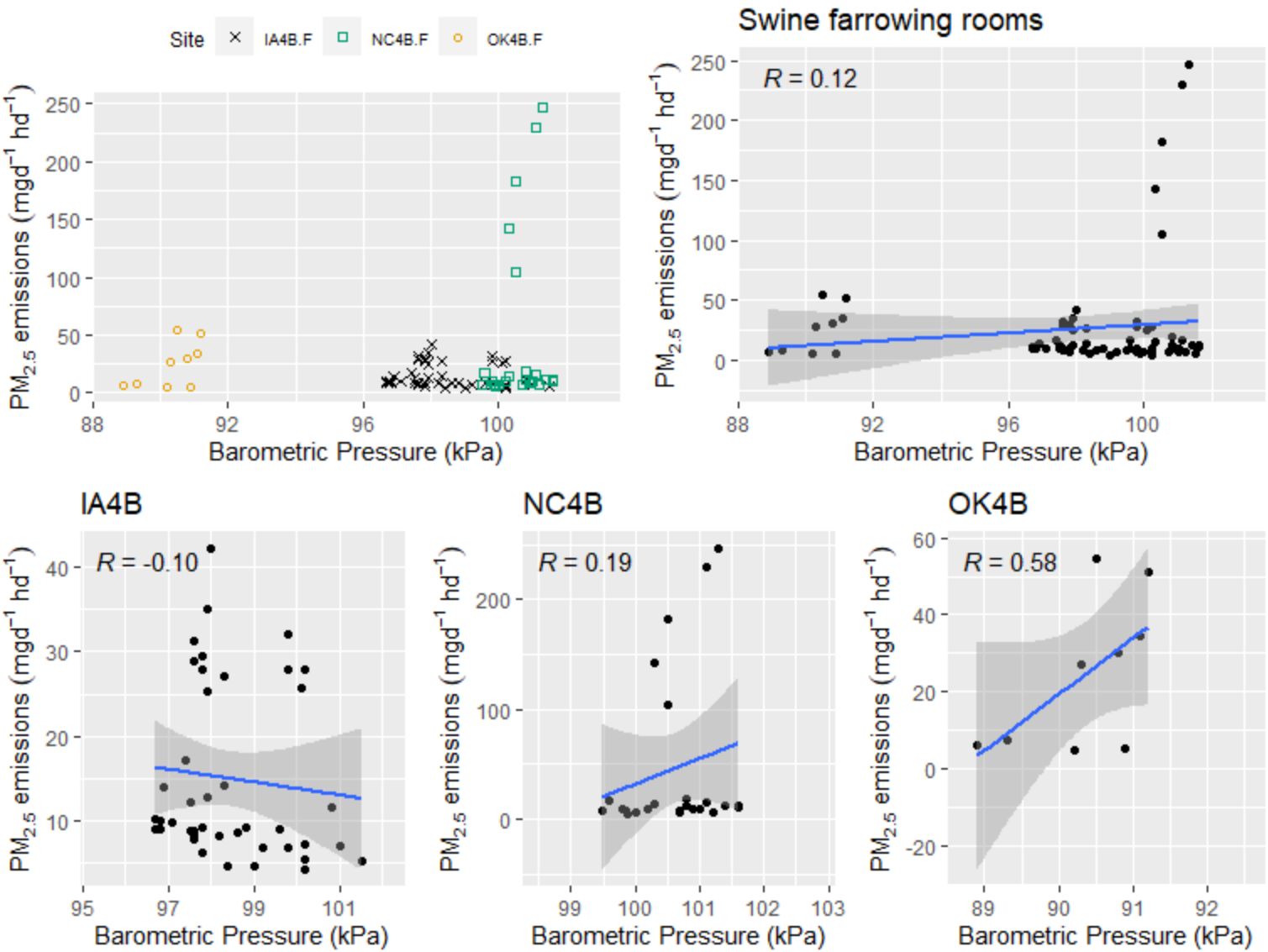


**Figure F.3-84. Scatter plot of swine farrowing rooms $PM_{2.5}$ emissions (mg $d^{-1}hd^{-1}$) versus air pressure.**

### *F.3.2.5 Total Suspended Particulates (TSP)*

F.3.2.5.1 Ambient temperature

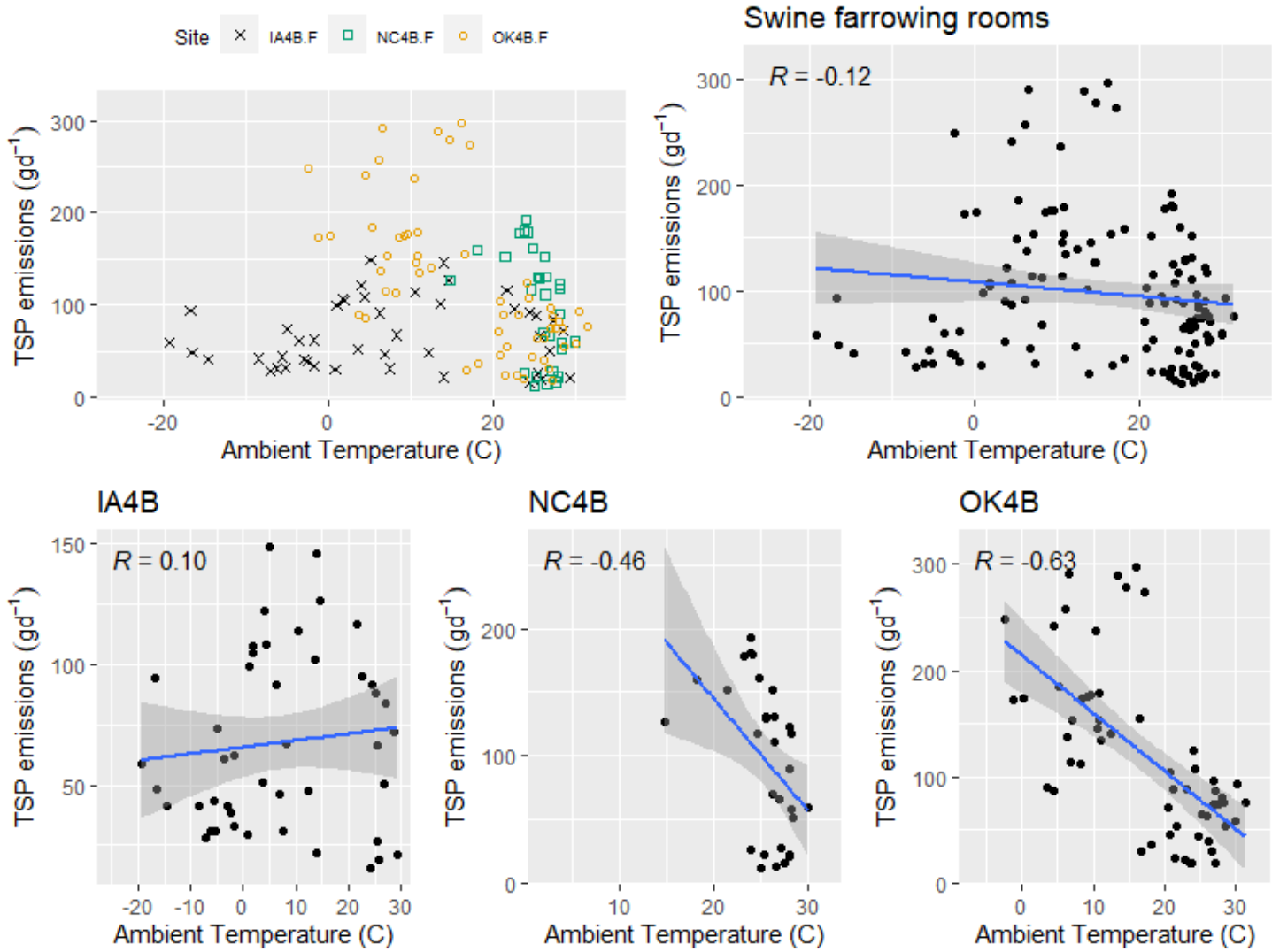


**Figure F.3-85. Scatter plot of swine farrowing rooms TSP emissions (g d$^{-1}$) versus ambient temperature.**

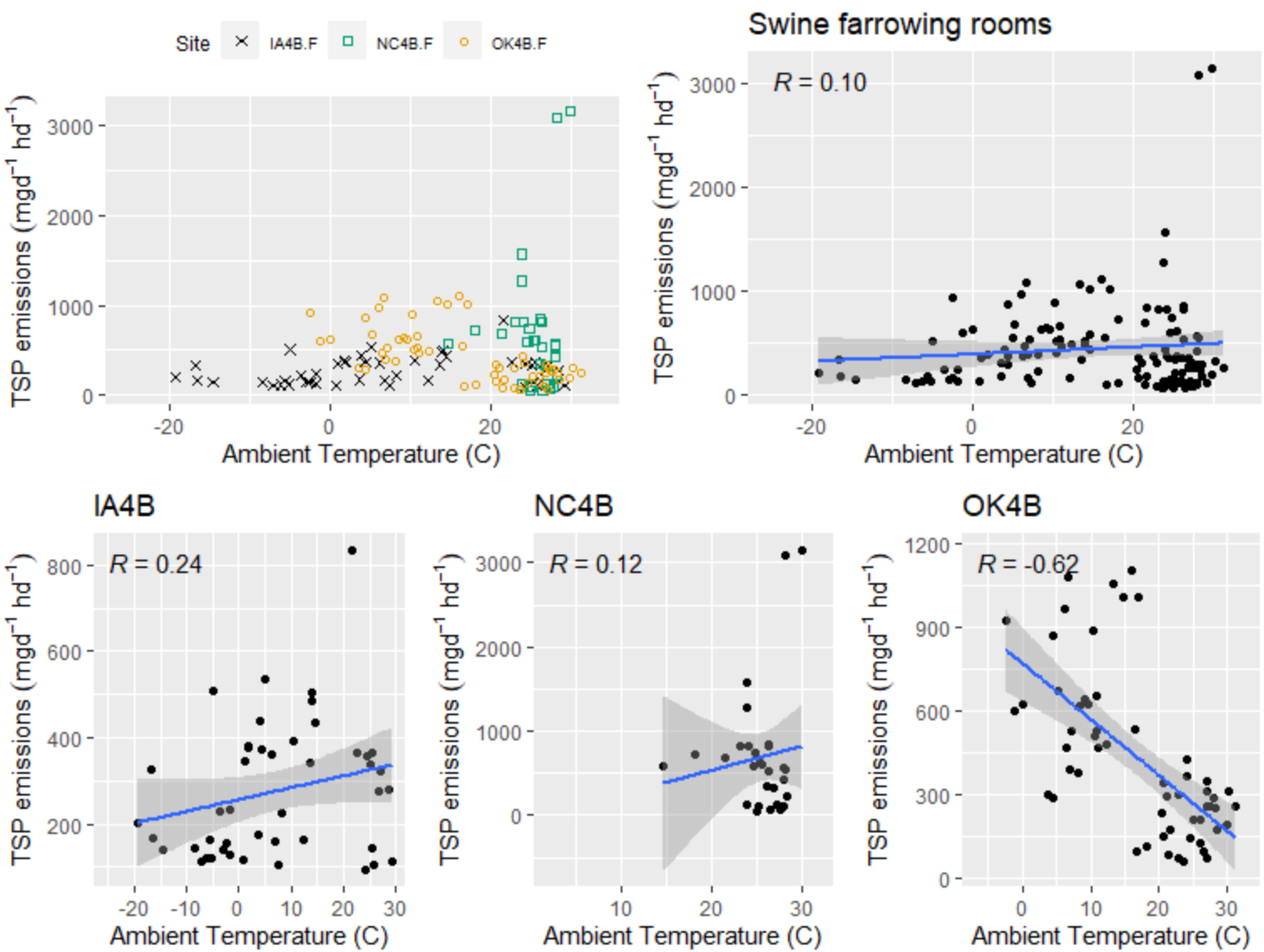


**Figure F.3-86. Scatter plot of swine farrowing rooms TSP emissions (mg d$^{-1}$hd$^{-1}$) versus ambient temperature.**

F.3.2.5.2 Ambient relative humidity

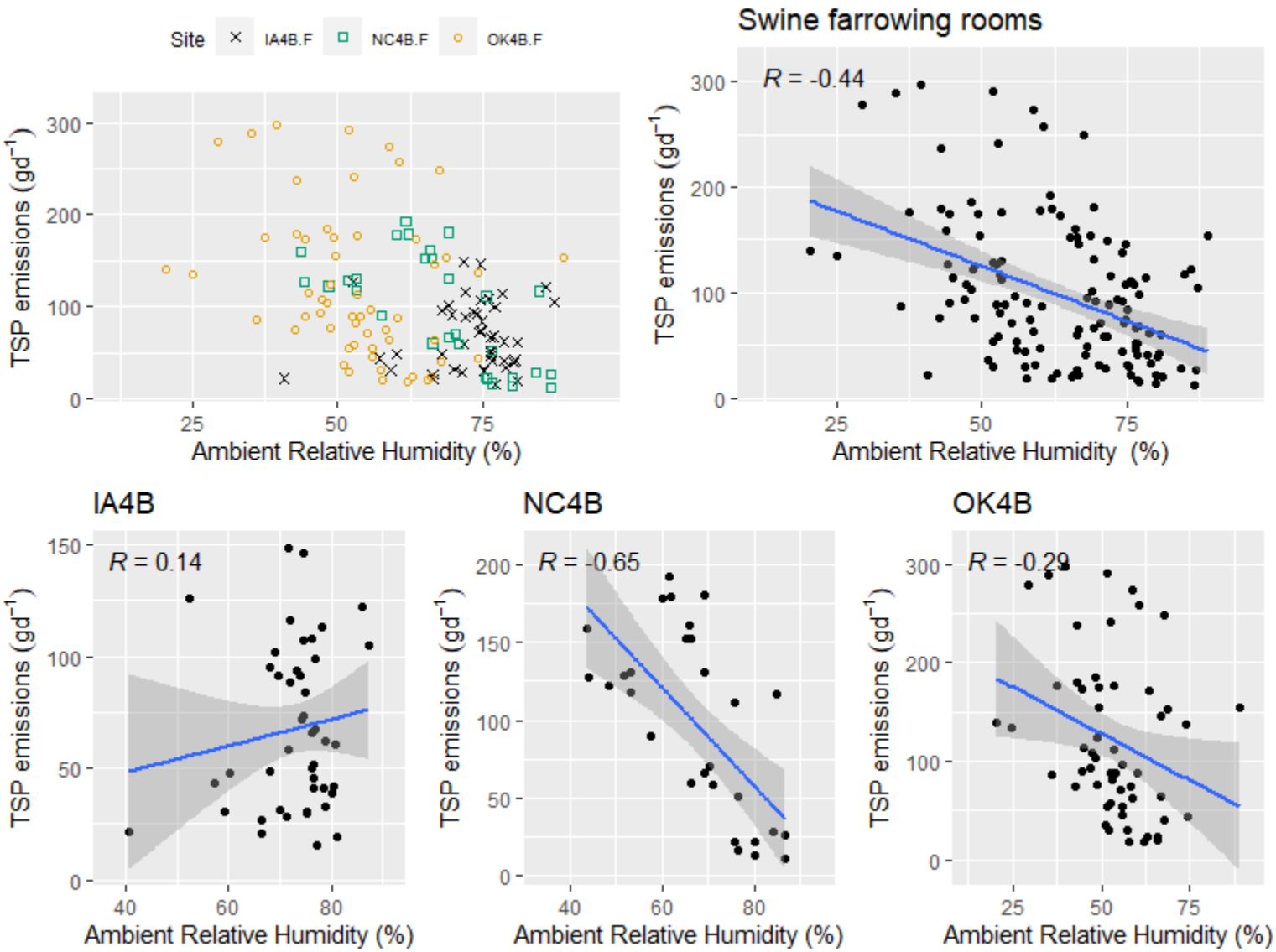


**Figure F.3-87. Scatter plot of swine farrowing rooms TSP emissions (g d$^{-1}$) versus ambient relative humidity.**

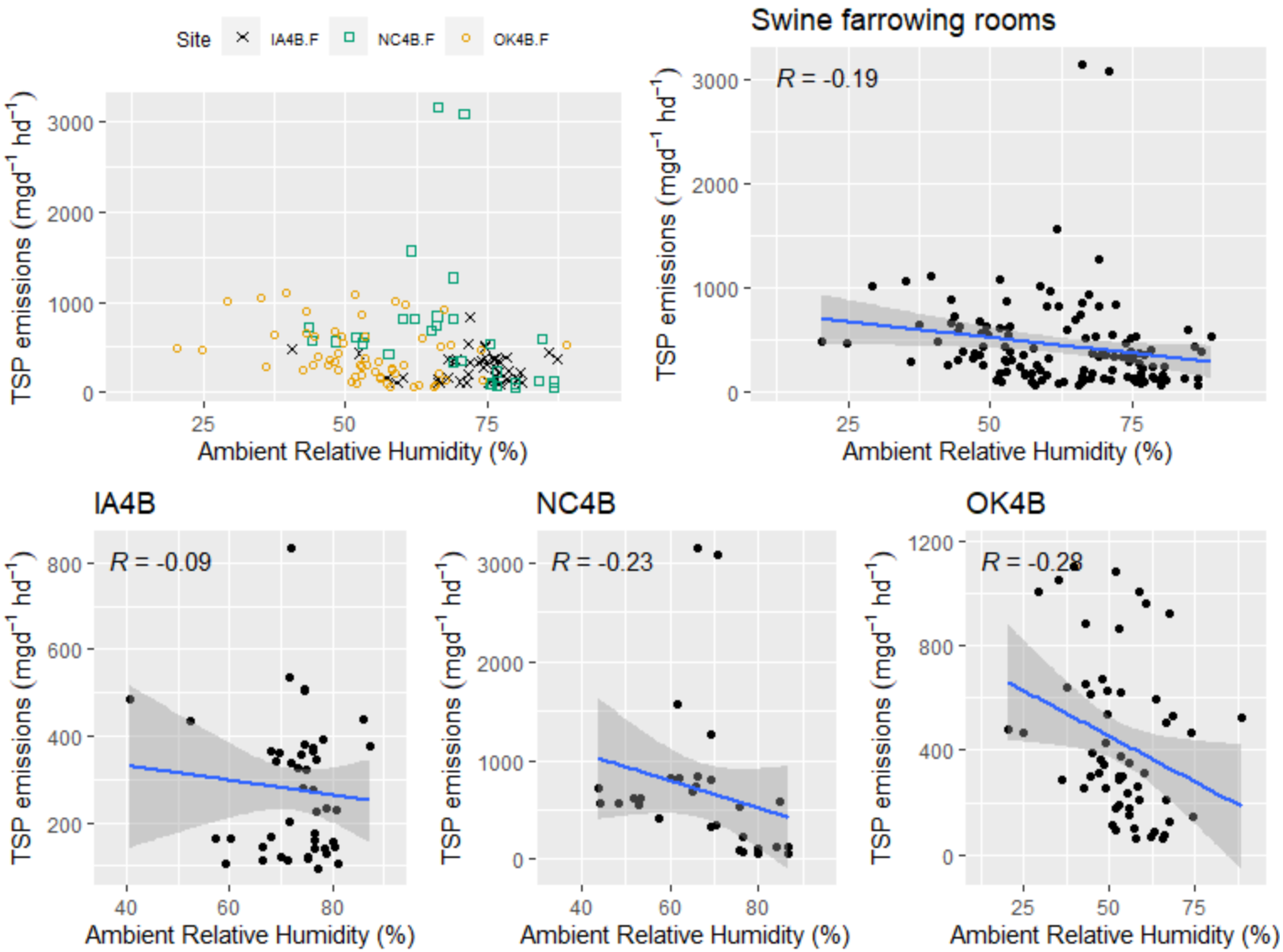


**Figure F.3-88. Scatter plot of swine farrowing rooms TSP emissions (mg $d^{-1}hd^{-1}$) versus ambient relative humidity.**

F.3.2.5.3 Air pressure

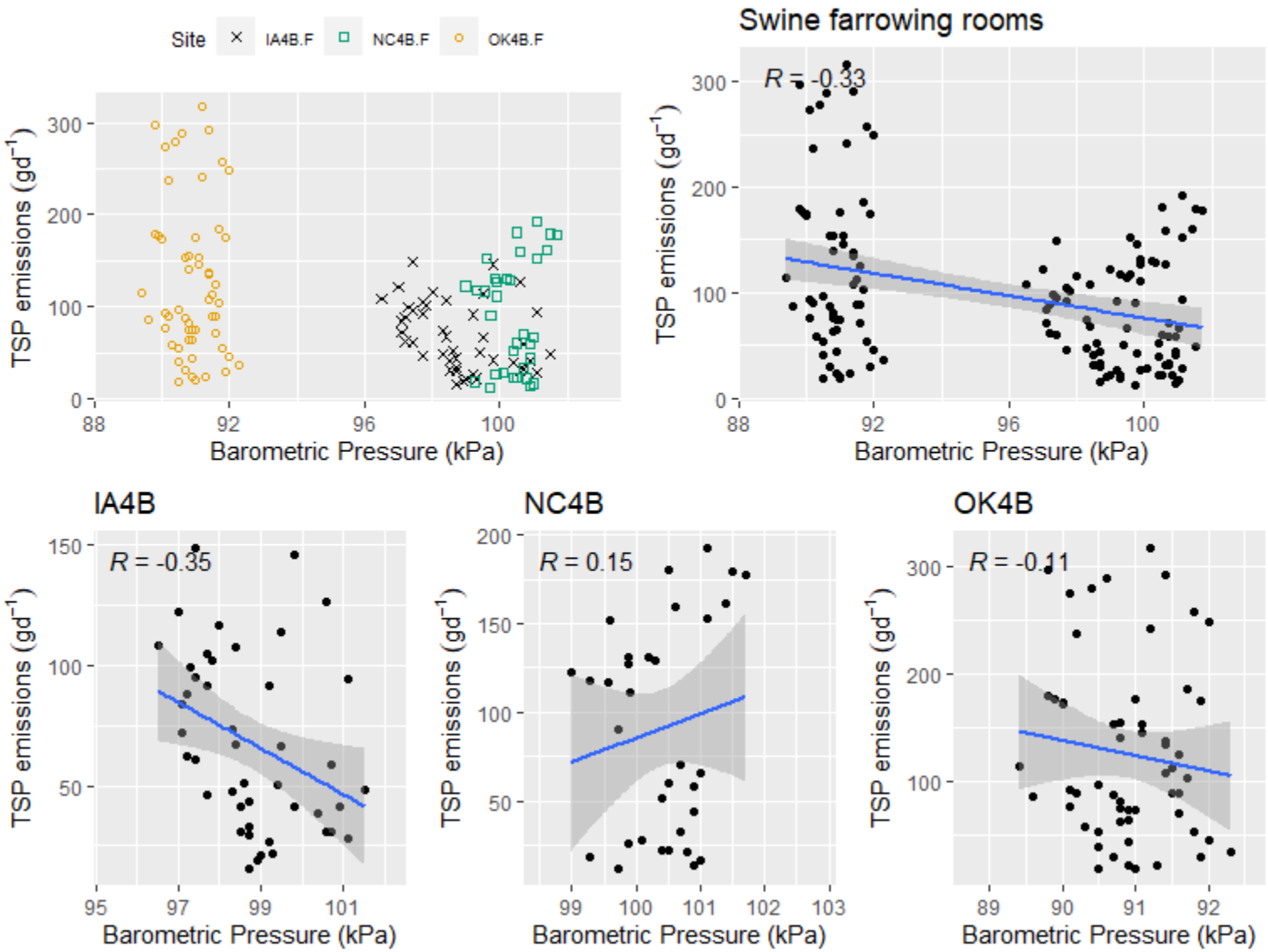


**Figure F.3-89. Scatter plot of swine farrowing rooms TSP emissions (g d$^{-1}$) versus air pressure.**

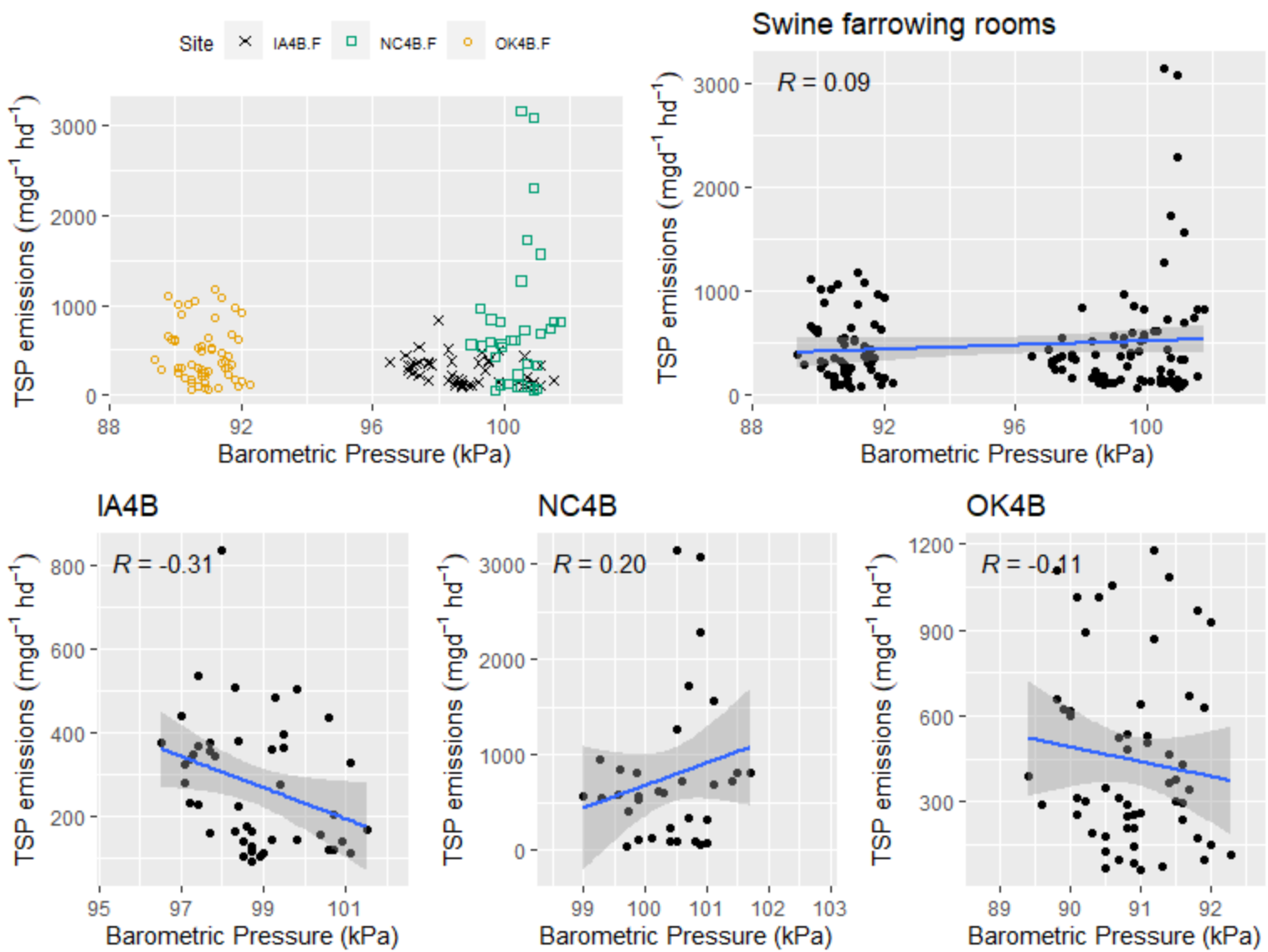


**Figure F.3-90. Scatter plot of swine farrowing rooms TSP emissions (mg d$^{-1}$hd$^{-1}$) versus air pressure.**

## F.4 Grow-Finish

### *F.4.1 Environmental*

**Table F.4.1. Summary of swine grow-finish barns $R^2$ values for environmental parameters (kg $d^{-1}$).**

| Pollutant | Parameter | R | $R^2$ | Strength | Figure |
|---|---|---|---|---|---|
| $NH_3$ ($kgd^{-1}$) | Inventory (hd) | 0.23 | 0.05 | slight or weak | F.4-1 |
| $NH_3$ ($gd^{-1}hd^{-1}$) | Inventory (hd) | -0.42 | 0.17 | slight or weak | F.4-2 |
| $NH_3$ ($kgd^{-1}$) | Average weight (kg) | 0.52 | 0.27 | modest | F.4-3 |
| $NH_3$ ($gd^{-1}hd^{-1}$) | Average weight (kg) | 0.56 | 0.31 | modest | F.4-4 |
| $NH_3$ ($kgd^{-1}$) | Live animal weight (kg) | 0.70 | 0.48 | moderate | F.4-5 |
| $NH_3$ ($gd^{-1}hd^{-1}$) | Live animal weight (kg) | 0.22 | 0.05 | slight or weak | F.4-6 |
| $NH_3$ ($kgd^{-1}$) | Exhaust Temperature (°C) | 0.18 | 0.03 | slight or weak | F.4-7 |
| $NH_3$ ($kgd^{-1}$) | Exhaust Relative humidity (%) | -0.09 | 0.01 | slight or weak | F.4-8 |
| $NH_3$ ($gd^{-1}hd^{-1}$) | Exhaust Temperature (°C) | -0.03 | 0.00 | slight or weak | F.4-9 |
| $NH_3$ ($gd^{-1}hd^{-1}$) | Exhaust Relative humidity (%) | 0.07 | 0.00 | slight or weak | F.4-10 |
| $NH_3$ ($kgd^{-1}$) | Airflow ($dsm^3s^{-1}$) | 0.42 | 0.17 | slight or weak | F.4-11 |
| $NH_3$ ($gd^{-1}hd^{-1}$) | Airflow ($dsm^3s^{-1}$) | 0.20 | 0.04 | slight or weak | F.4-12 |
| $H_2S$ ($gd^{-1}$) | Inventory (hd) | 0.11 | 0.01 | slight or weak | F.4-13 |
| $H_2S$ ($mgd^{-1}hd^{-1}$) | Inventory (hd) | -0.21 | 0.04 | slight or weak | F.4-14 |
| $H_2S$ ($gd^{-1}$) | Average weight (kg) | 0.29 | 0.09 | slight or weak | F.4-15 |
| $H_2S$ ($mgd^{-1}hd^{-1}$) | Average weight (kg) | 0.33 | 0.11 | slight or weak | F.4-16 |
| $H_2S$ ($gd^{-1}$) | Live animal weight (kg) | 0.37 | 0.13 | slight or weak | F.4-17 |
| $H_2S$ ($mgd^{-1}hd^{-1}$) | Live animal weight (kg) | 0.12 | 0.01 | slight or weak | F.4-18 |
| $H_2S$ ($gd^{-1}$) | Exhaust Temperature (°C) | 0.02 | 0.00 | slight or weak | F.4-19 |
| $H_2S$ ($mgd^{-1}hd^{-1}$) | Exhaust Temperature (°C) | -0.09 | 0.01 | slight or weak | F.4-20 |
| $H_2S$ ($gd^{-1}$) | Exhaust Relative humidity (%) | -0.12 | 0.01 | slight or weak | F.4-21 |
| $H_2S$ ($mgd^{-1}hd^{-1}$) | Exhaust Relative humidity (%) | -0.01 | 0.00 | slight or weak | F.4-22 |
| $H_2S$ ($gd^{-1}$) | Airflow ($dsm^3s^{-1}$) | 0.19 | 0.03 | slight or weak | F.4-23 |
| $H_2S$ ($mgd^{-1}hd^{-1}$) | Airflow ($dsm^3s^{-1}$) | 0.12 | 0.02 | slight or weak | F.4-24 |
| $PM_{10}$ ($gd^{-1}$) | Inventory (hd) | 0.17 | 0.03 | slight or weak | F.4-25 |
| $PM_{10}$ ($mgd^{-1}hd^{-1}$) | Inventory (hd) | -0.34 | 0.12 | slight or weak | F.4-26 |
| $PM_{10}$ ($gd^{-1}$) | Average weight (kg) | 0.44 | 0.20 | slight or weak | F.4-27 |
| $PM_{10}$ ($mgd^{-1}hd^{-1}$) | Average weight (kg) | 0.49 | 0.24 | modest | F.4-28 |
| $PM_{10}$ ($gd^{-1}$) | Live animal weight (kg) | 0.55 | 0.30 | modest | F.4-29 |
| $PM_{10}$ ($mgd^{-1}hd^{-1}$) | Live animal weight (kg) | 0.22 | 0.05 | slight or weak | F.4-30 |
| $PM_{10}$ ($gd^{-1}$) | Exhaust Temperature (°C) | 0.11 | 0.01 | slight or weak | F.4-31 |
| $PM_{10}$ ($mgd^{-1}hd^{-1}$) | Exhaust Temperature (°C) | 0.02 | 0.00 | slight or weak | F.4-32 |
| $PM_{10}$ ($gd^{-1}$) | Exhaust Relative humidity (%) | -0.30 | 0.09 | slight or weak | F.4-33 |
| $PM_{10}$ ($mgd^{-1}hd^{-1}$) | Exhaust Relative humidity (%) | -0.09 | 0.01 | slight or weak | F.4-34 |
| $PM_{10}$ ($gd^{-1}$) | Airflow ($dsm^3s^{-1}$) | 0.34 | 0.12 | slight or weak | F.4-35 |
| $PM_{10}$ ($mgd^{-1}hd^{-1}$) | Airflow ($dsm^3s^{-1}$) | 0.23 | 0.05 | slight or weak | F.4-36 |
| $PM_{2.5}$ ($gd^{-1}$) | Inventory (hd) | -0.15 | 0.02 | slight or weak | F.4-37 |
| $PM_{2.5}$ ($mgd^{-1}hd^{-1}$) | Inventory (hd) | -0.39 | 0.15 | slight or weak | F.4-38 |
| $PM_{2.5}$ ($gd^{-1}$) | Average weight (kg) | 0.57 | 0.32 | modest | F.4-39 |

| Pollutant | Parameter | R | $R^2$ | Strength | Figure |
|---|---|---|---|---|---|
| $PM_{2.5}$ ($mgd^{-1}hd^{-1}$) | Average weight (kg) | 0.60 | 0.37 | modest | F.4-40 |
| $PM_{2.5}$ ($gd^{-1}$) | Live animal weight (kg) | 0.55 | 0.30 | modest | F.4-41 |
| $PM_{2.5}$ ($mgd^{-1}hd^{-1}$) | Live animal weight (kg) | 0.40 | 0.16 | slight or weak | F.4-42 |
| $PM_{2.5}$ ($gd^{-1}$) | Exhaust Temperature (°C) | 0.03 | 0.00 | slight or weak | F.4-43 |
| $PM_{2.5}$ ($mgd^{-1}hd^{-1}$) | Exhaust Temperature (°C) | -0.04 | 0.00 | slight or weak | F.4-44 |
| $PM_{2.5}$ ($gd^{-1}$) | Exhaust Relative humidity (%) | 0.12 | 0.01 | slight or weak | F.4-45 |
| $PM_{2.5}$ ($mgd^{-1}hd^{-1}$) | Exhaust Relative humidity (%) | 0.13 | 0.02 | slight or weak | F.4-46 |
| $PM_{2.5}$ ($gd^{-1}$) | Airflow ($dsm^3s^{-1}$) | 0.45 | 0.20 | modest | F.4-47 |
| $PM_{2.5}$ ($mgd^{-1}hd^{-1}$) | Airflow ($dsm^3s^{-1}$) | 0.44 | 0.20 | slight or weak | F.4-48 |
| TSP ($gd^{-1}$) | Inventory (hd) | 0.68 | 0.46 | moderate | F.4-49 |
| TSP ($mgd^{-1}hd^{-1}$) | Inventory (hd) | 0.25 | 0.06 | slight or weak | F.4-50 |
| TSP ($gd^{-1}$) | Average weight (kg) | 0.00 | 0.00 | slight or weak | F.4-51 |
| TSP ($mgd^{-1}hd^{-1}$) | Average weight (kg) | 0.27 | 0.07 | slight or weak | F.4-52 |
| TSP ($gd^{-1}$) | Live animal weight (kg) | 0.43 | 0.18 | slight or weak | F.4-53 |
| TSP ($mgd^{-1}hd^{-1}$) | Live animal weight (kg) | 0.37 | 0.14 | slight or weak | F.4-54 |
| TSP ($gd^{-1}$) | Exhaust Temperature (°C) | -0.12 | 0.01 | slight or weak | F.4-55 |
| TSP ($mgd^{-1}hd^{-1}$) | Exhaust Temperature (°C) | -0.03 | 0.00 | slight or weak | F.4-56 |
| TSP ($gd^{-1}$) | Exhaust Relative humidity (%) | -0.62 | 0.39 | modest | F.4-57 |
| TSP ($mgd^{-1}hd^{-1}$) | Exhaust Relative humidity (%) | -0.52 | 0.27 | modest | F.4-58 |
| TSP ($gd^{-1}$) | Airflow ($dsm^3s^{-1}$) | 0.22 | 0.05 | slight or weak | F.4-59 |
| TSP ($mgd^{-1}hd^{-1}$) | Airflow ($dsm^3s^{-1}$) | 0.26 | 0.07 | slight or weak | F.4-60 |

### *F.4.1.1 Ammonia ($NH_3$)*

F.4.1.1.1 Inventory

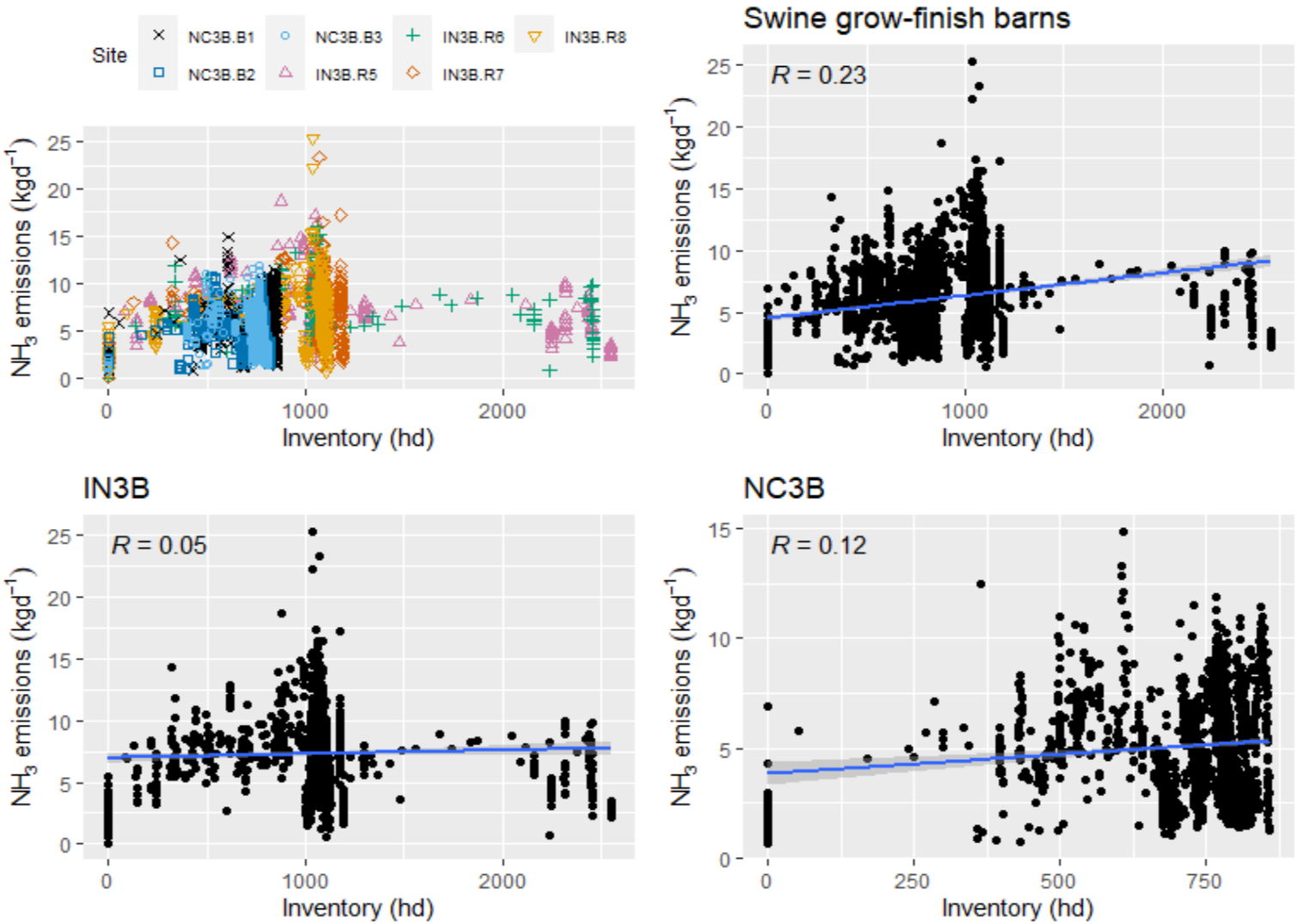


**Figure F.4-1. Scatter plot of swine grow-finish barns $NH_3$ emissions (kg $d^{-1}$) versus Inventory.**

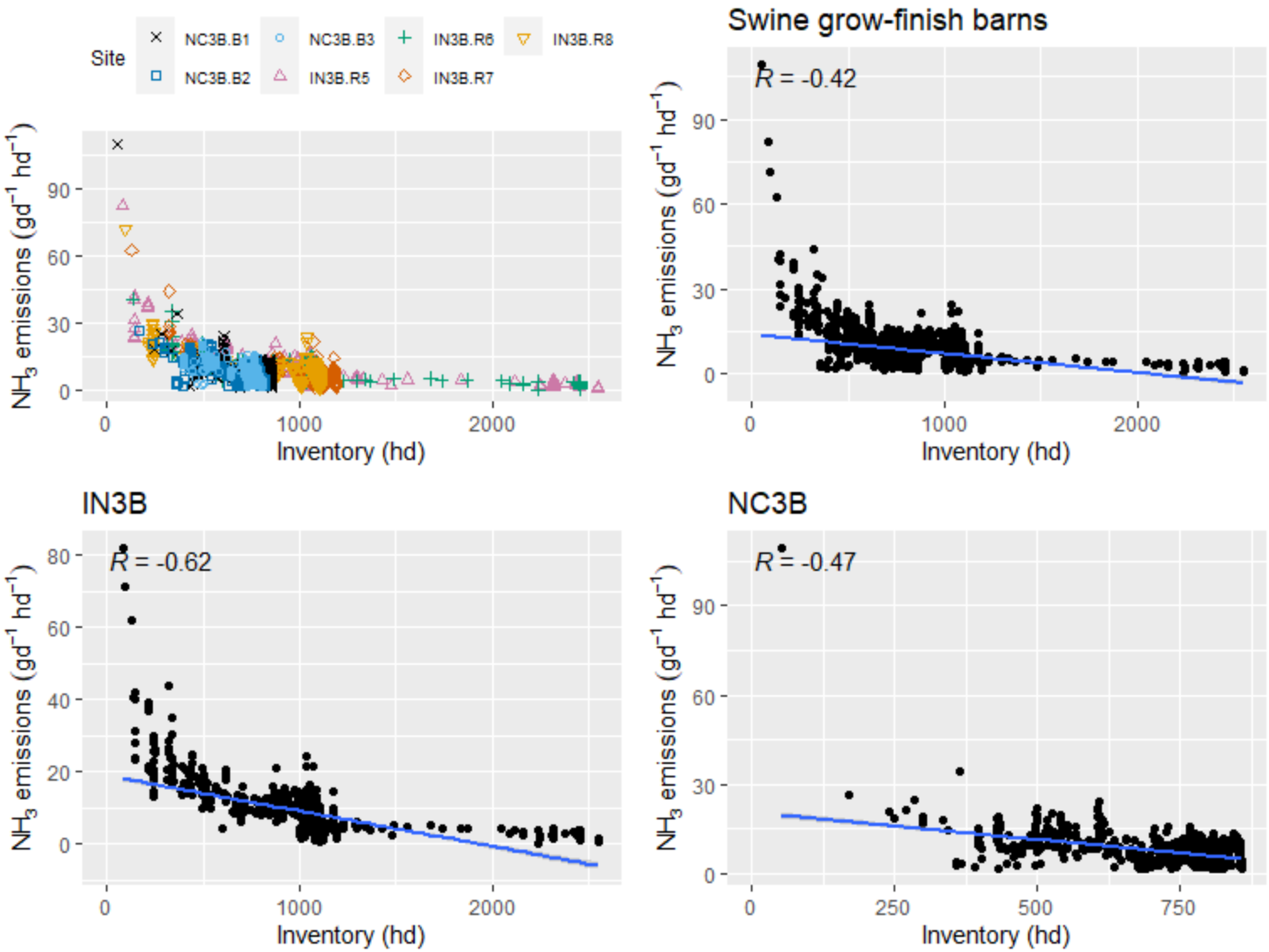


**Figure F.4-2. Scatter plot of swine grow-finish barns $NH_3$ emissions (g $d^{-1}hd^{-1}$) versus Inventory.**

F.4.1.1.2 Average animal weight

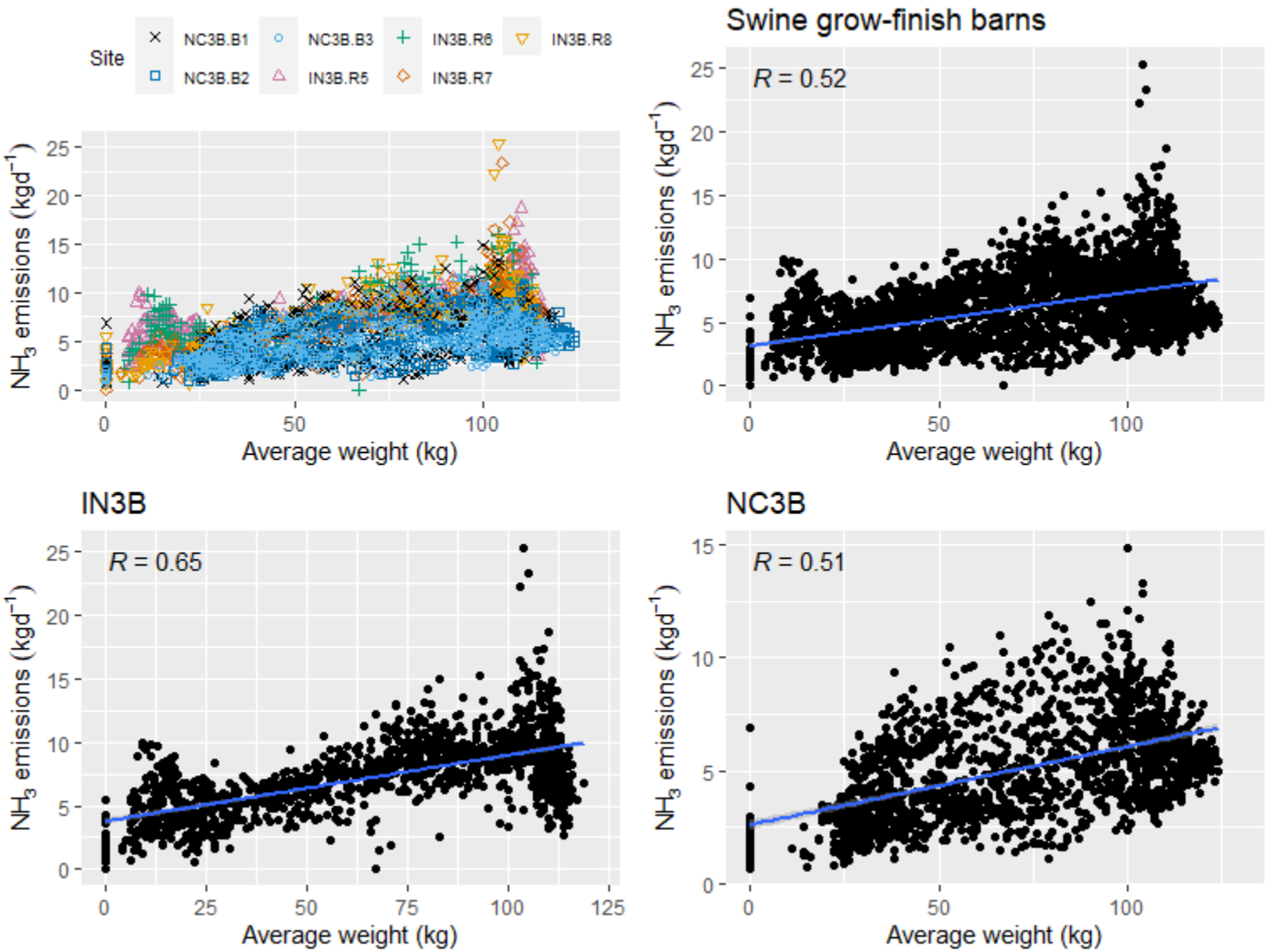


**Figure F.4-3. Scatter plot of swine grow-finish barns $NH_3$ emissions (kg $d^{-1}$) versus average animal weight.**

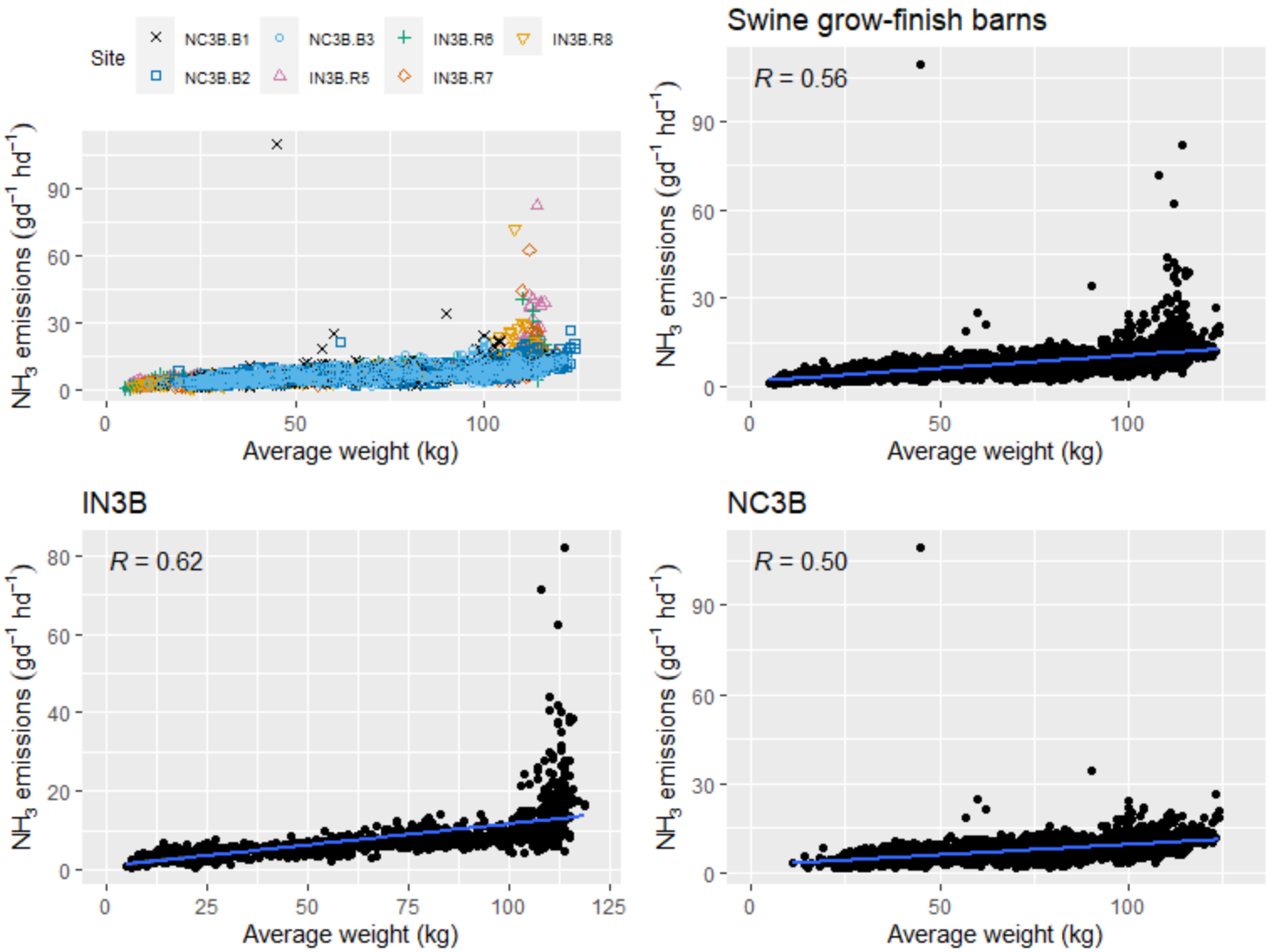


**Figure F.4-4. Scatter plot of swine grow-finish barns $NH_3$ emissions (g $d^{-1}hd^{-1}$) versus average animal weight.**

F.4.1.1.3 Live animal weight

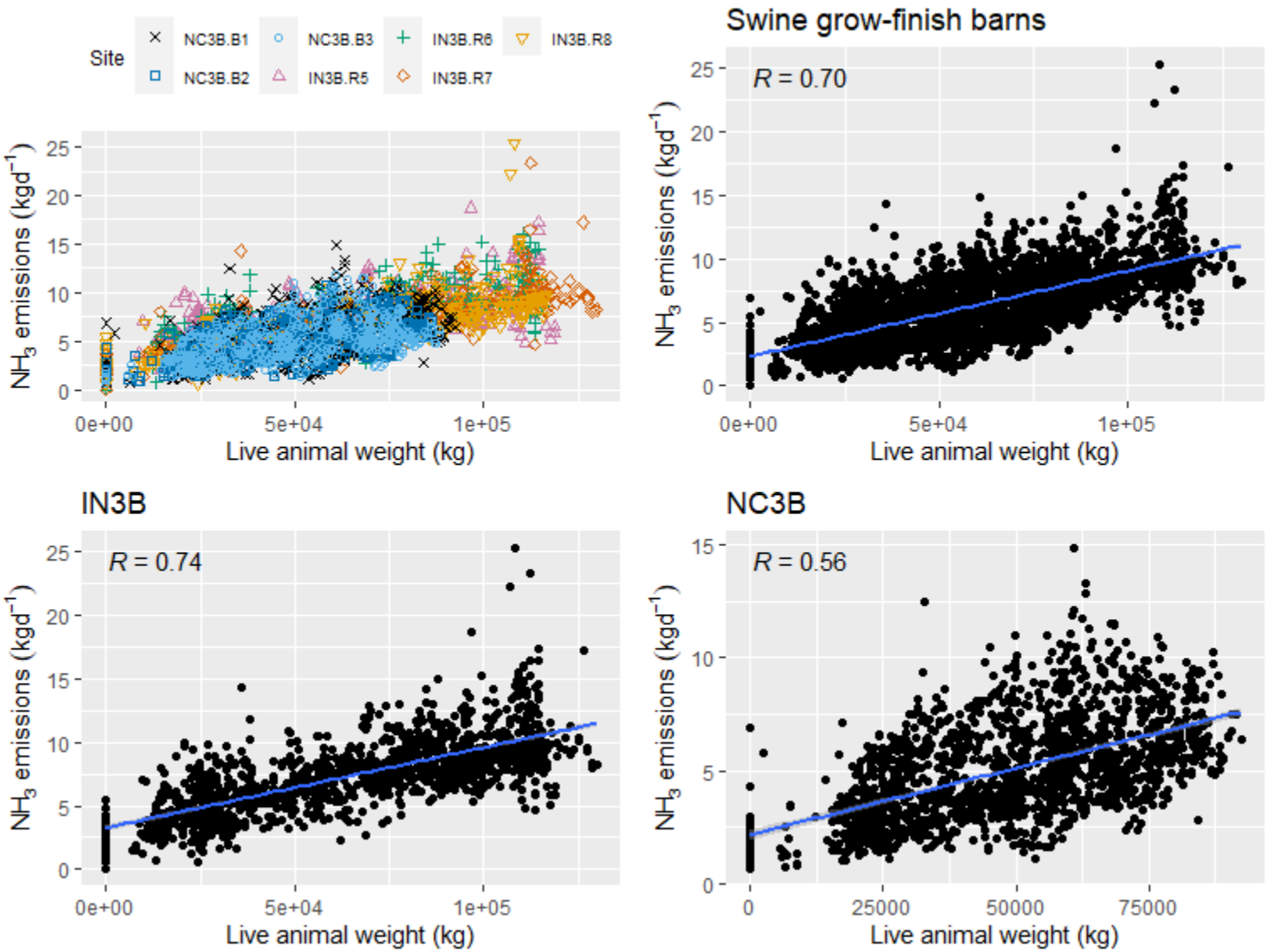


**Figure F.4-5. Scatter plot of swine grow-finish barns $NH_3$ emissions (kg $d^{-1}$) versus live animal weight.**

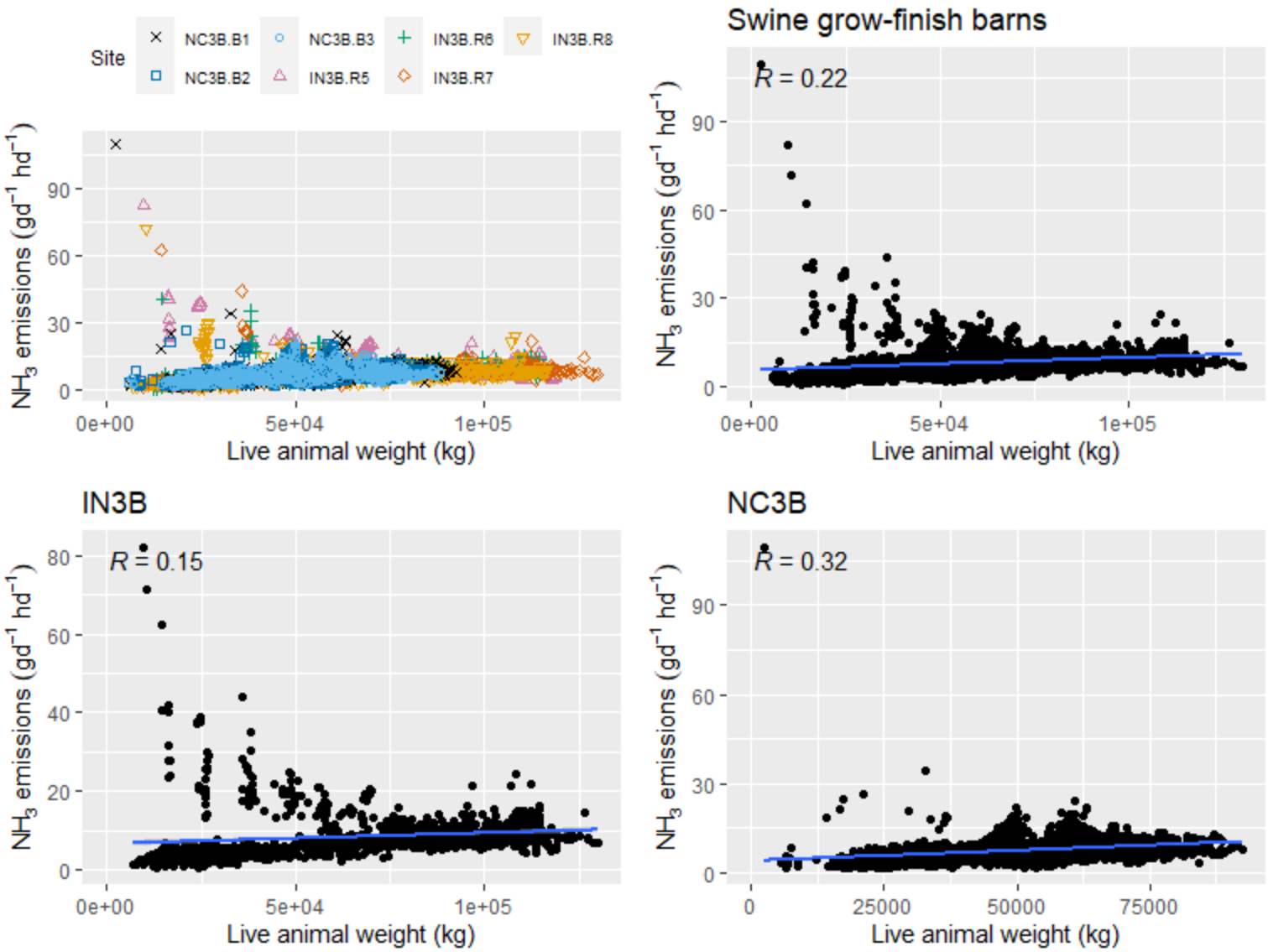


**Figure F.4-6. Scatter plot of swine grow-finish barns $NH_3$ emissions (g $d^{-1}hd^{-1}$) versus live animal weight.**

F.4.1.1.4 Exhaust temperature

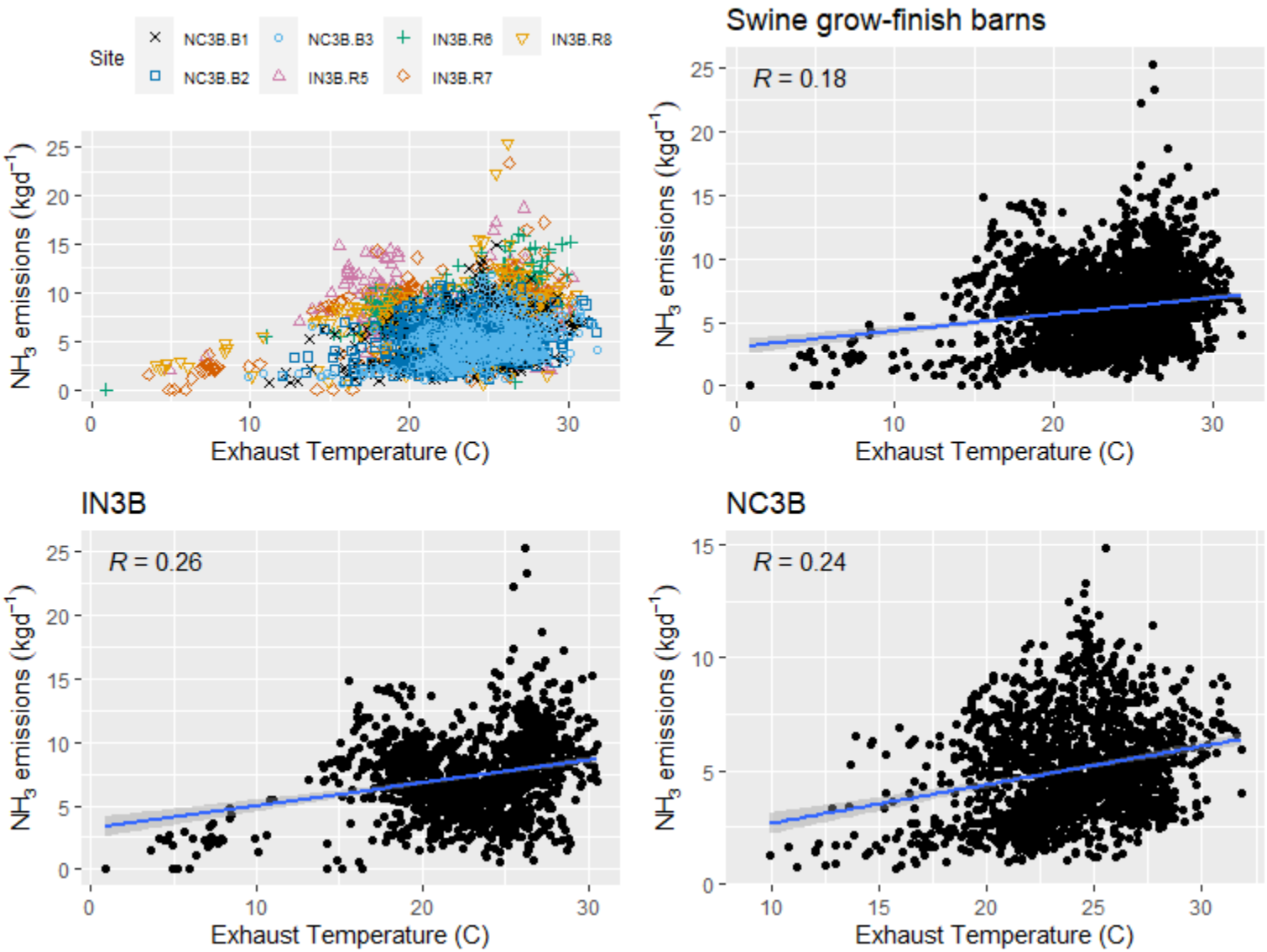


**Figure F.4-7. Scatter plot of swine grow-finish barns $NH_3$ emissions (kg $d^{-1}$) versus exhaust temperature.**

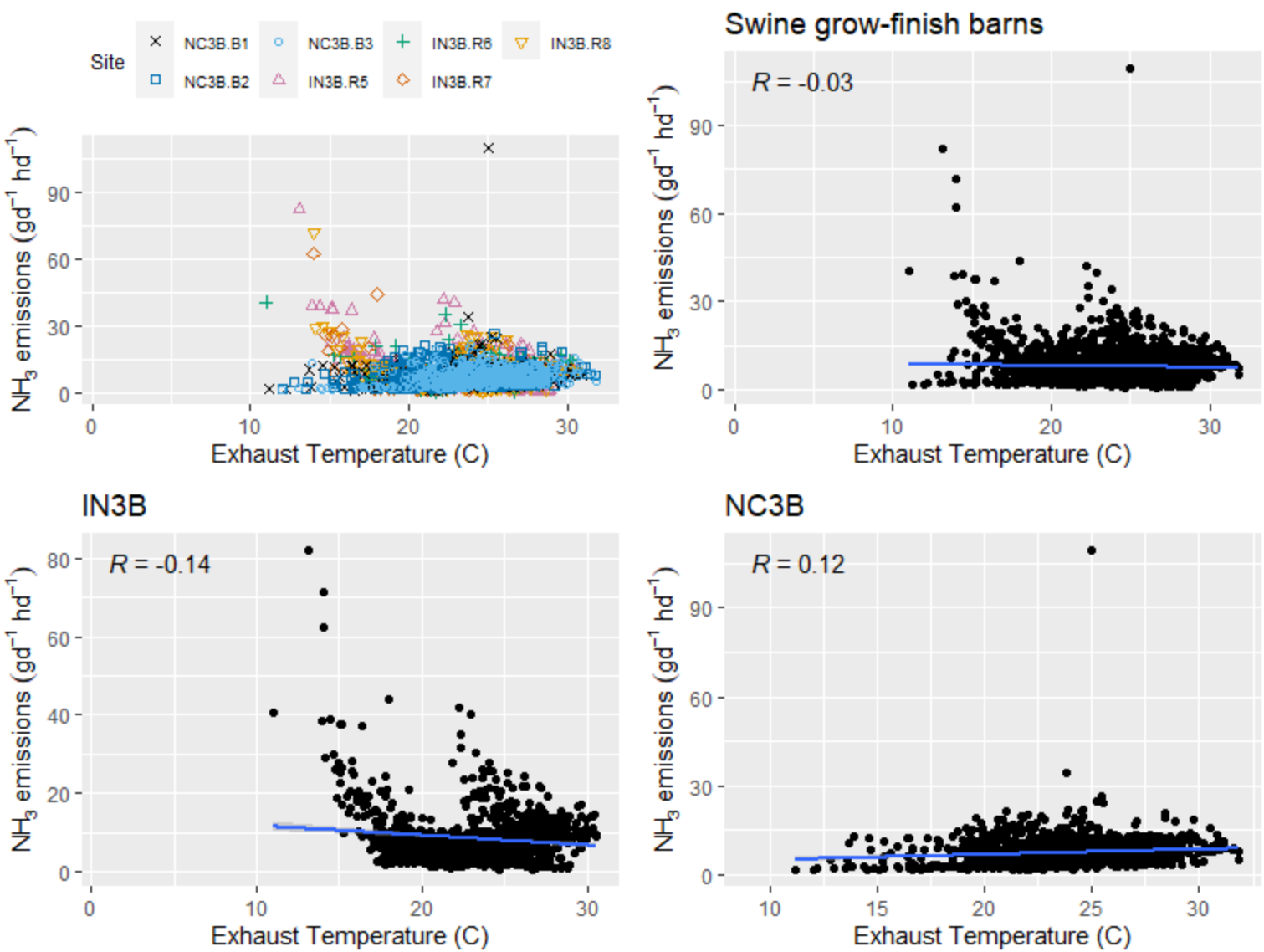


**Figure F.4-8. Scatter plot of swine grow-finish barns $NH_3$ emissions (g $d^{-1}hd^{-1}$) versus exhaust temperature.**

F.4.1.1.5 Exhaust relative humidity

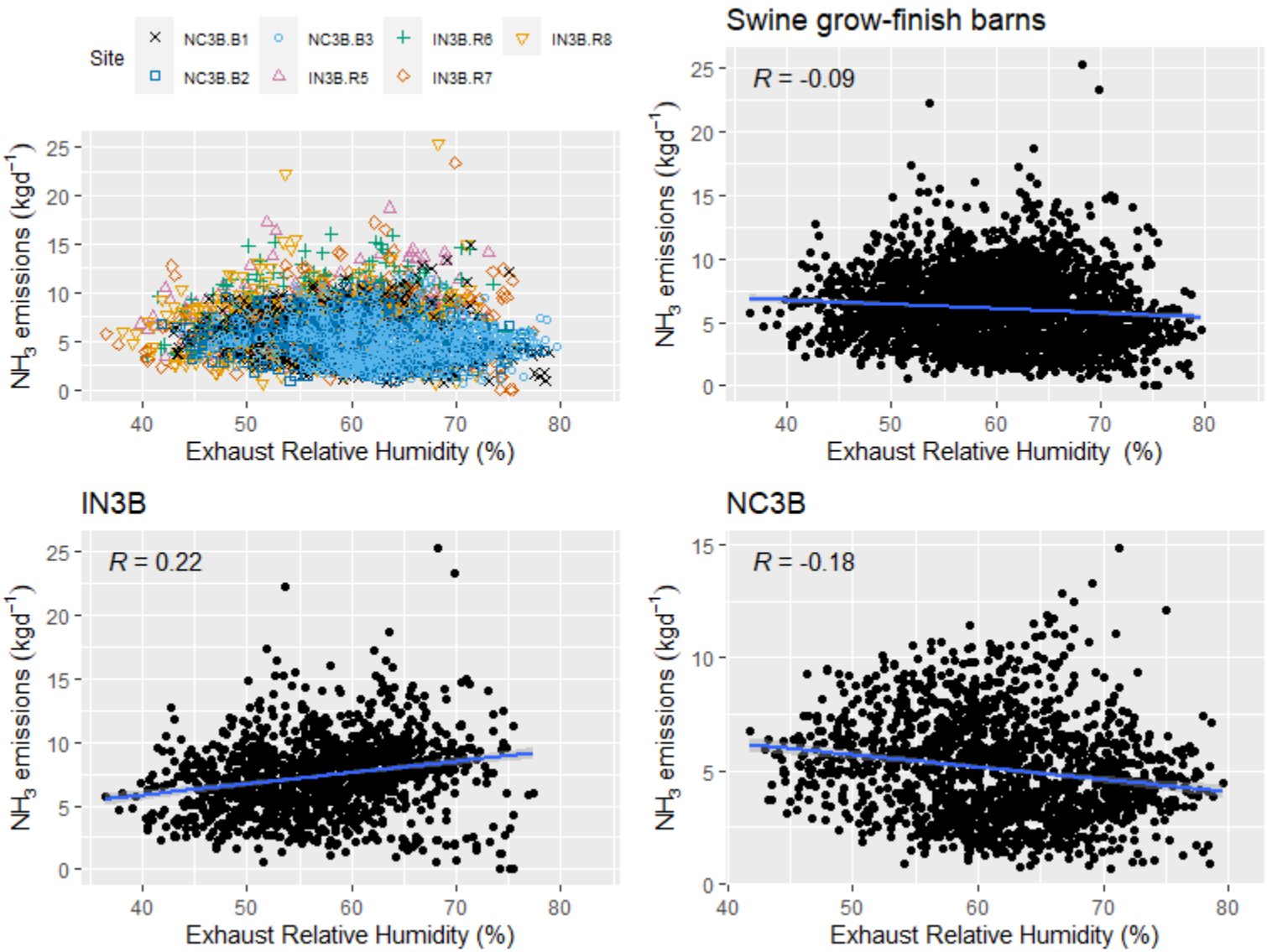


**Figure F.4-9. Scatter plot of swine grow-finish barns $NH_3$ emissions (kg $d^{-1}$) versus exhaust relative humidity.**

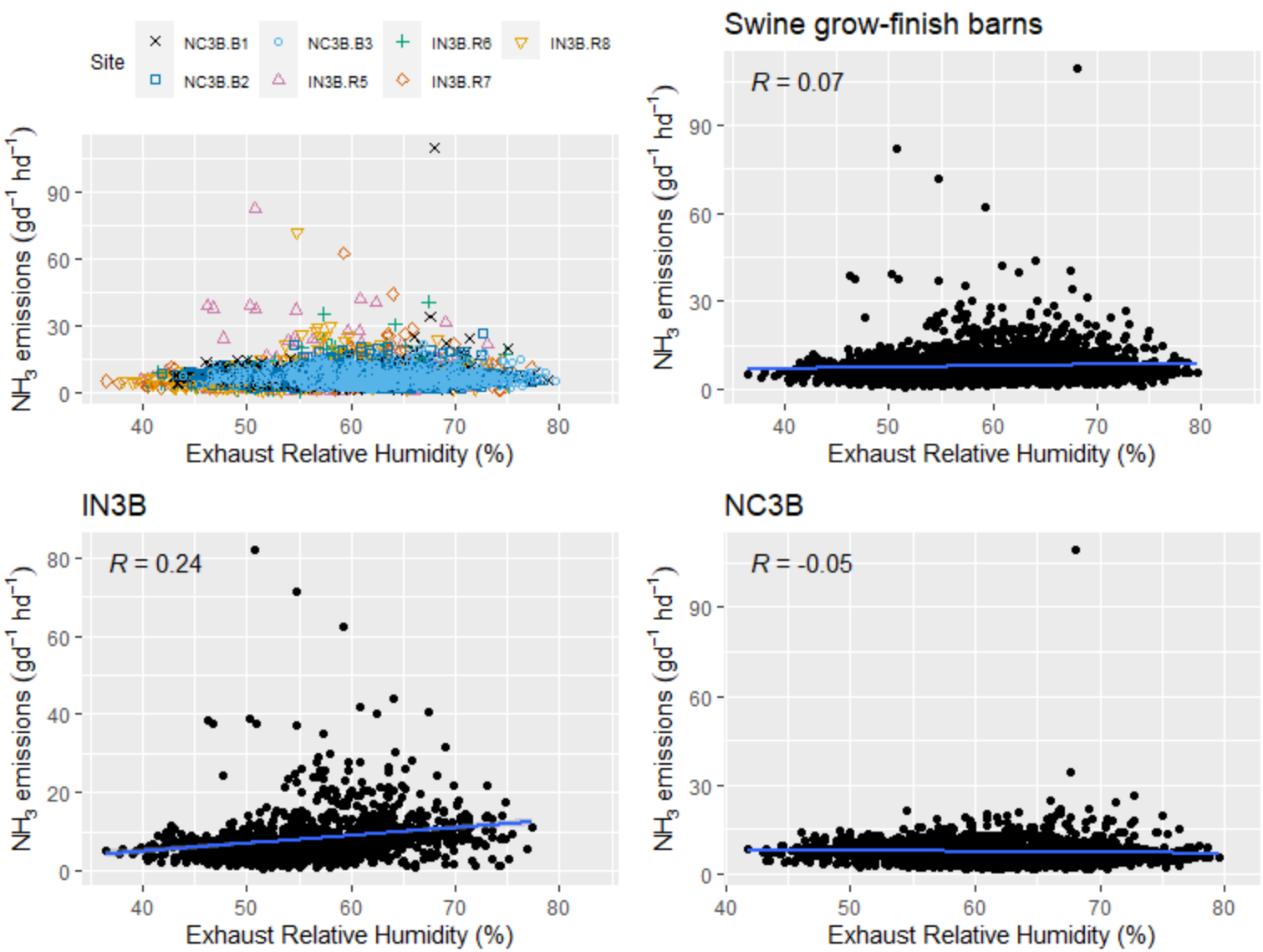


**Figure F.4-10. Scatter plot of swine grow-finish barns $NH_3$ emissions (g $d^{-1}hd^{-1}$) versus exhaust relative humidity.**

F.4.1.1.6 Airflow

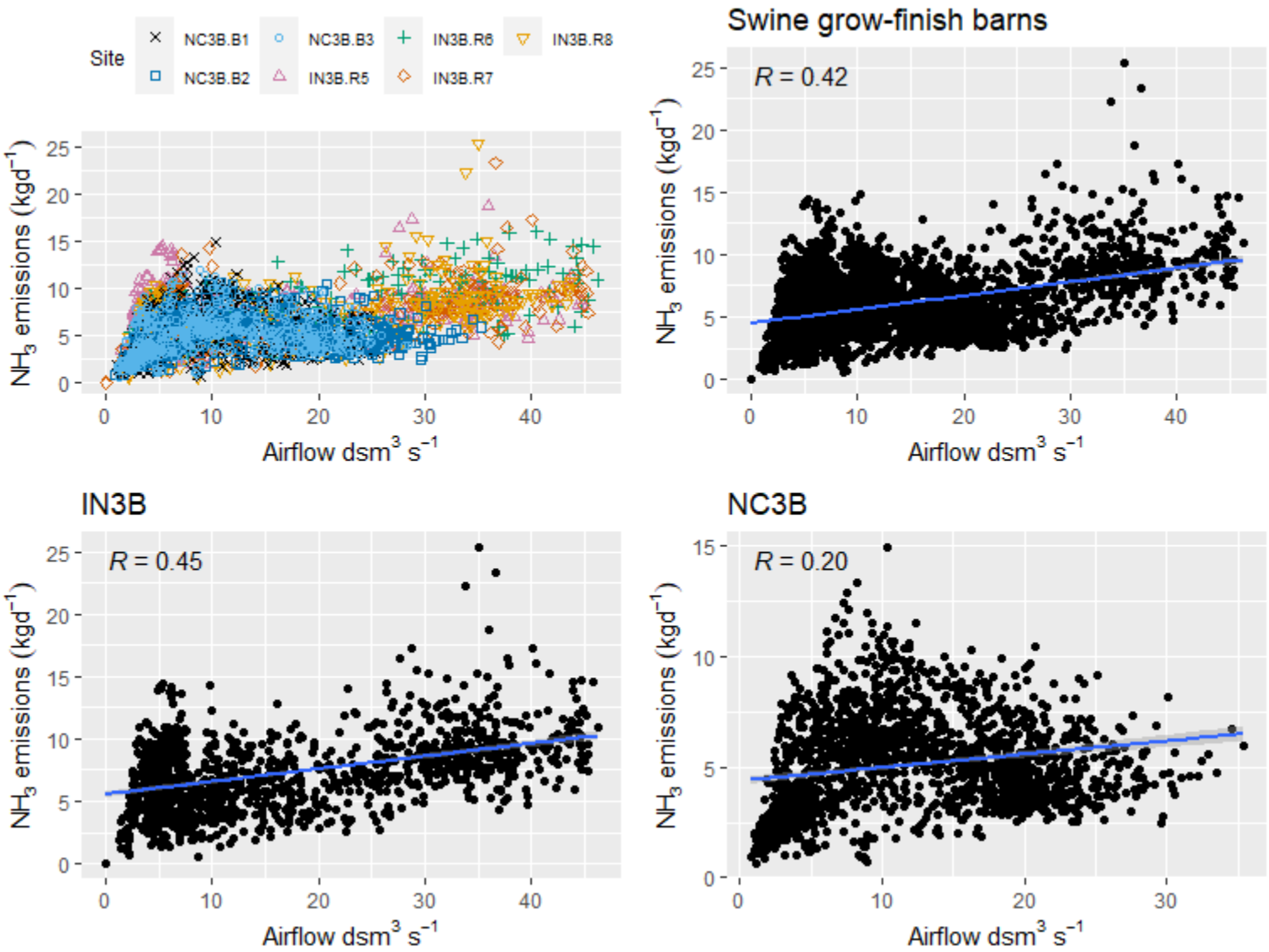


**Figure F.4-11. Scatter plot of swine grow-finish barns $NH_3$ emissions (kg $d^{-1}$) versus airflow.**

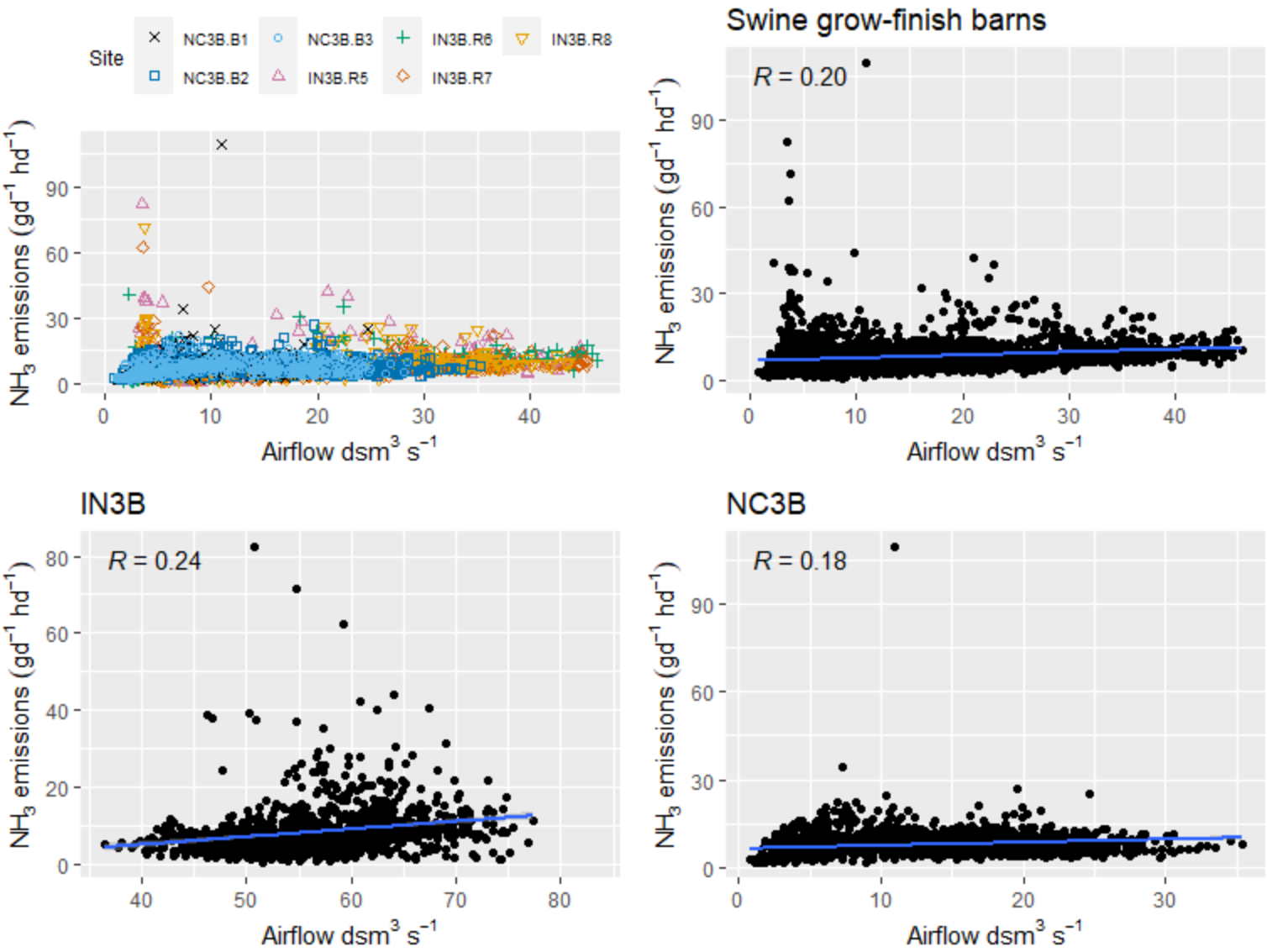


**Figure F.4-12. Scatter plot of swine grow-finish barns $NH_3$ emissions (g $d^{-1}hd^{-1}$) versus airflow.**

### *F.4.1.2 Hydrogen Sulfide ($H_2S$)*

F.4.1.2.1 Inventory

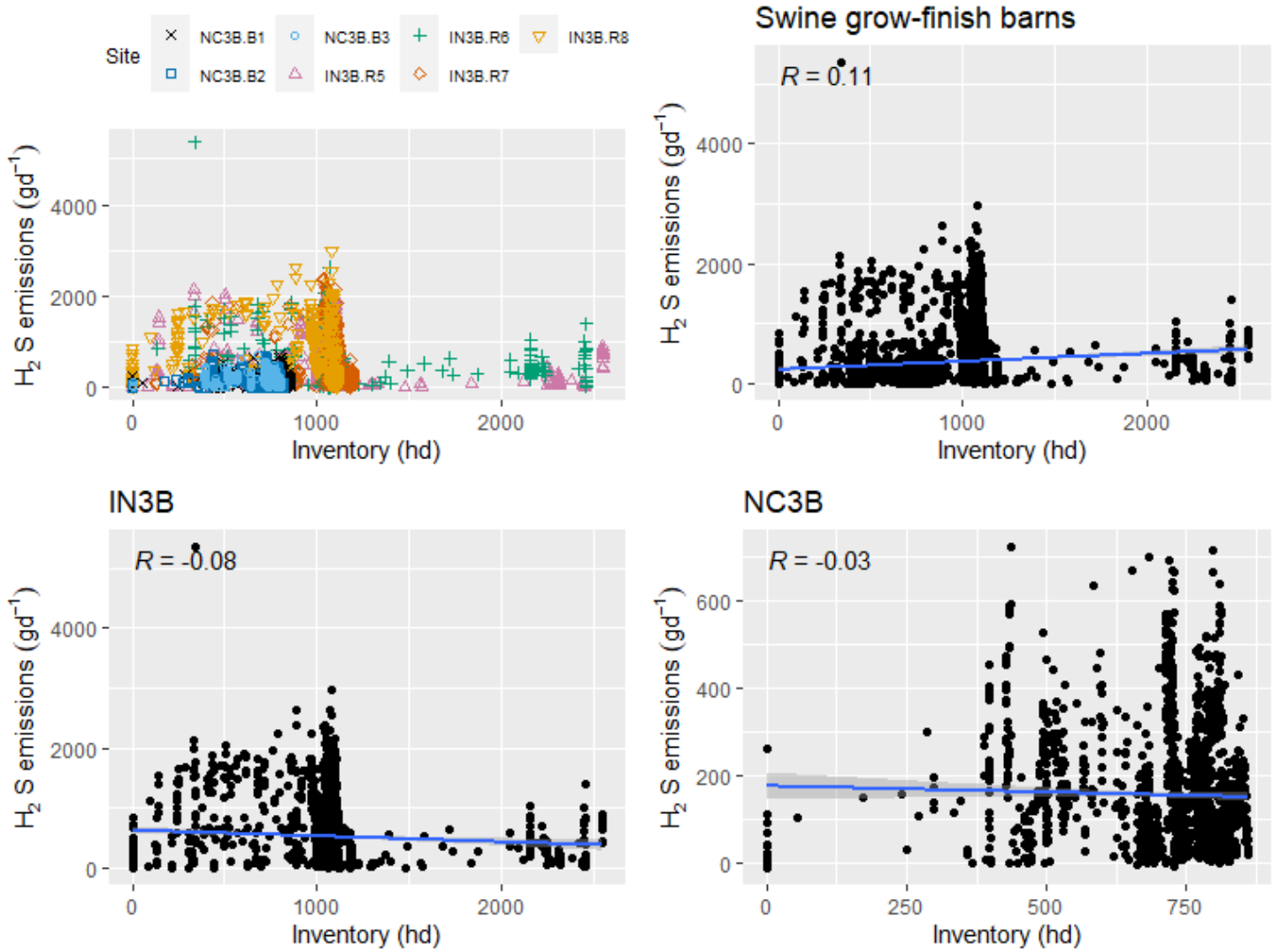


**Figure F.4-13. Scatter plot of swine grow-finish barns $H_2S$ emissions (g $d^{-1}$) versus Inventory.**

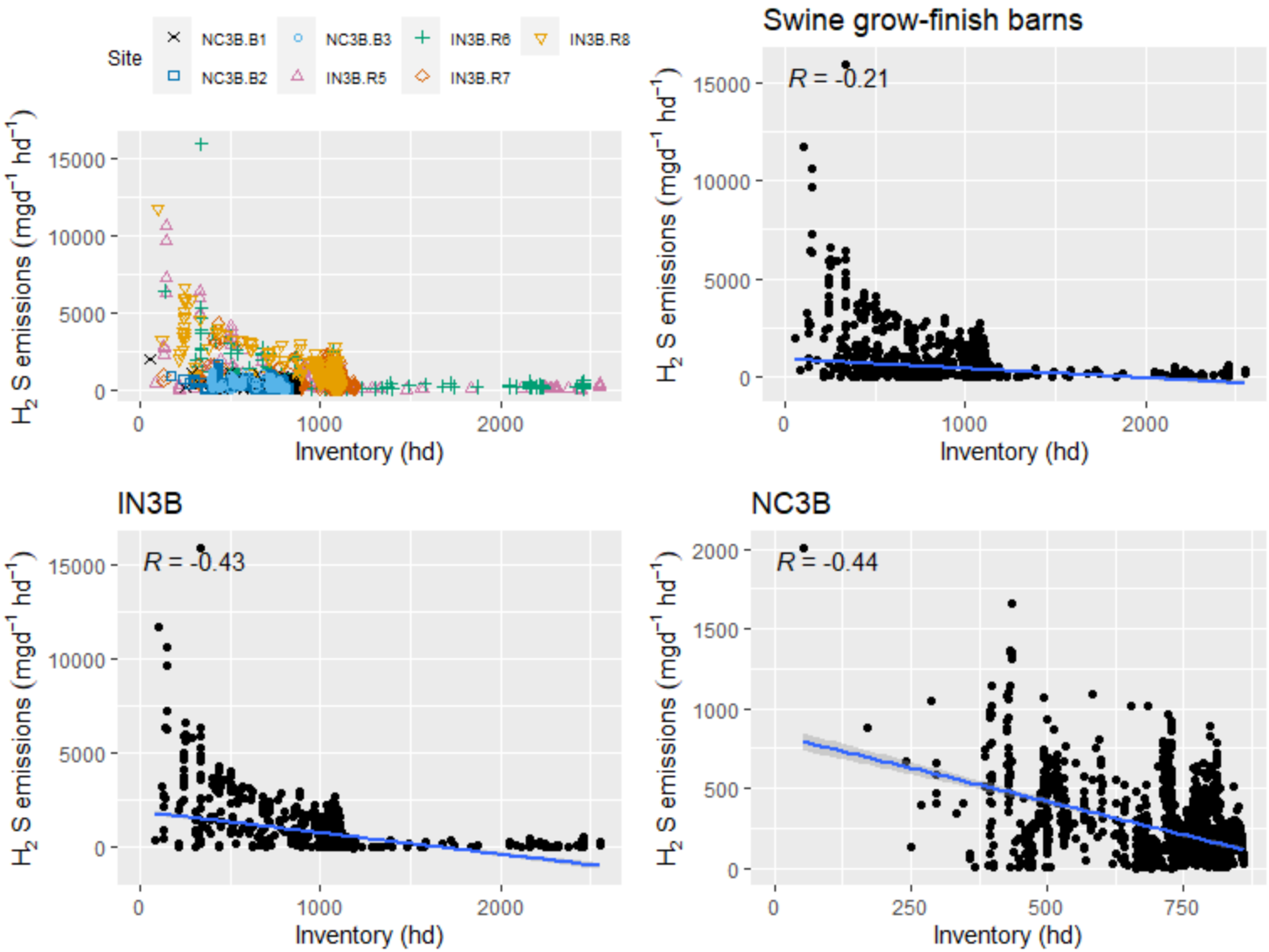


**Figure F.4-14. Scatter plot of swine grow-finish barns $H_2S$ emissions (mg $d^{-1}hd^{-1}$) versus Inventory.**

F.4.1.2.2 Average animal weight

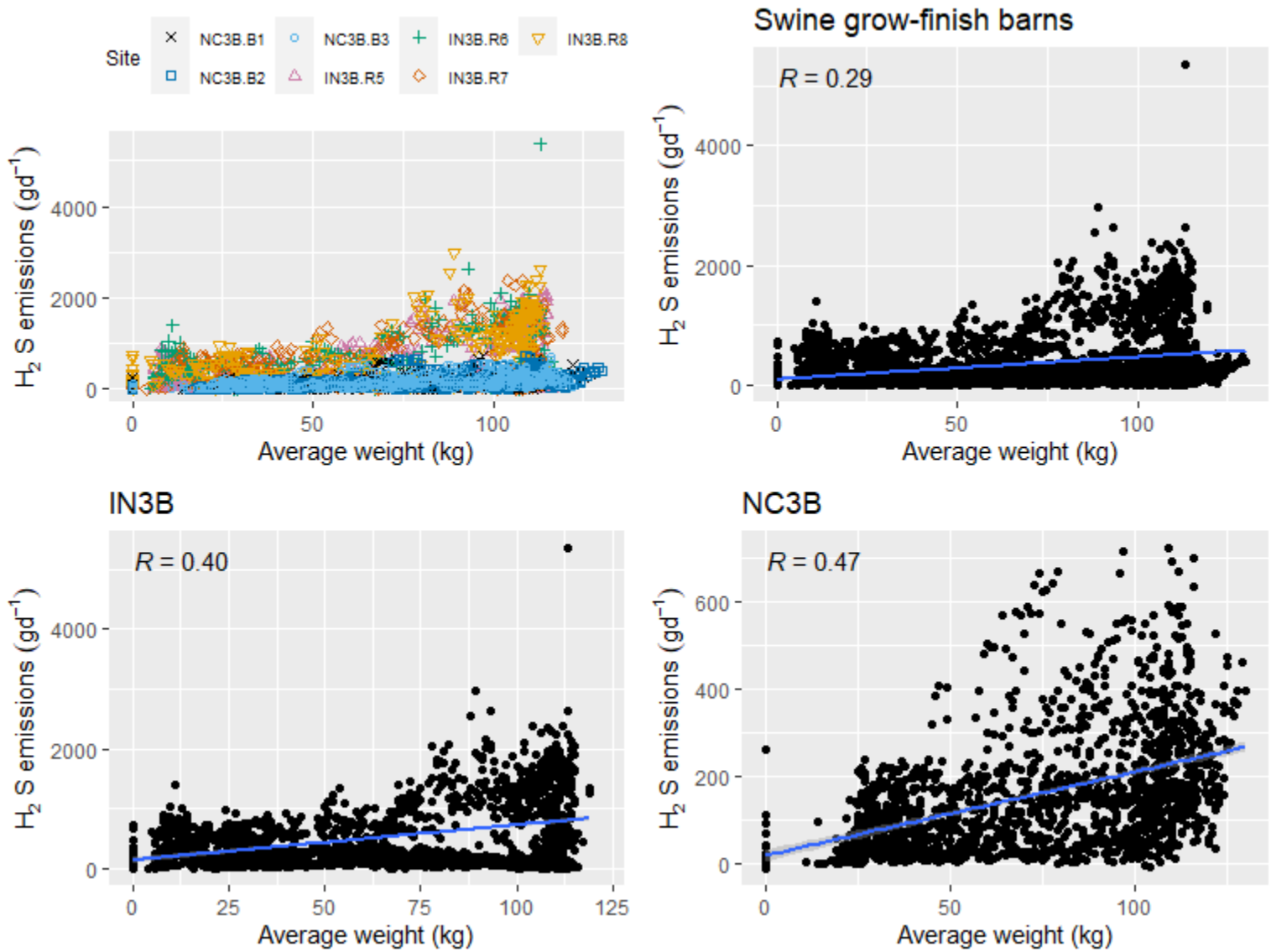


**Figure F.4-15. Scatter plot of swine grow-finish barns $H_2S$ emissions (g $d^{-1}$) versus average animal weight.**

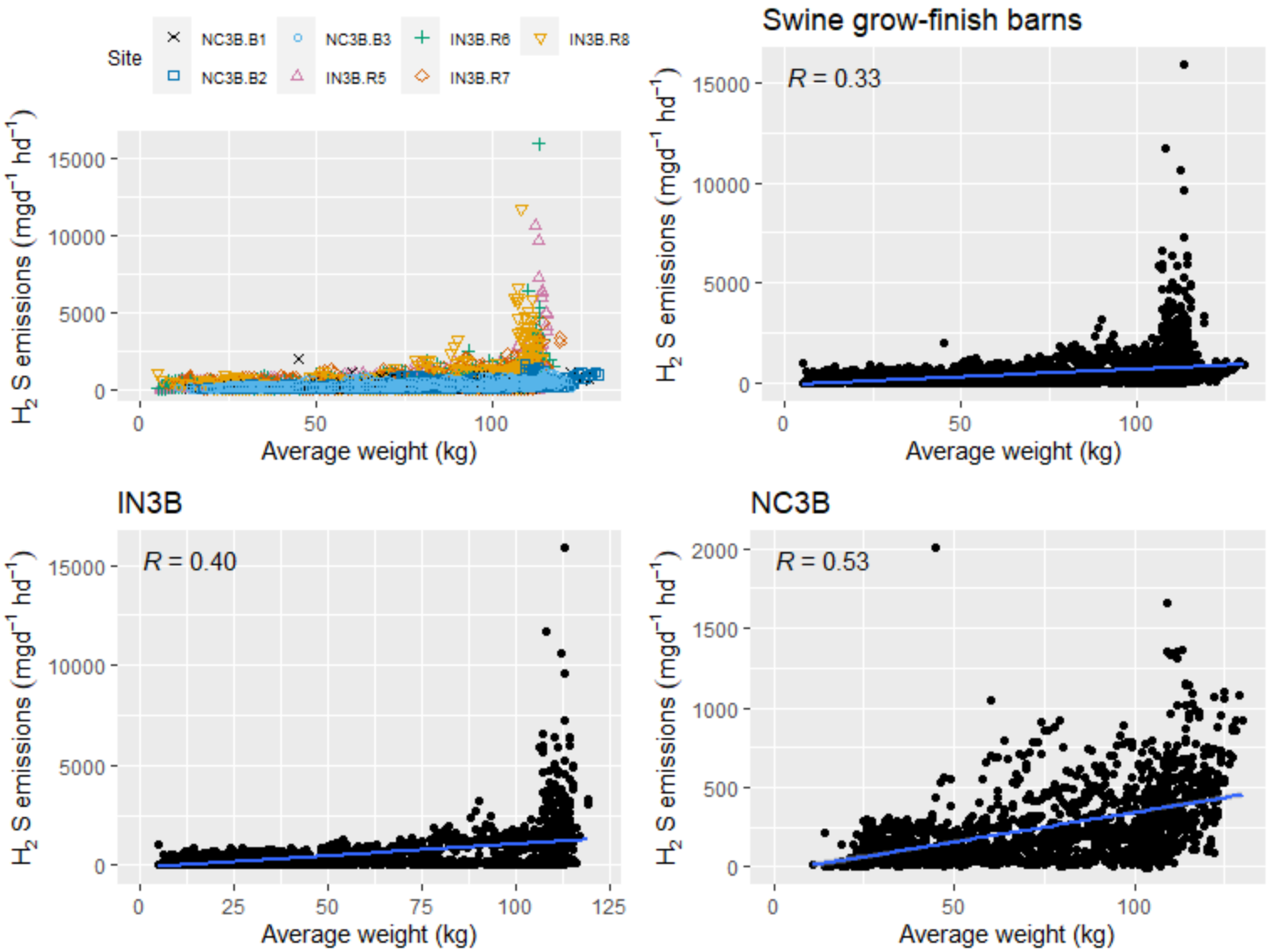


**Figure F.4-16. Scatter plot of swine grow-finish barns $H_2S$ emissions (mg $d^{-1}hd^{-1}$) versus average animal weight.**

F.4.1.2.3 Live animal weight

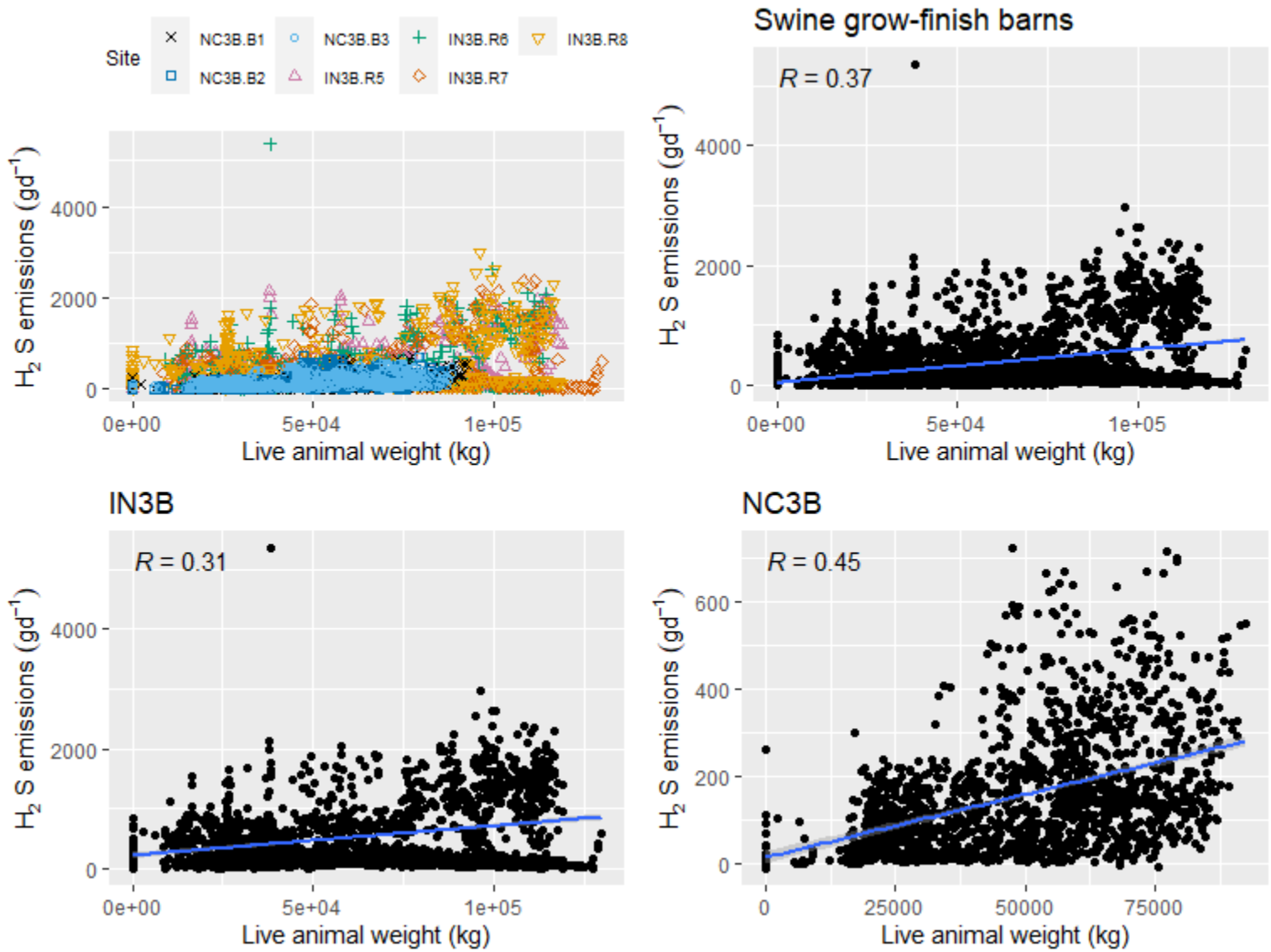


**Figure F.4-17. Scatter plot of swine grow-finish barns $H_2S$ emissions (g $d^{-1}$)versus live animal weight.**

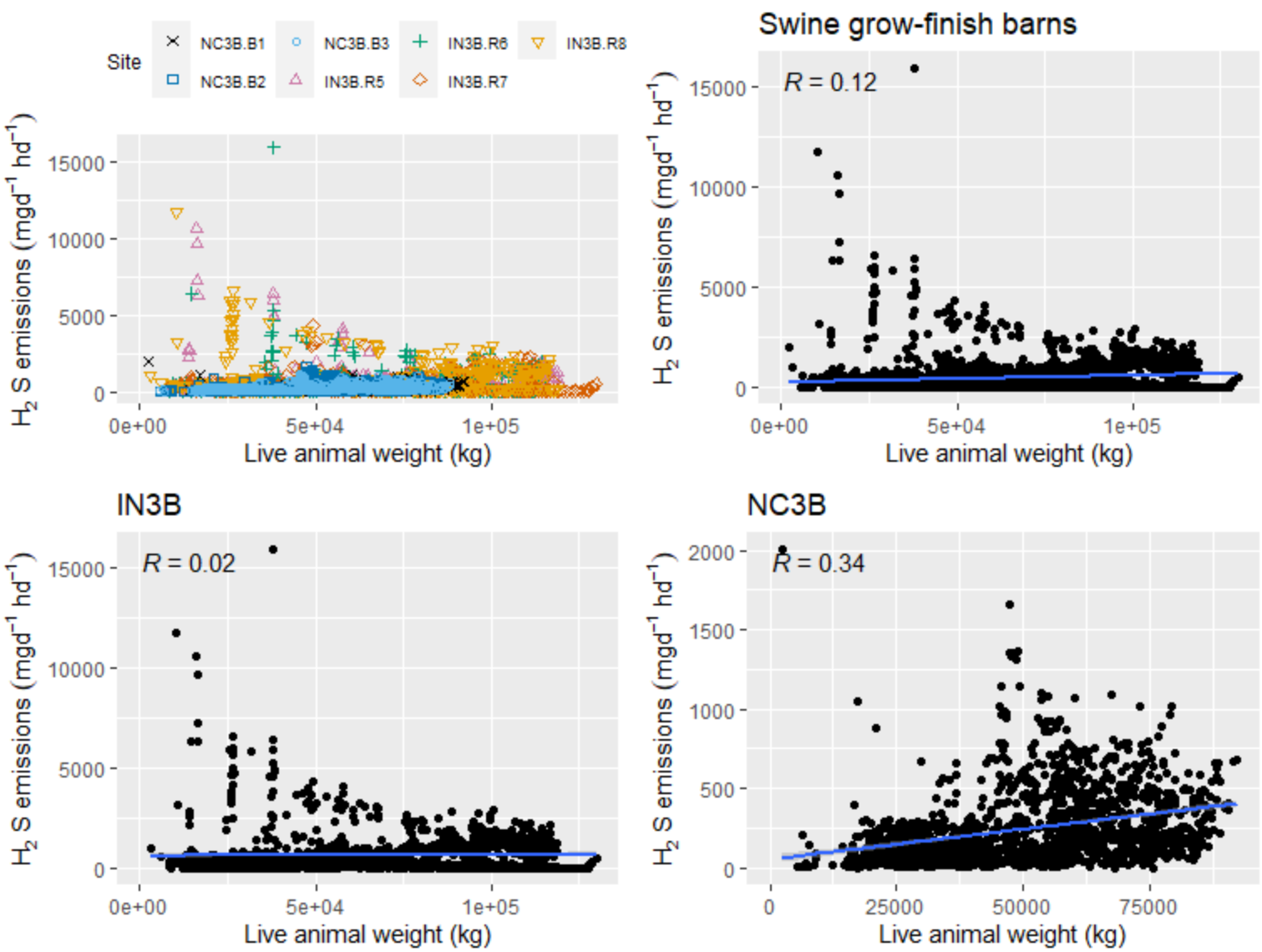


**Figure F.4-18. Scatter plot of swine grow-finish barns $H_2S$ emissions (mg $d^{-1}hd^{-1}$) versus live animal weight.**

F.4.1.2.4 Exhaust temperature

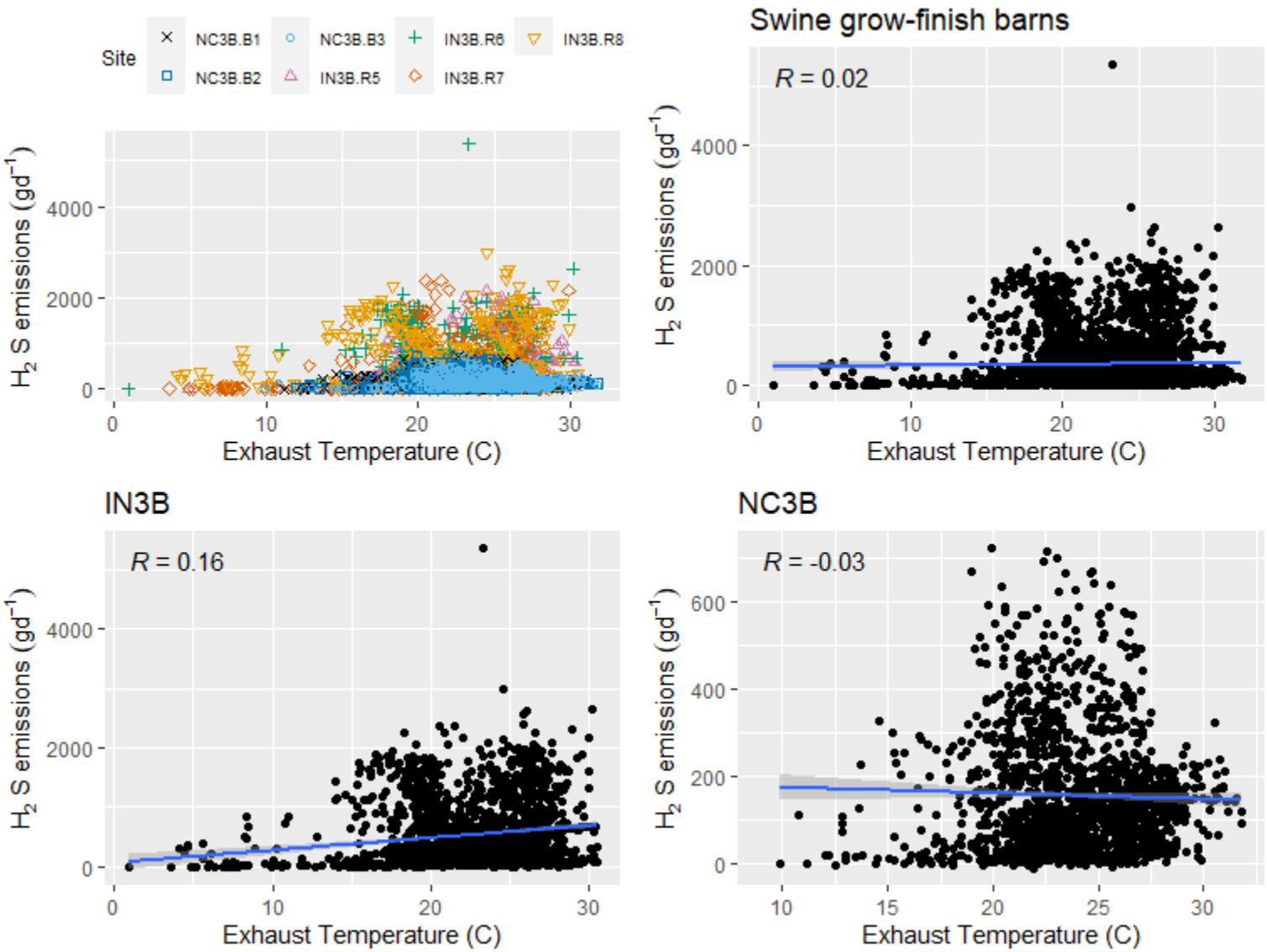


**Figure F.4-19. Scatter plot of swine grow-finish barns $H_2S$ emissions (g $d^{-1}$) versus exhaust temperature.**

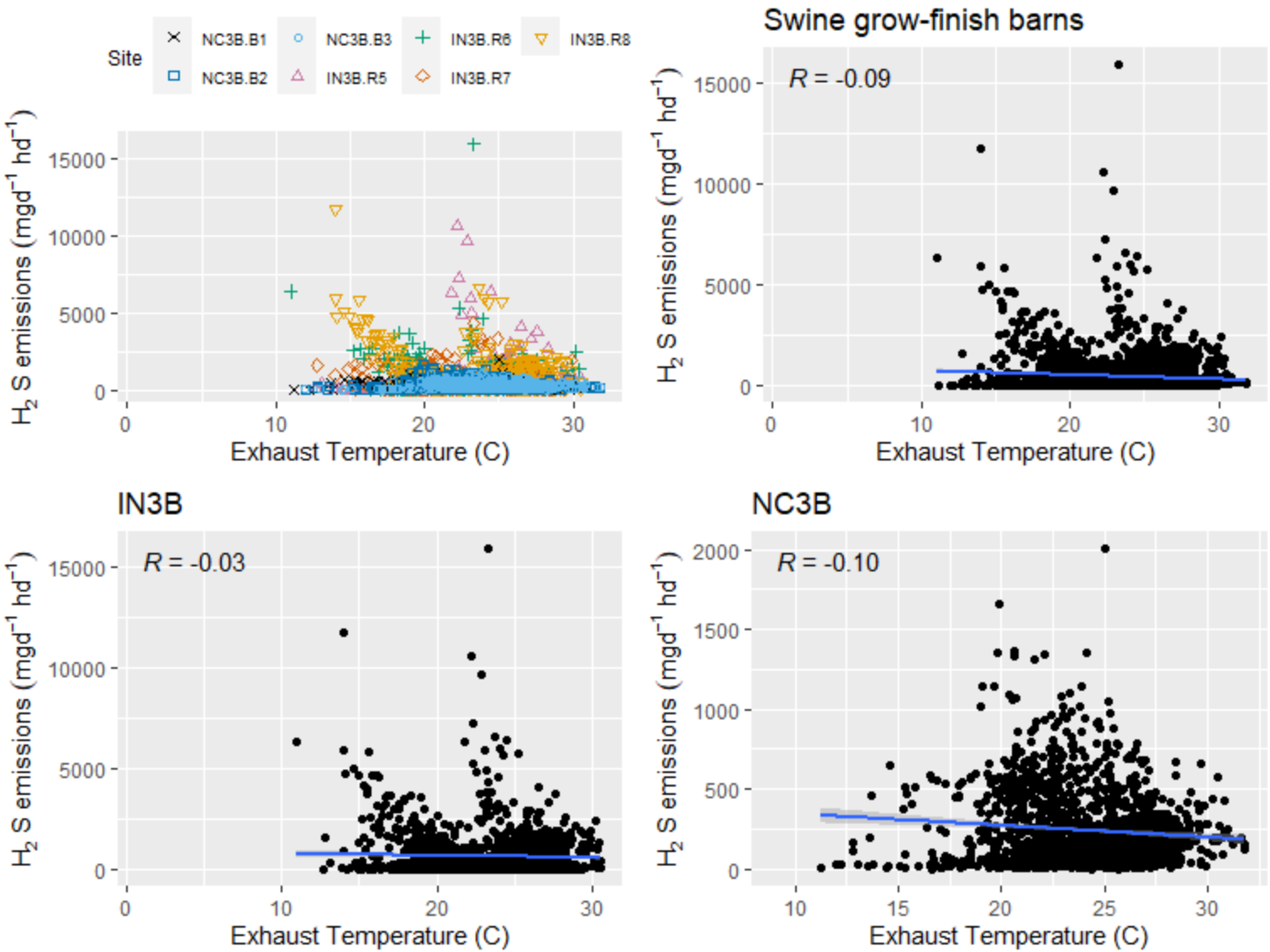


**Figure F.4-20. Scatter plot of swine grow-finish barns $H_2S$ emissions (mg $d^{-1}hd^{-1}$) versus exhaust temperature.**

F.4.1.2.5 Exhaust relative humidity

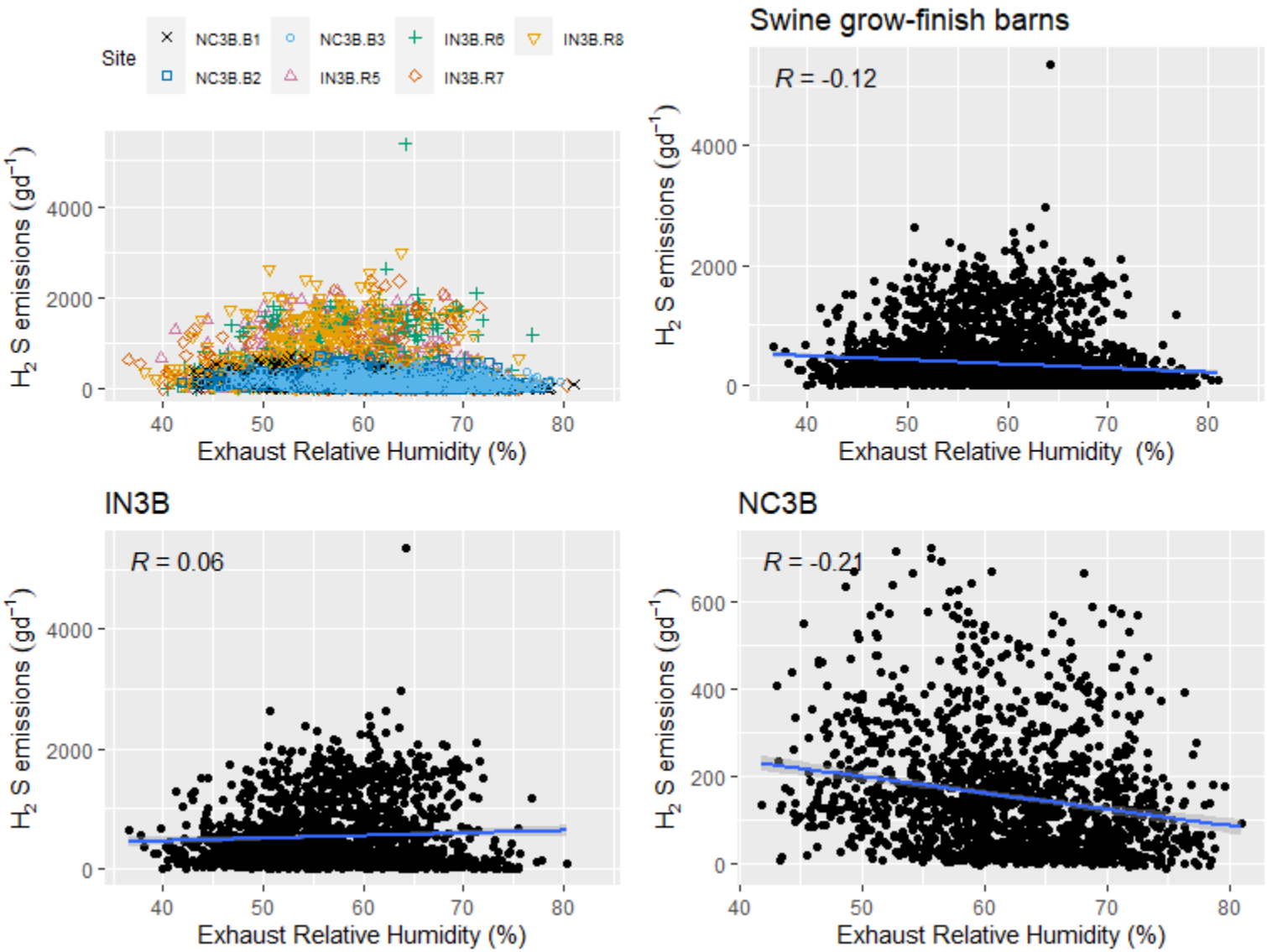


**Figure F.4-21. Scatter plot of swine grow-finish barns $H_2S$ emissions (g $d^{-1}$) versus exhaust relative humidity.**

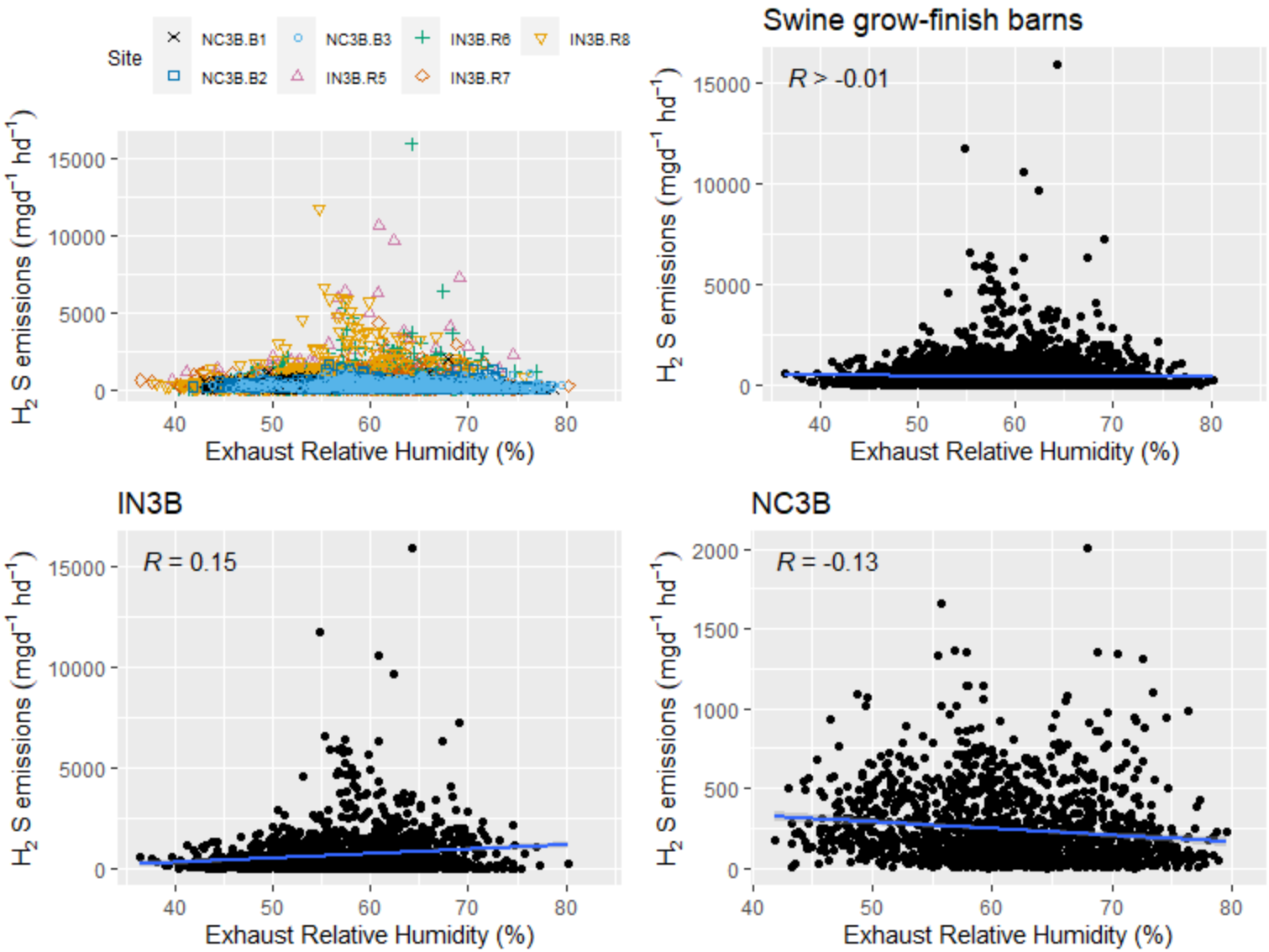


**Figure F.4-22. Scatter plot of swine grow-finish barns $H_2S$ emissions (mg $d^{-1}hd^{-1}$) versus exhaust relative humidity.**

F.4.1.2.6 Airflow

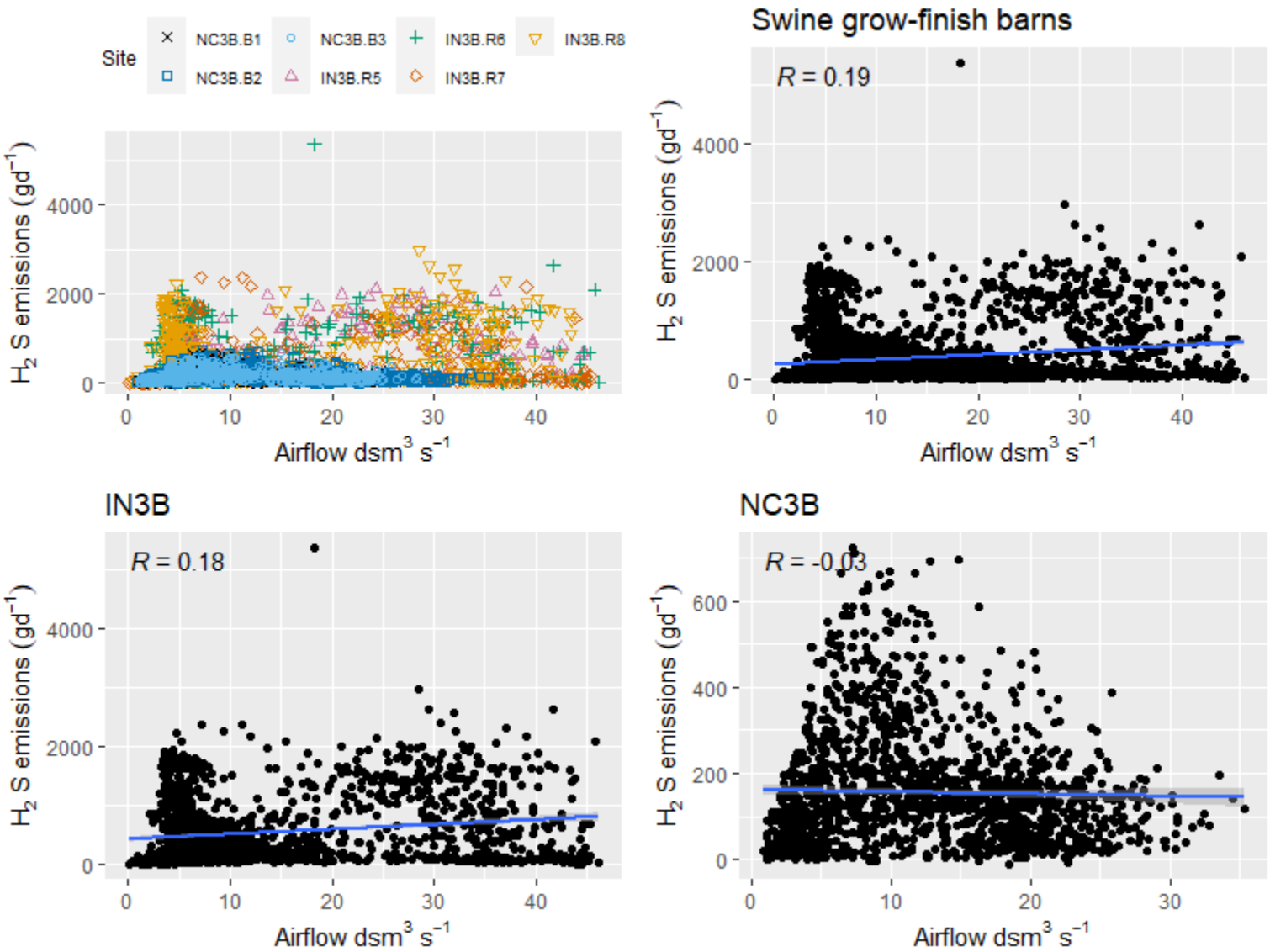


**Figure F.4-23. Scatter plot of swine grow-finish barns $H_2S$ emissions (g $d^{-1}$) versus airflow.**

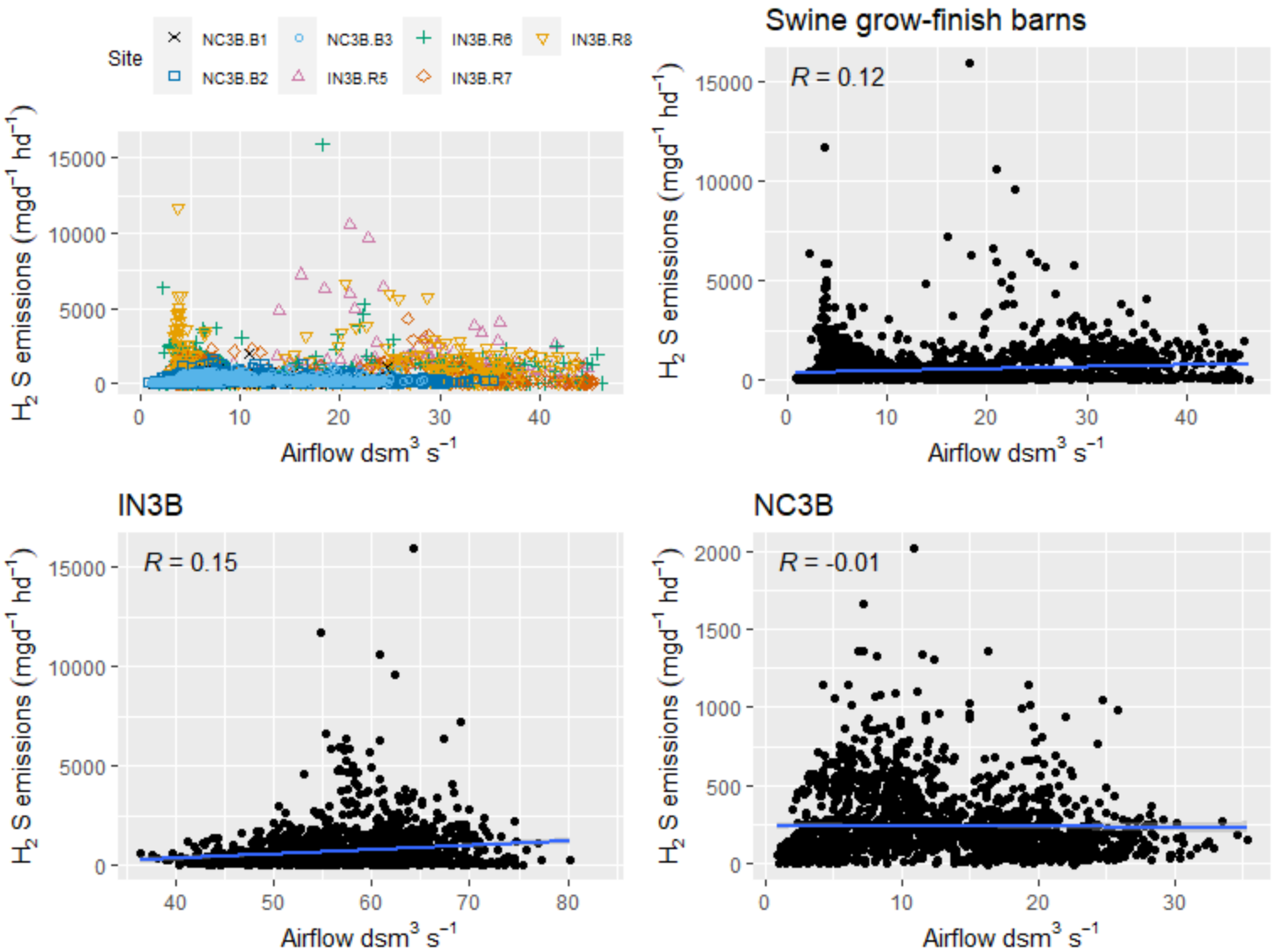


**Figure F.4-24. Scatter plot of swine grow-finish barns $H_2S$ emissions (mg $d^{-1}hd^{-1}$) versus airflow.**

### *F.4.1.3 Particulate Matter ($PM_{10}$)*

F.4.1.3.1 Inventory

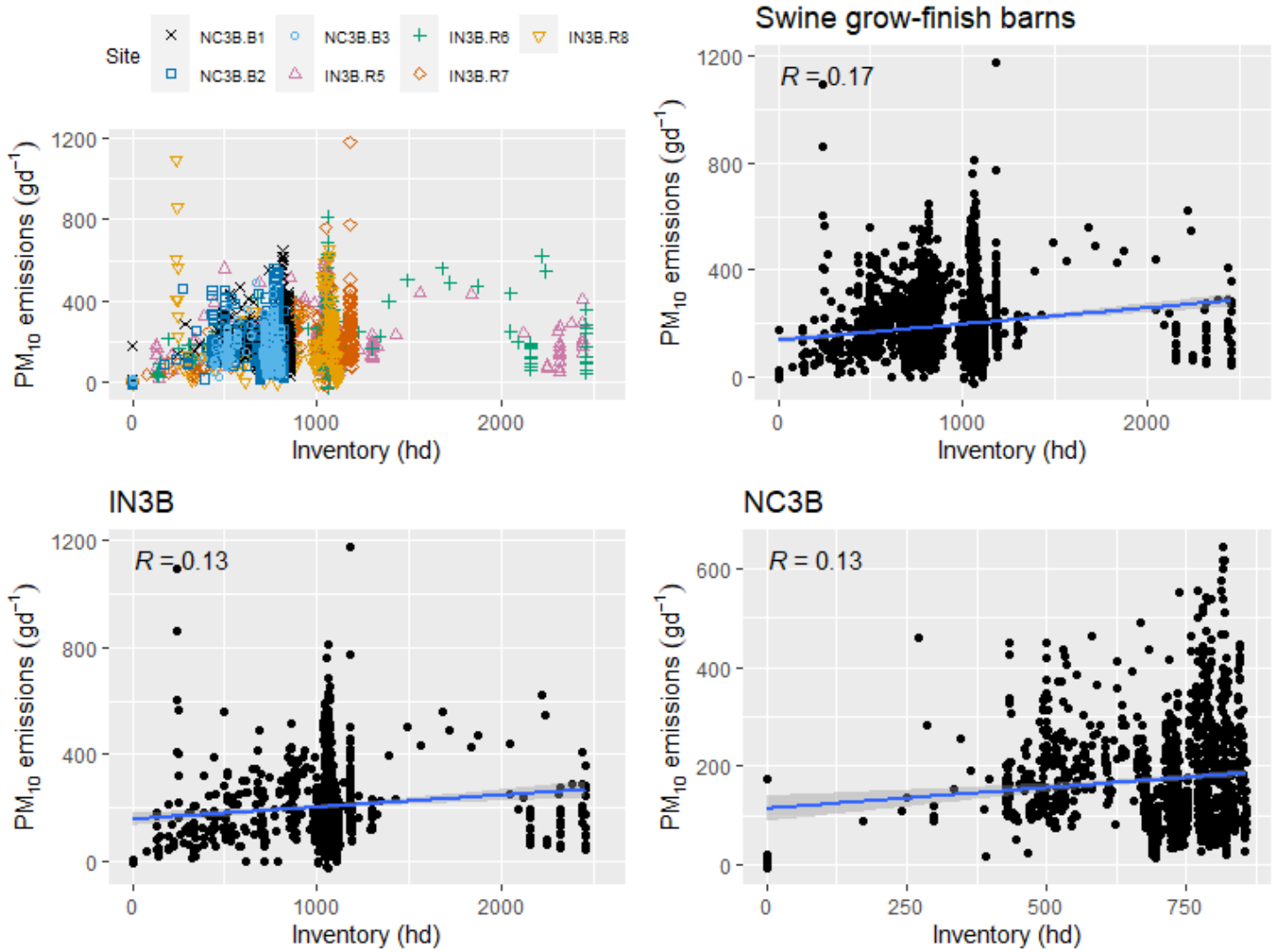


**Figure F.4-25. Scatter plot of swine grow-finish barns $PM_{10}$ emissions (g $d^{-1}$) versus Inventory.**

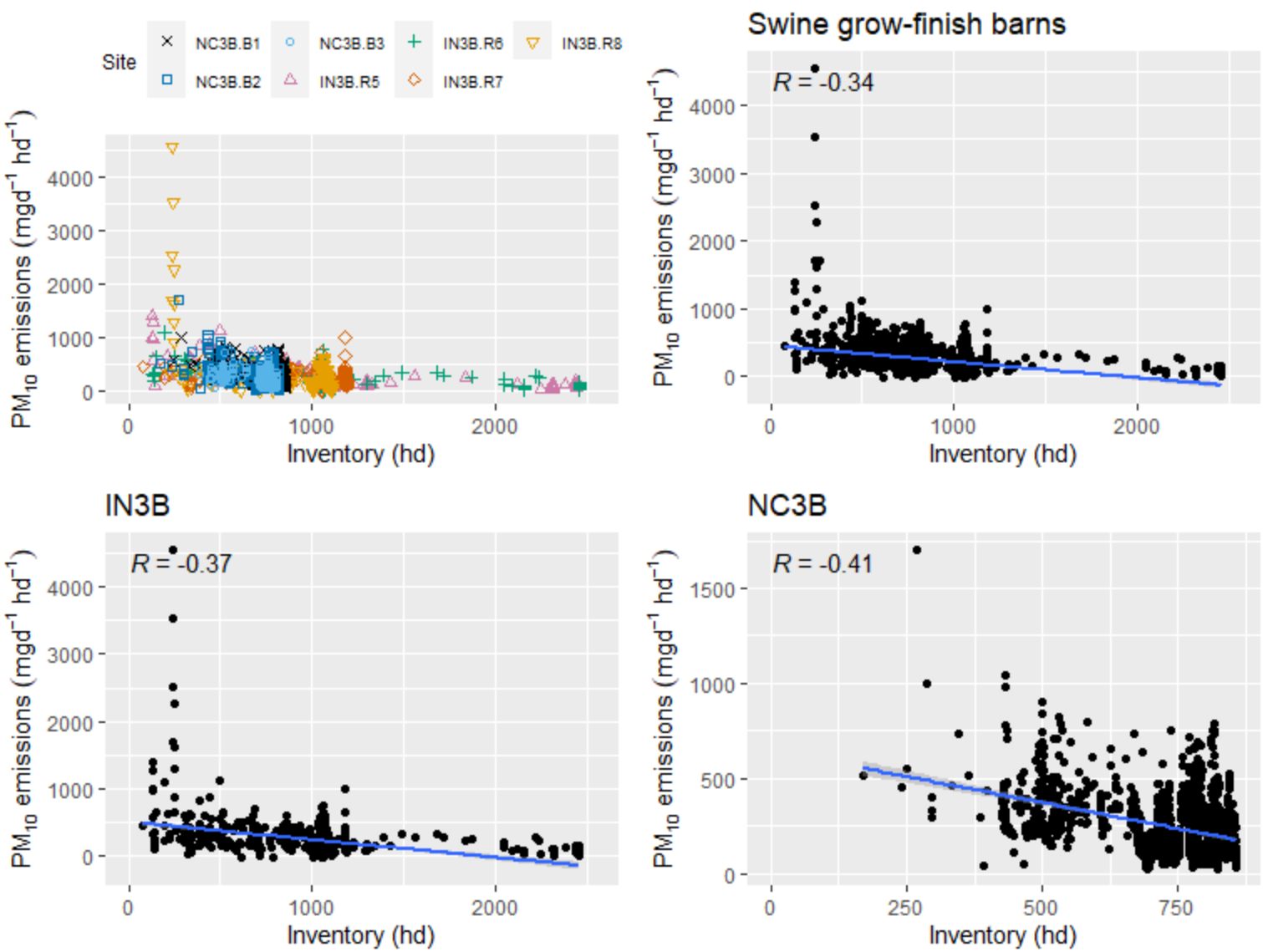


**Figure F.4-26. Scatter plot of swine grow-finish barns $PM_{10}$ emissions (mg $d^{-1}hd^{-1}$) versus Inventory.**

F.4.1.3.2 Average animal weight

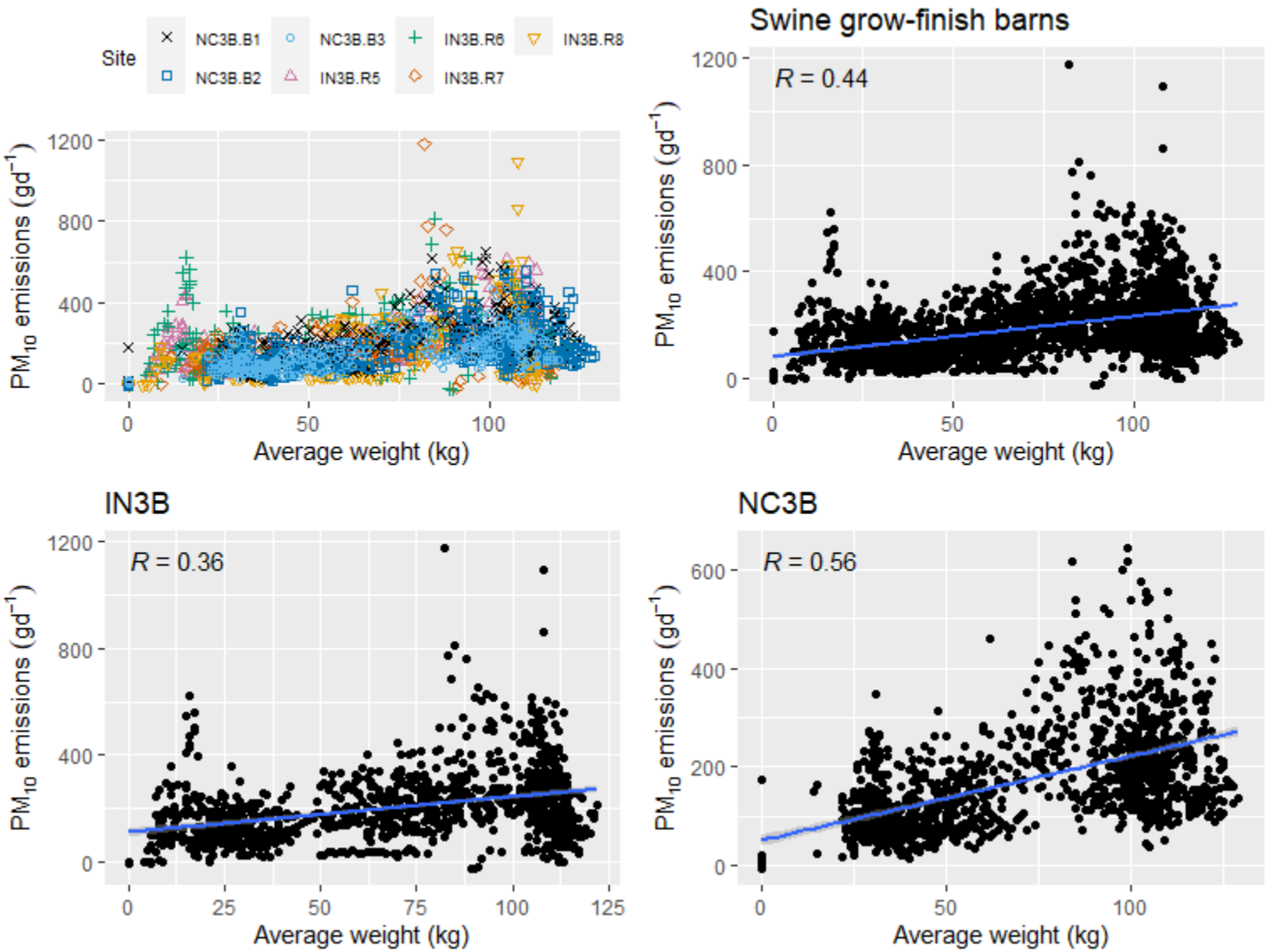


**Figure F.4-27. Scatter plot of swine grow-finish barns $PM_{10}$ emissions (g $d^{-1}$) versus average animal weight.**

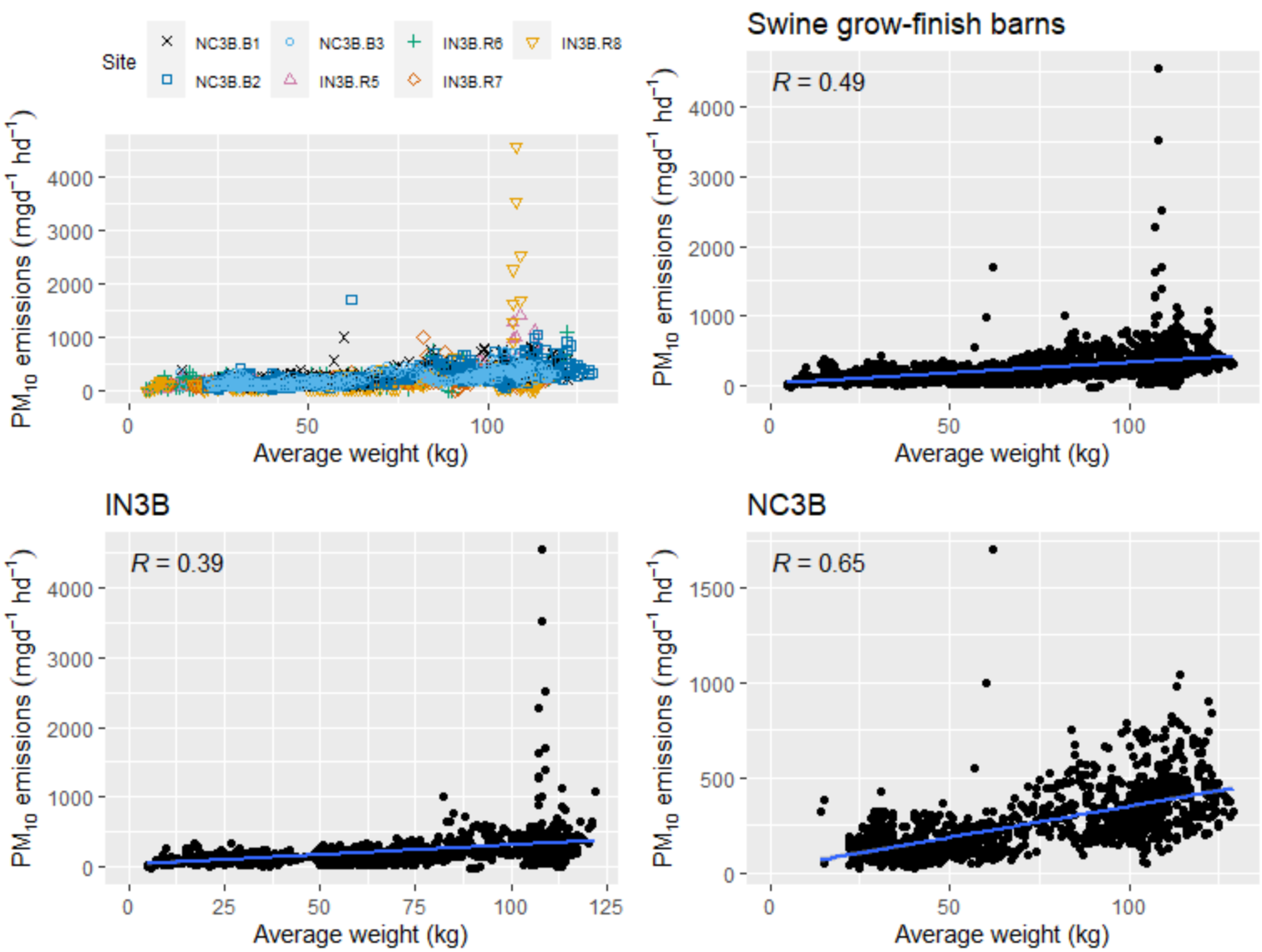


**Figure F.4-28. Scatter plot of swine grow-finish barns $PM_{10}$ emissions (mg $d^{-1}hd^{-1}$) versus average animal weight.**

F.4.1.3.3 Live animal weight

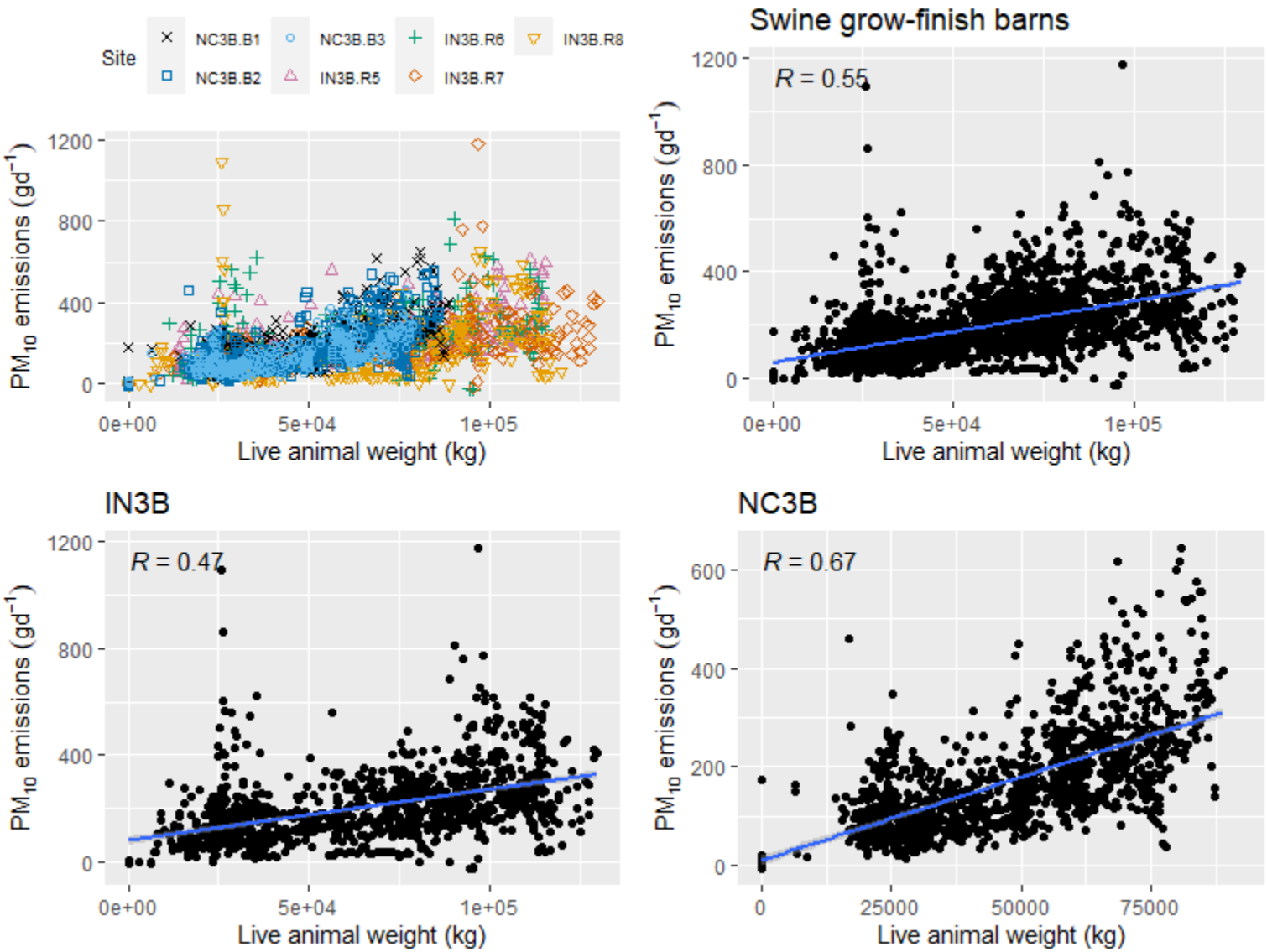


**Figure F.4-29. Scatter plot of swine grow-finish barns $PM_{10}$ emissions (g $d^{-1}$)versus live animal weight.**

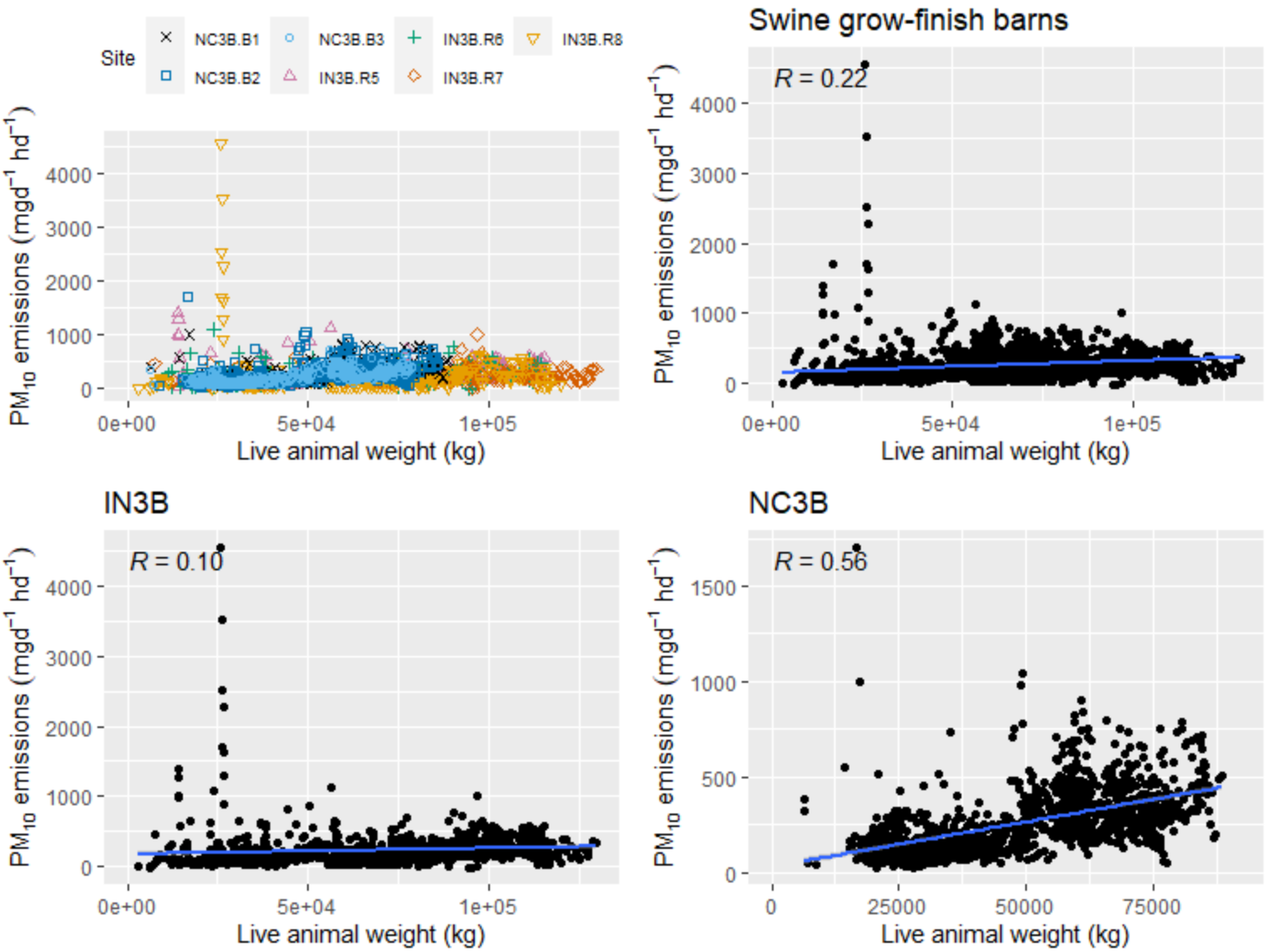


**Figure F.4-30. Scatter plot of swine grow-finish barns $PM_{10}$ emissions (mg $d^{-1}hd^{-1}$) versus live animal weight.**

F.4.1.3.4 Exhaust temperature

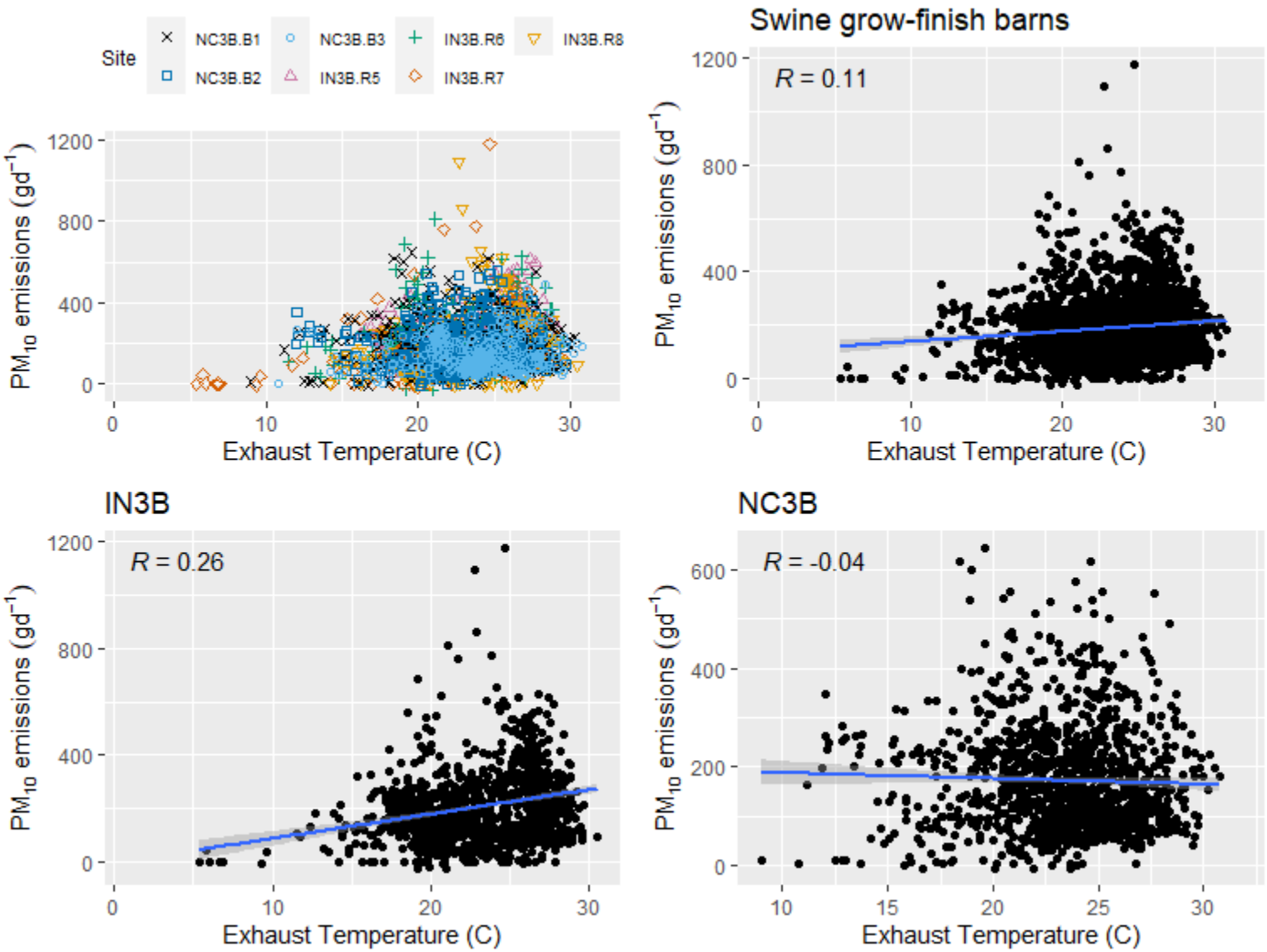


**Figure F.4-31. Scatter plot of swine grow-finish barns $PM_{10}$ emissions (g $d^{-1}$) versus exhaust temperature.**

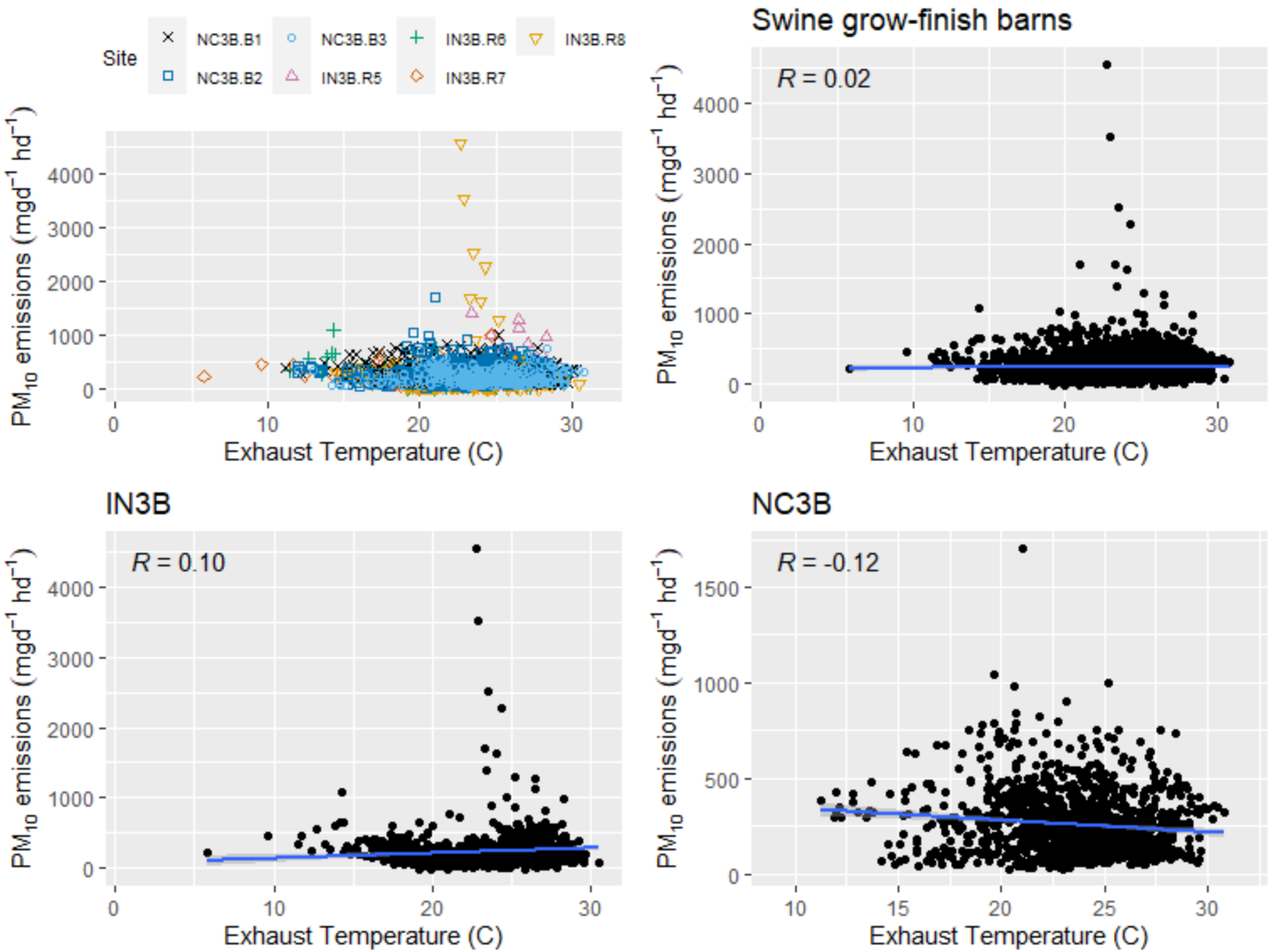


**Figure F.4-32. Scatter plot of swine grow-finish barns $PM_{10}$ emissions (mg $d^{-1}hd^{-1}$) versus exhaust temperature.**

F.4.1.3.5 Exhaust relative humidity

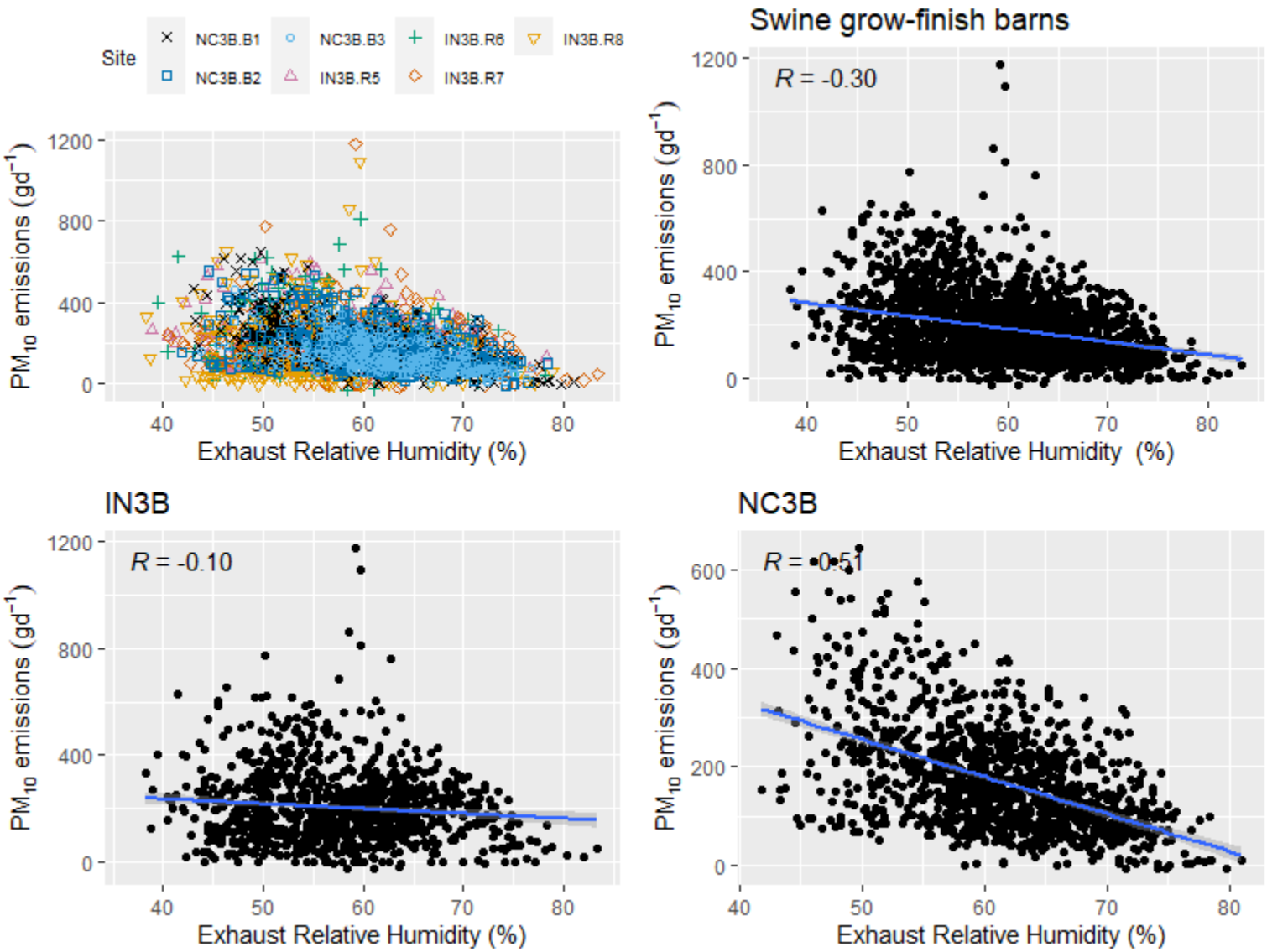


**Figure F.4-33. Scatter plot of swine grow-finish barns $PM_{10}$ emissions (g $d^{-1}$) versus exhaust relative humidity.**

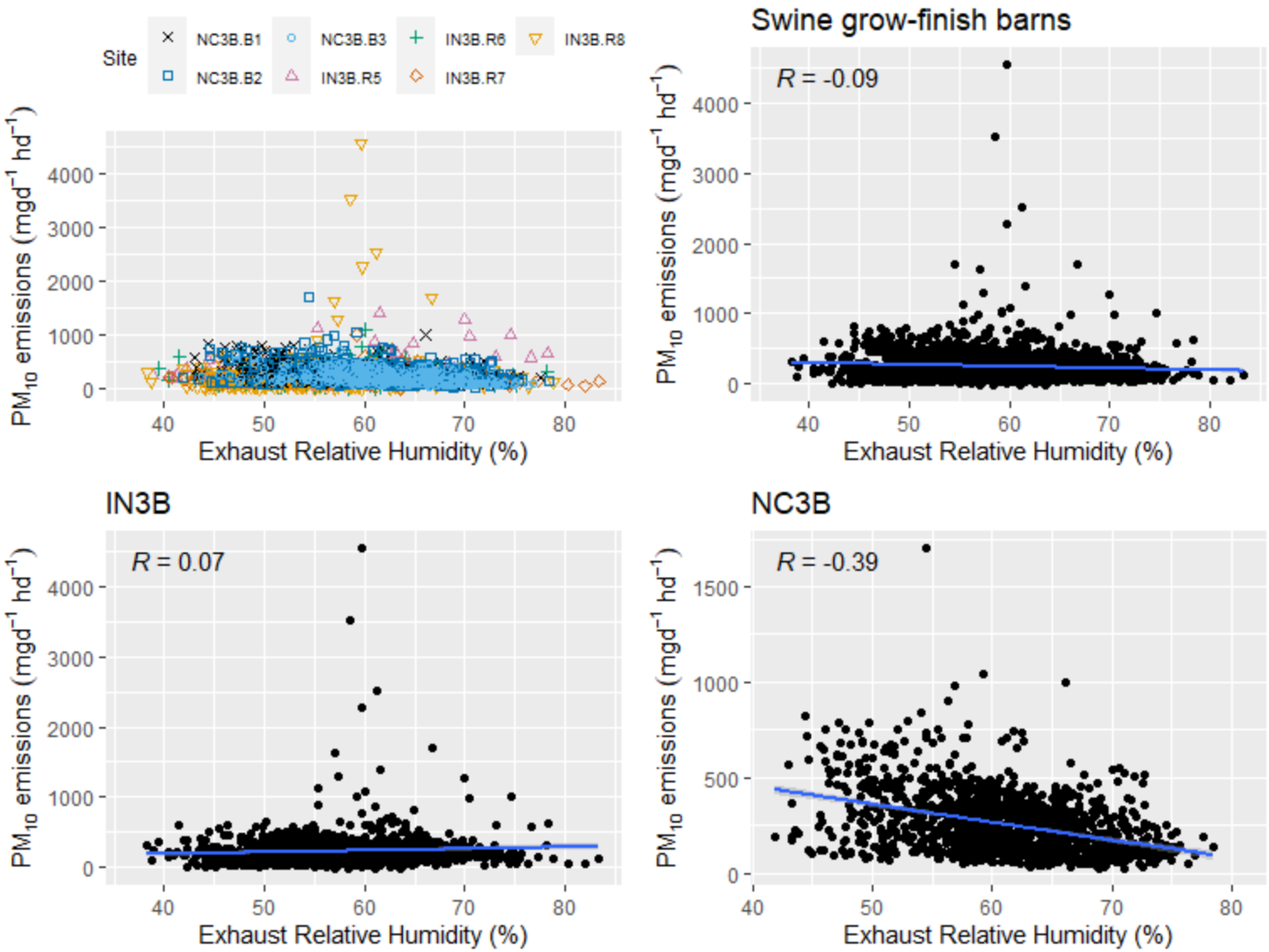


**Figure F.4-34. Scatter plot of swine grow-finish barns $PM_{10}$ emissions (mg $d^{-1}hd^{-1}$) versus exhaust relative humidity.**

F.4.1.3.6 Airflow

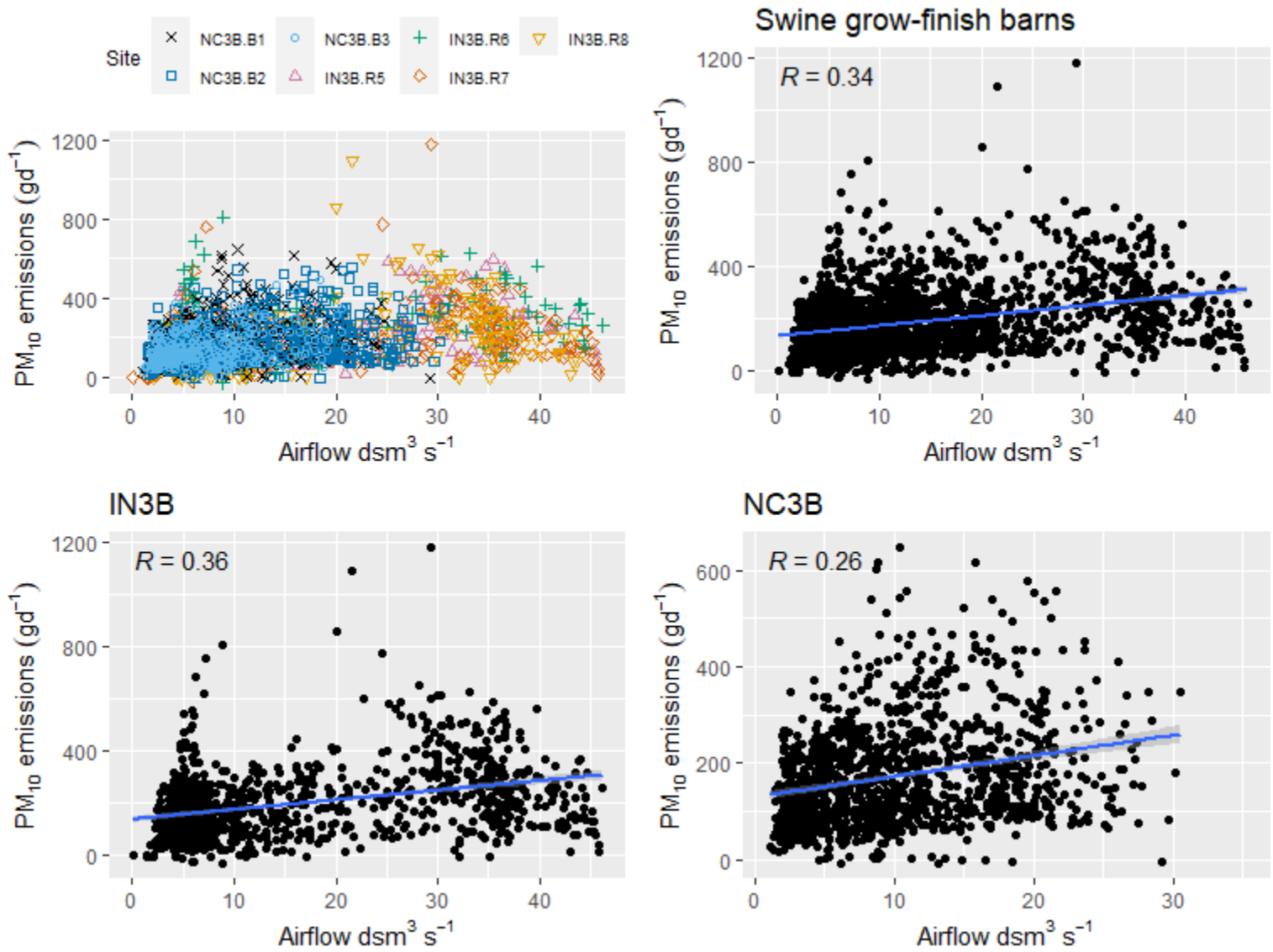


**Figure F.4-35. Scatter plot of swine grow-finish barns $PM_{10}$ emissions (g $d^{-1}$) versus airflow.**

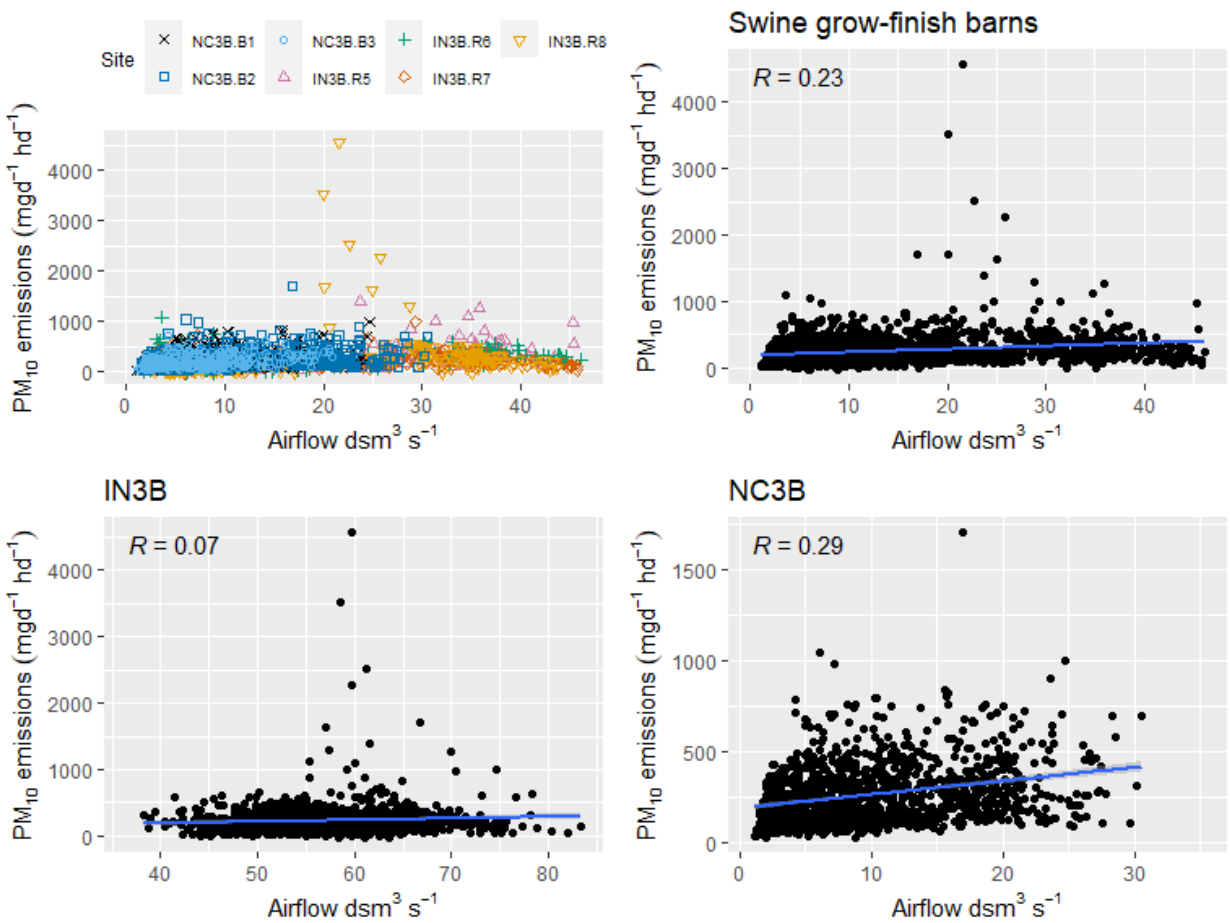


**Figure F.4-36. Scatter plot of swine grow-finish barns $PM_{10}$ emissions (mg $d^{-1}hd^{-1}$) versus airflow.**

### *F.4.1.4 Particulate Matter ($PM_{2.5}$)*

F.4.1.4.1 Inventory

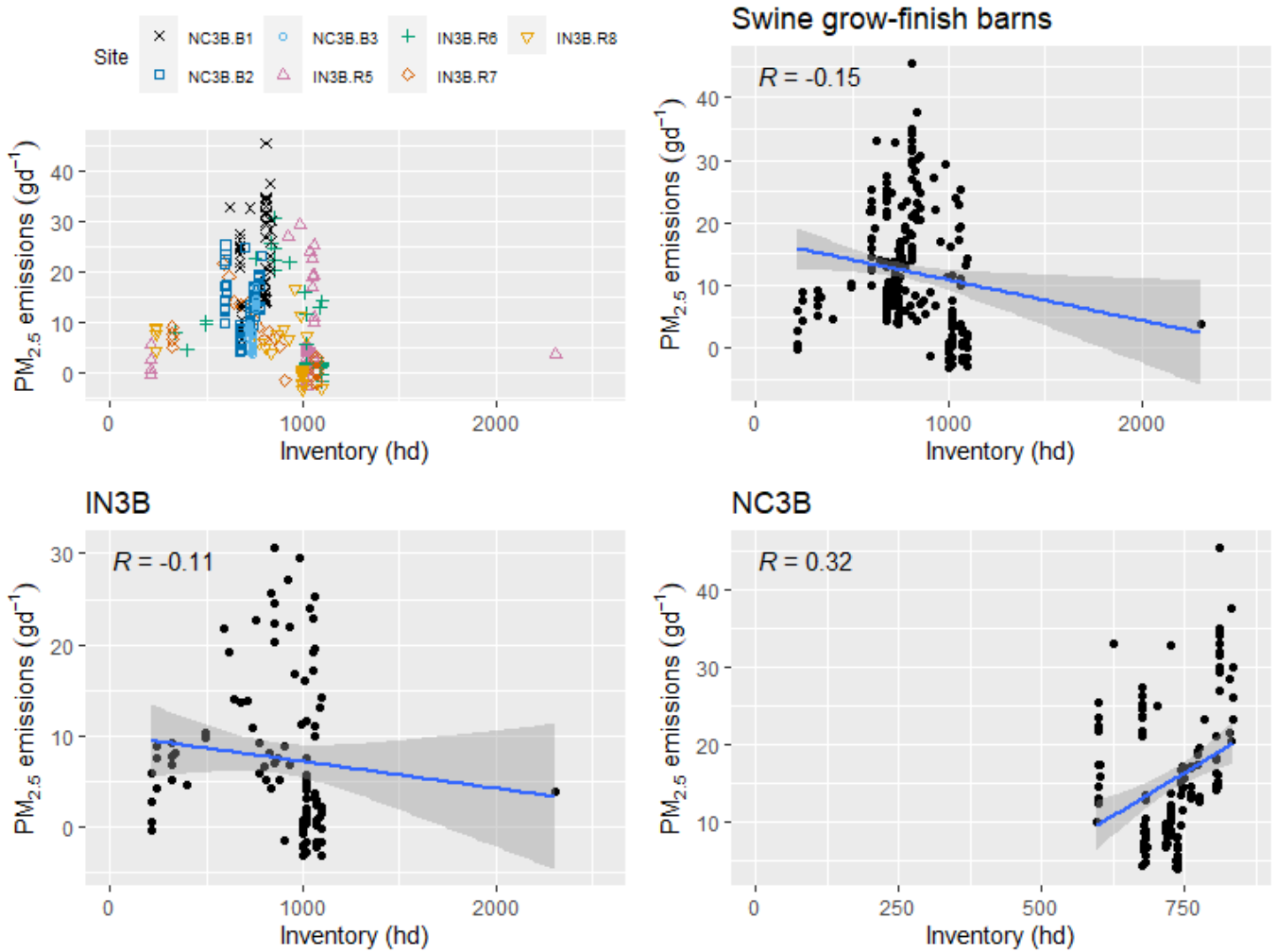


**Figure F.4-37. Scatter plot of swine grow-finish barns $PM_{2.5}$ emissions (g $d^{-1}$) versus Inventory.**

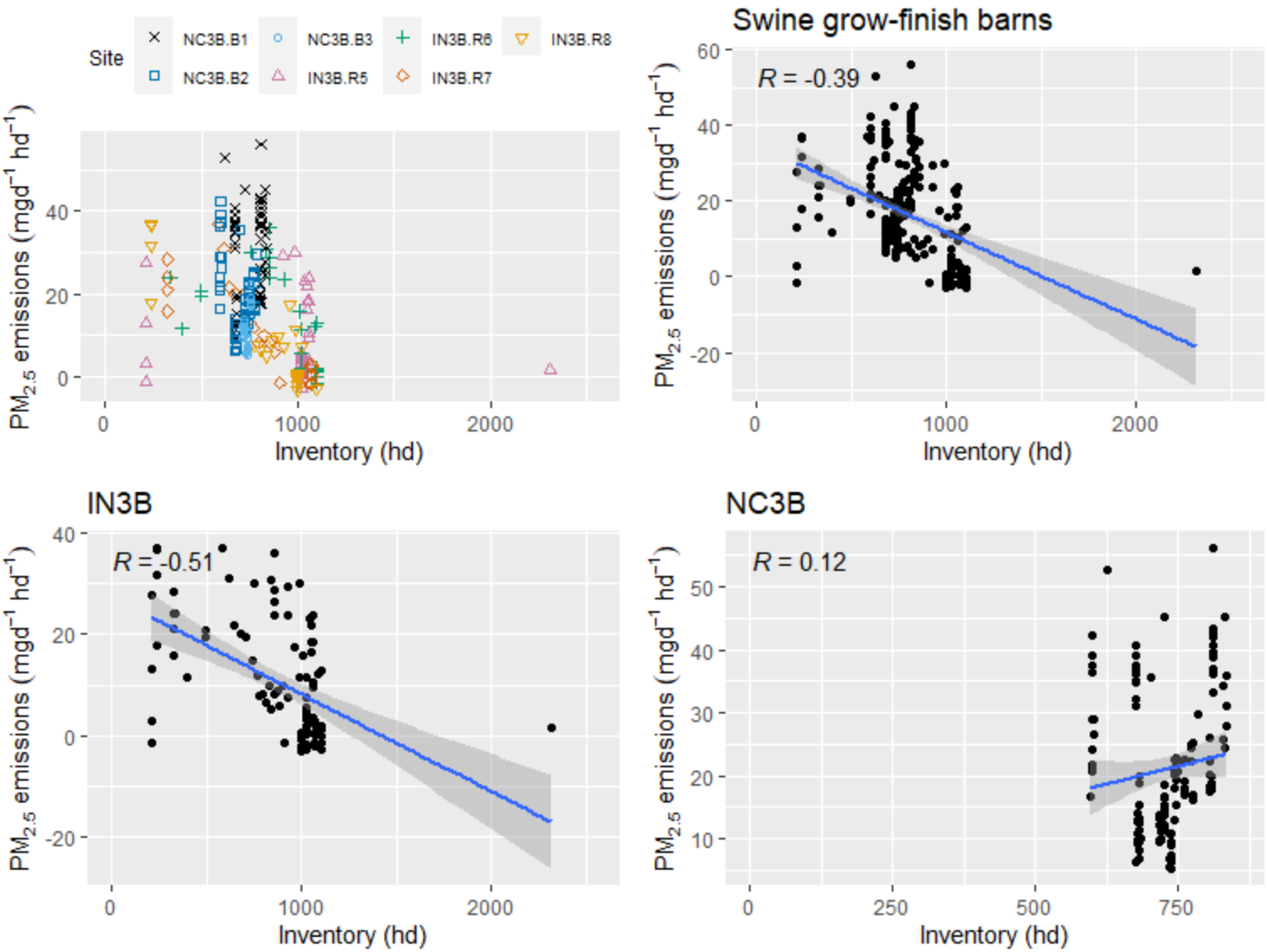


**Figure F.4-38. Scatter plot of swine grow-finish barns $PM_{2.5}$ emissions (mg $d^{-1}hd^{-1}$) versus Inventory.**

F.4.1.4.2 Average animal weight

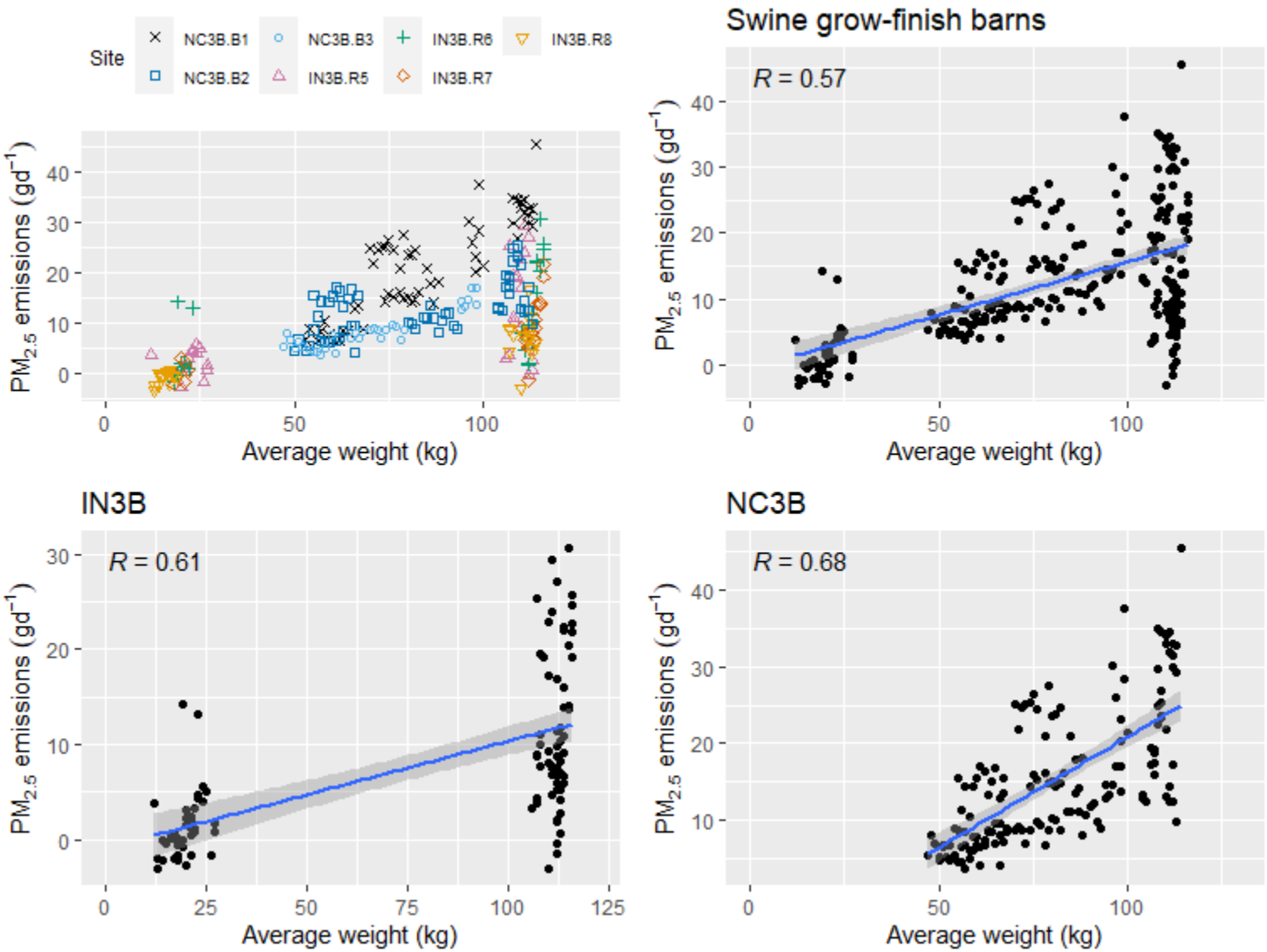


**Figure F.4-39. Scatter plot of swine grow-finish barns $PM_{2.5}$ emissions (g $d^{-1}$) versus average animal weight.**

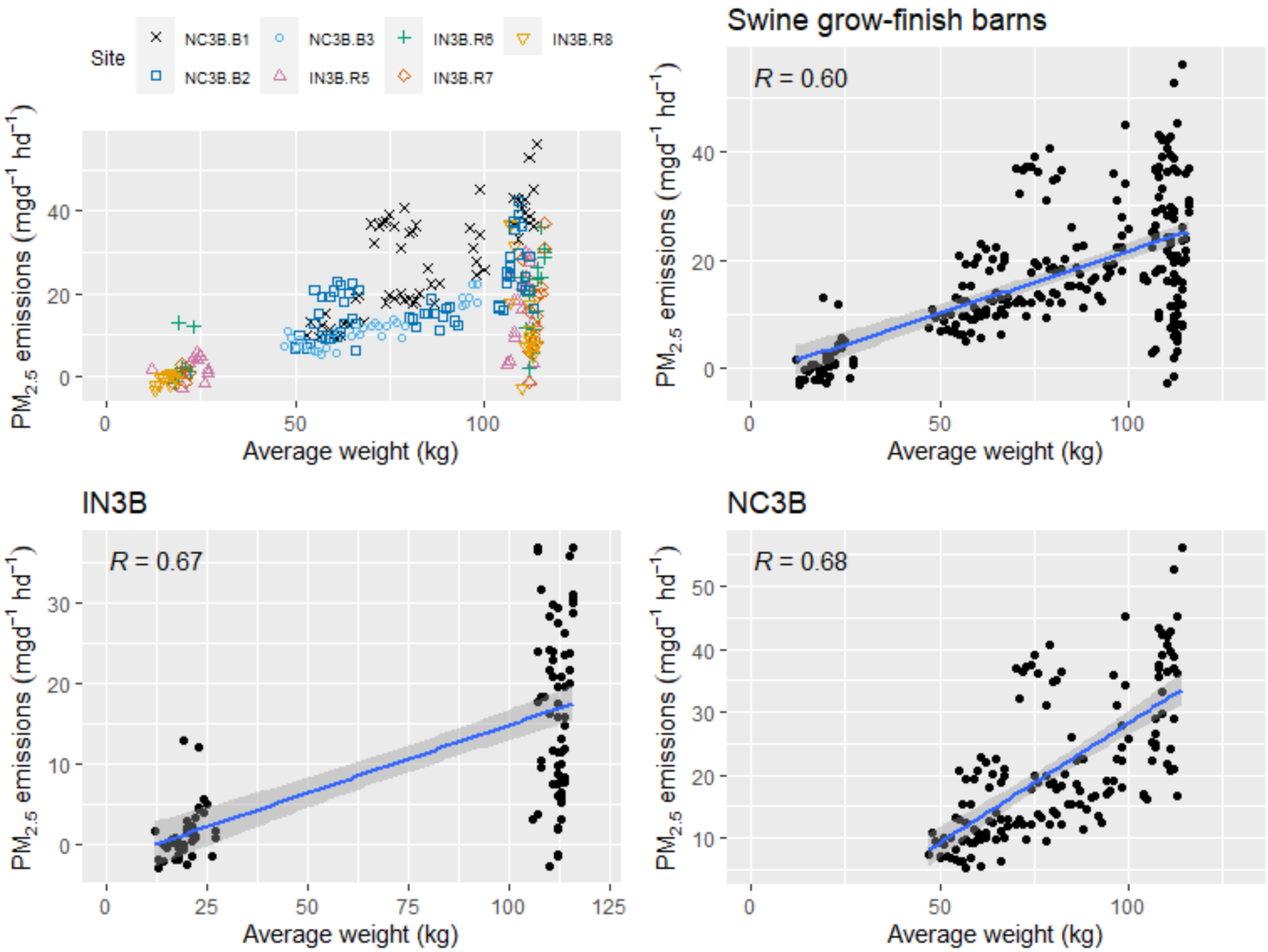


**Figure F.4-40. Scatter plot of swine grow-finish barns $PM_{2.5}$ emissions (mg $d^{-1}hd^{-1}$) versus average animal weight.**

F.4.1.4.3 Live animal weight

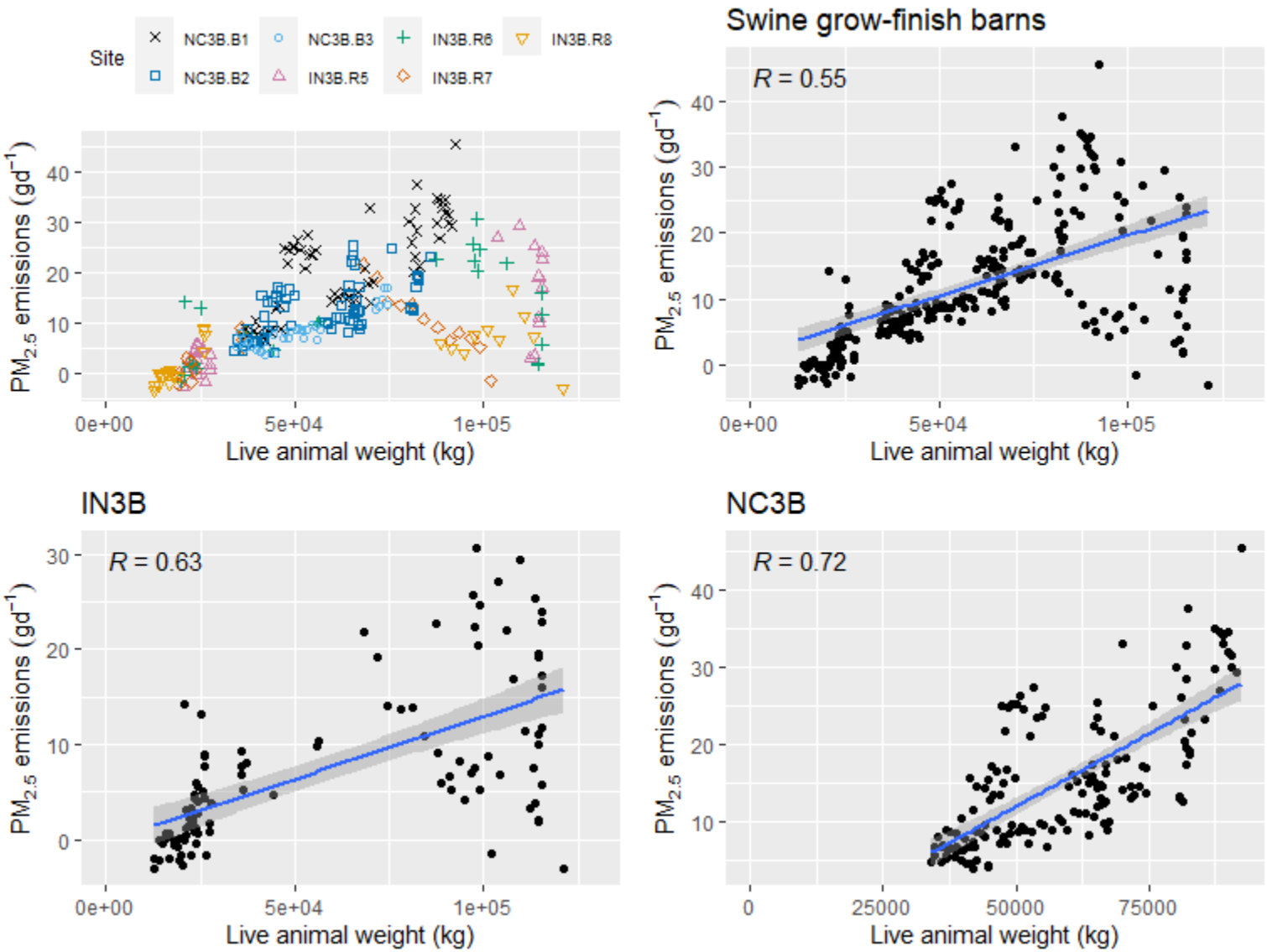


**Figure F.4-41. Scatter plot of swine grow-finish barns $PM_{2.5}$ emissions (g $d^{-1}$)versus live animal weight.**

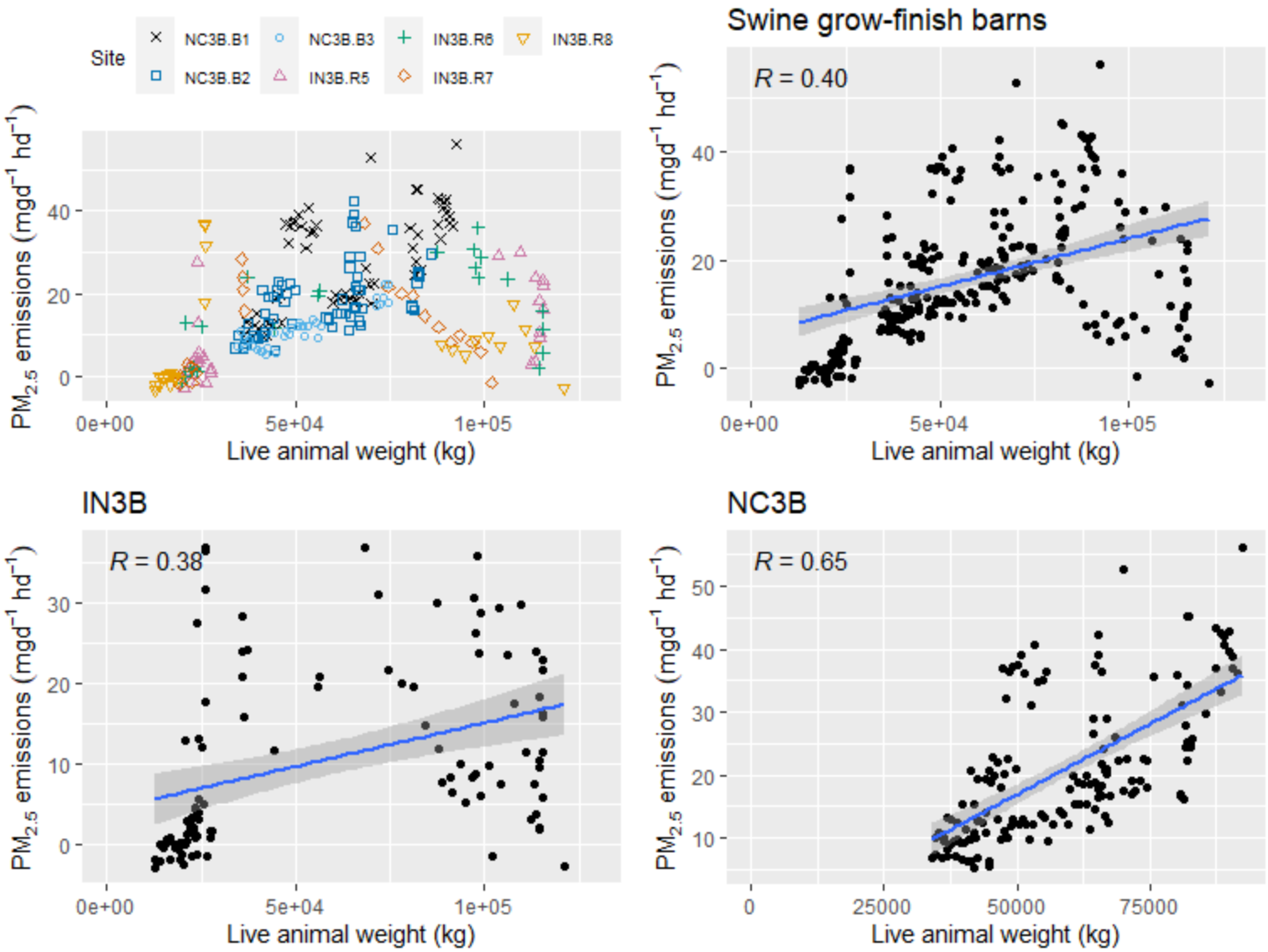


**Figure F.4-42. Scatter plot of swine grow-finish barns $PM_{2.5}$ emissions (mg $d^{-1}hd^{-1}$) versus live animal weight.**

F.4.1.4.4 Exhaust temperature

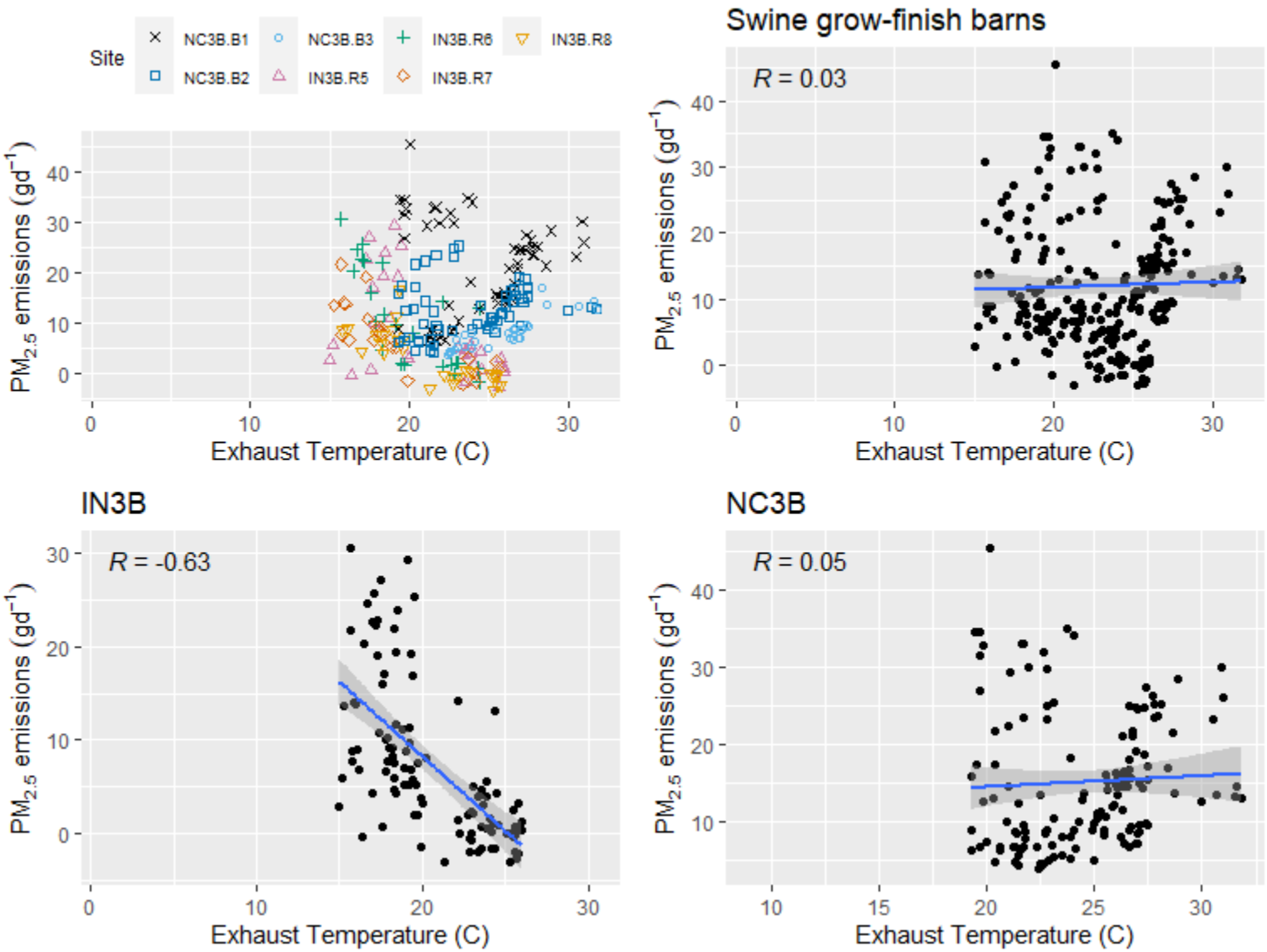


**Figure F.4-43. Scatter plot of swine grow-finish barns $PM_{2.5}$ emissions (g $d^{-1}$) versus exhaust temperature.**

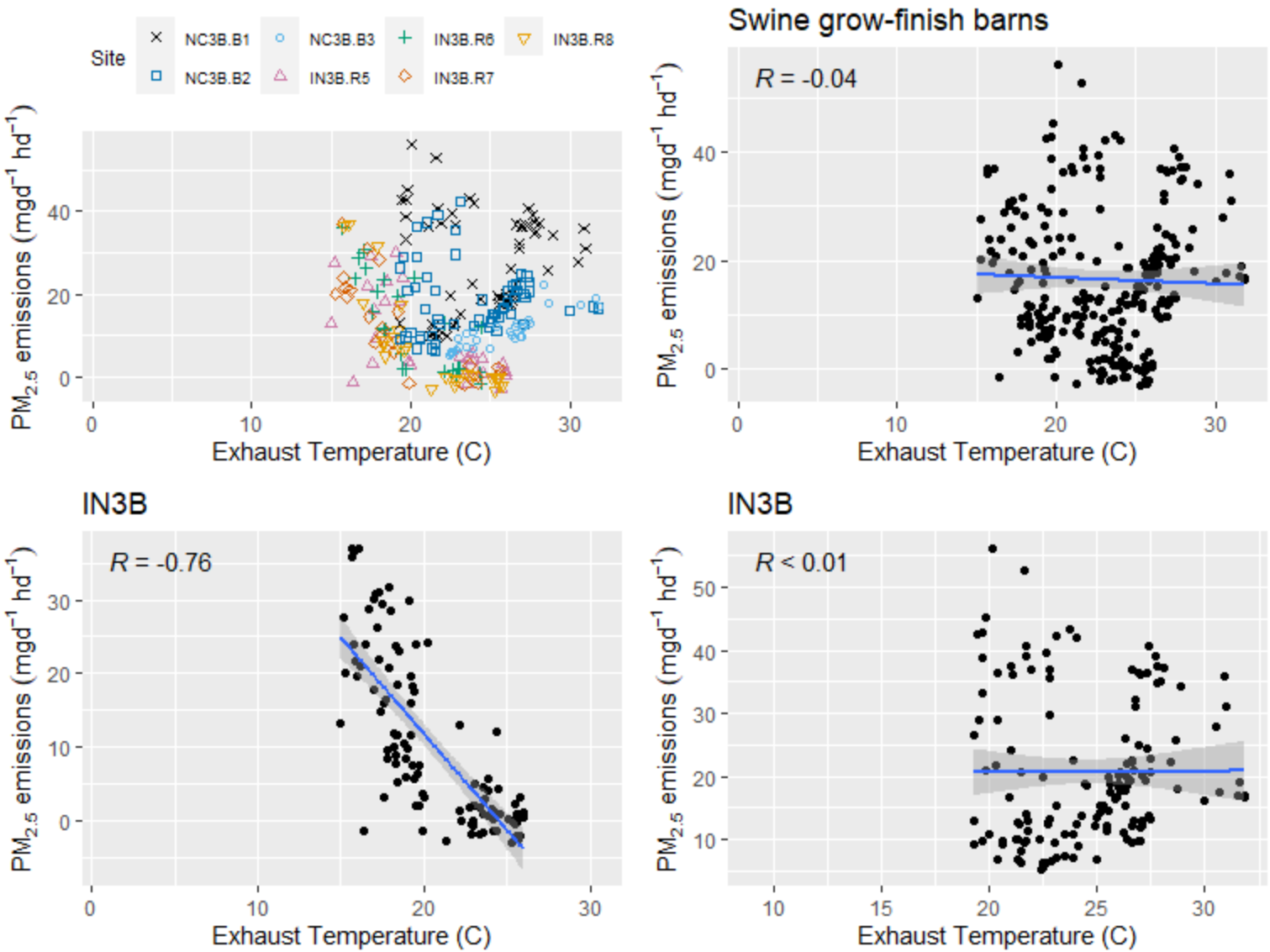


**Figure F.4-44. Scatter plot of swine grow-finish barns $PM_{2.5}$ emissions (mg $d^{-1}hd^{-1}$) versus exhaust temperature.**

F.4.1.4.5 Exhaust relative humidity

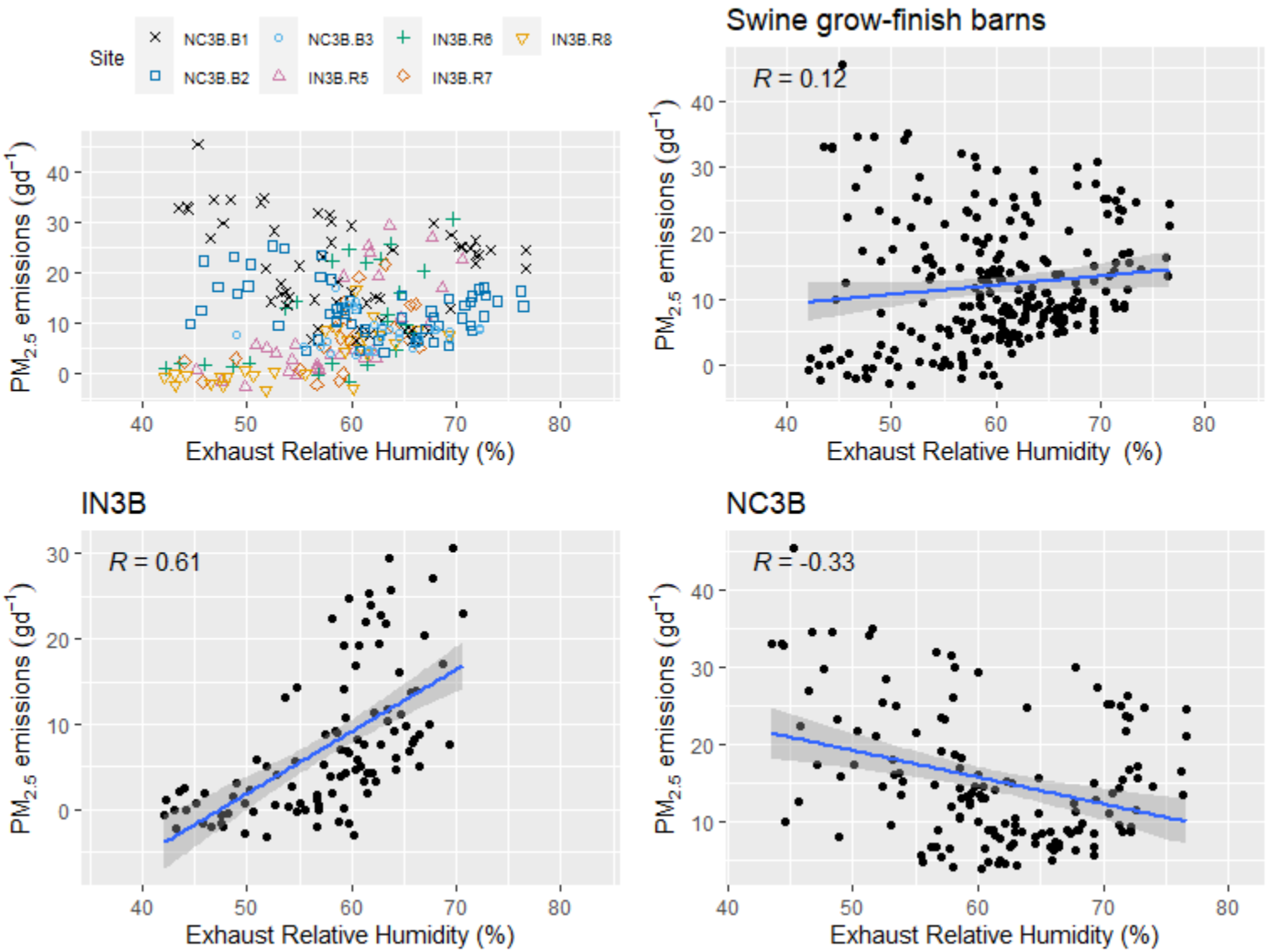


**Figure F.4-45. Scatter plot of swine grow-finish barns $PM_{2.5}$ emissions (g $d^{-1}$) versus exhaust relative humidity.**

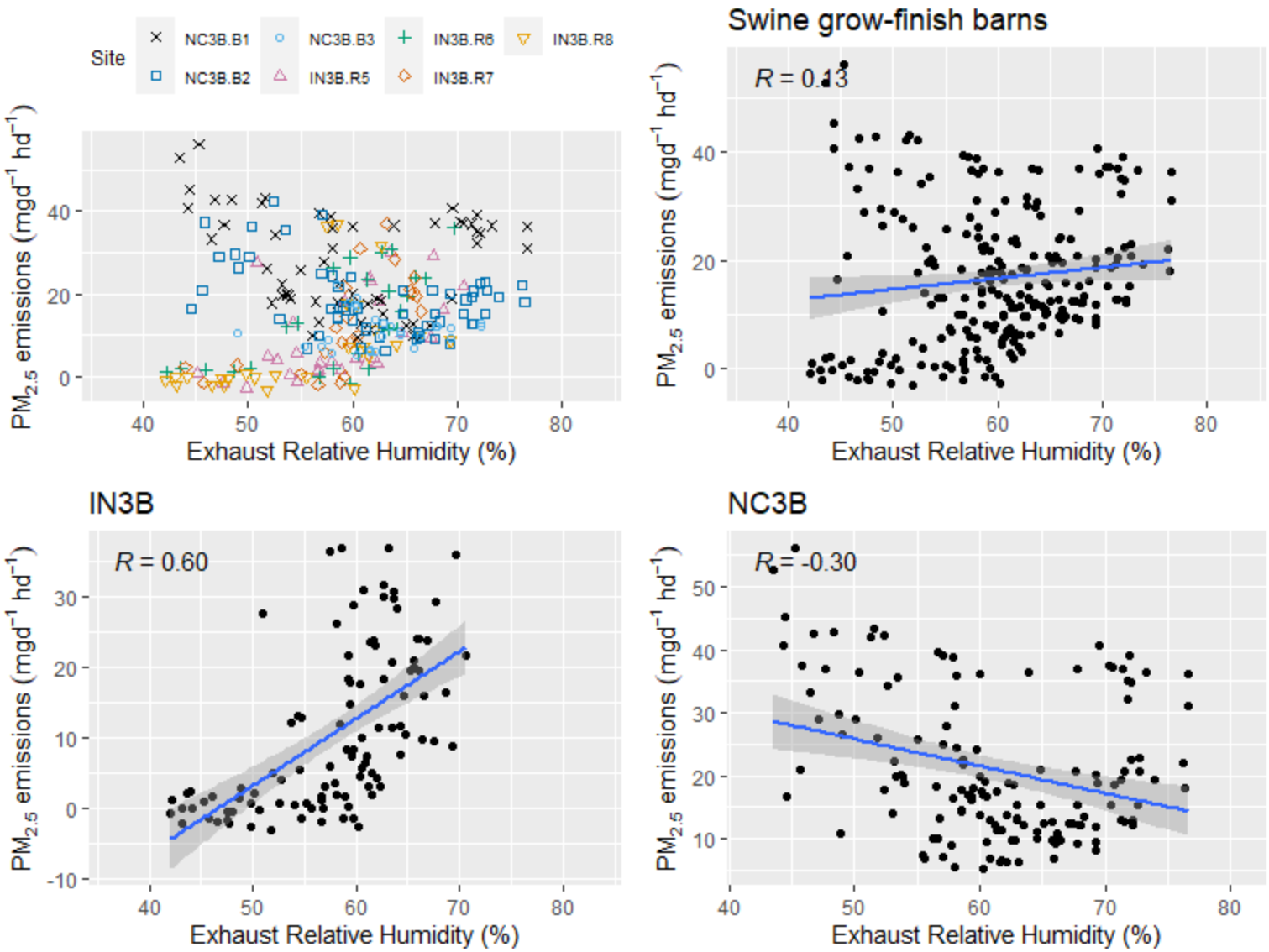


**Figure F.4-46. Scatter plot of swine grow-finish barns $PM_{2.5}$ emissions (mg $d^{-1}hd^{-1}$) versus exhaust relative humidity.**

F.4.1.4.6 Airflow

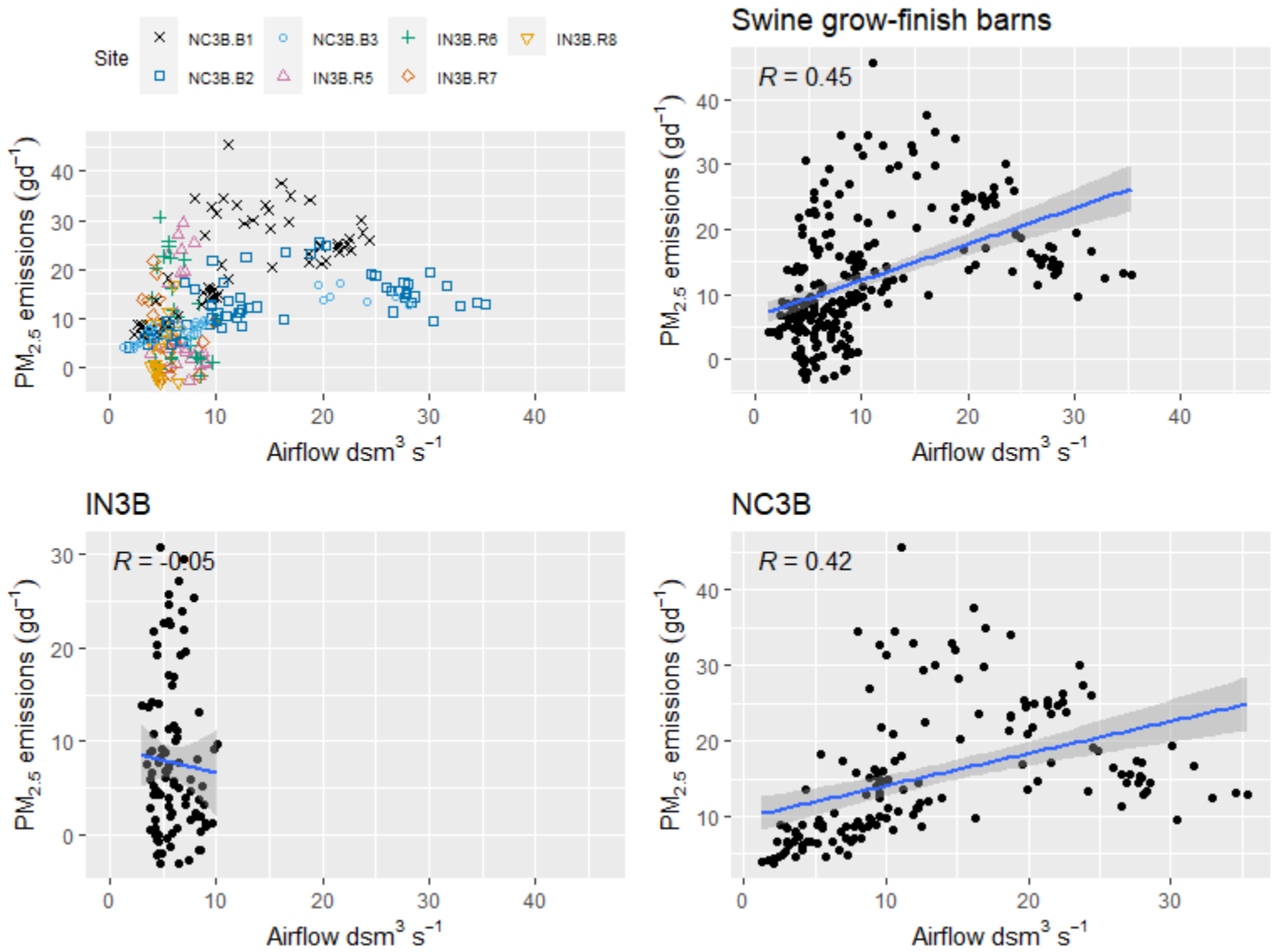


**Figure F.4-47. Scatter plot of swine grow-finish barns $PM_{2.5}$ emissions (g $d^{-1}$) versus airflow.**

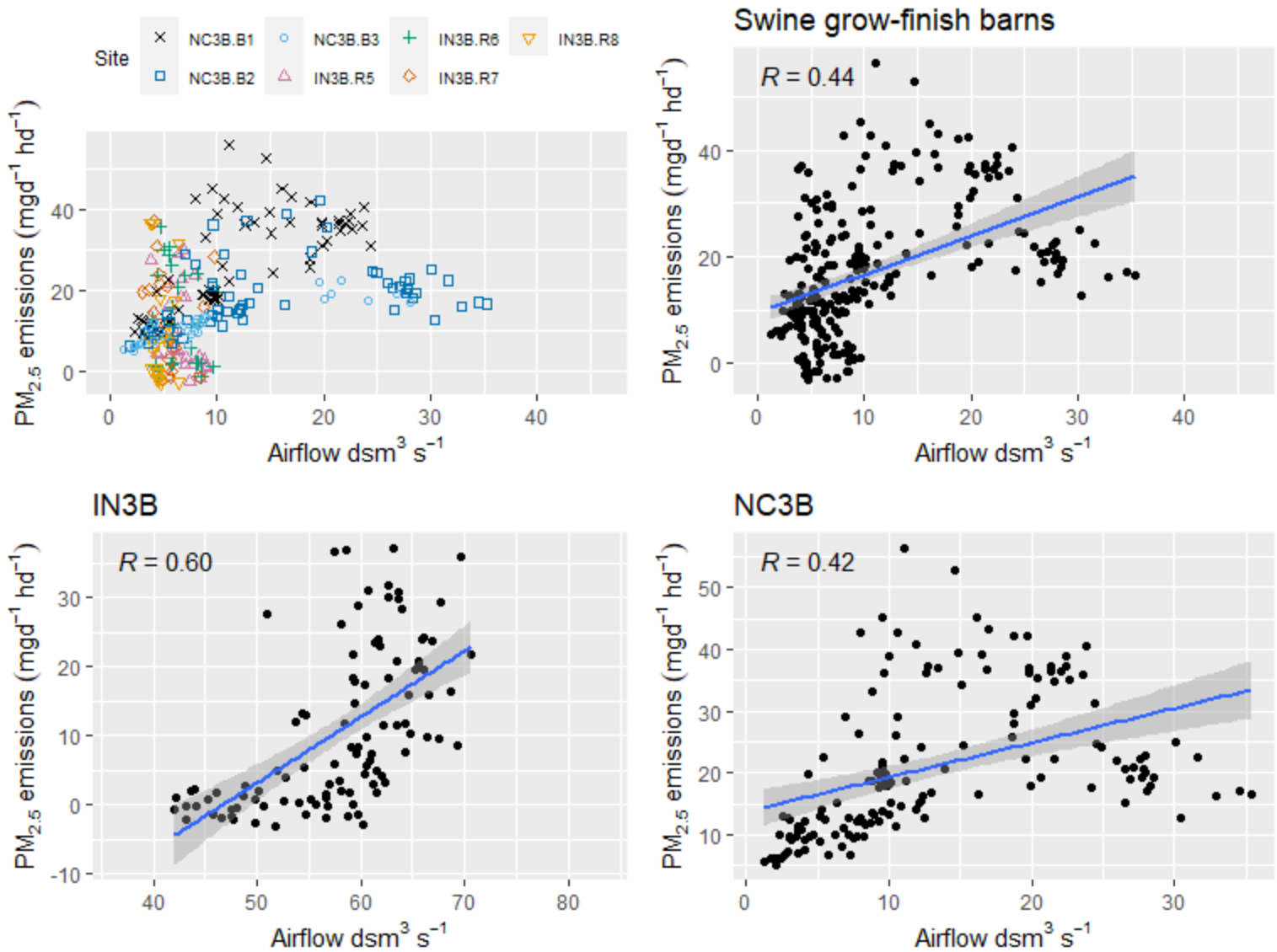


**Figure F.4-48. Scatter plot of swine grow-finish barns $PM_{2.5}$ emissions (mg $d^{-1}hd^{-1}$) versus airflow.**

### *F.4.1.5 Total Suspended Particulates (TSP)*

F.4.1.5.1 Inventory

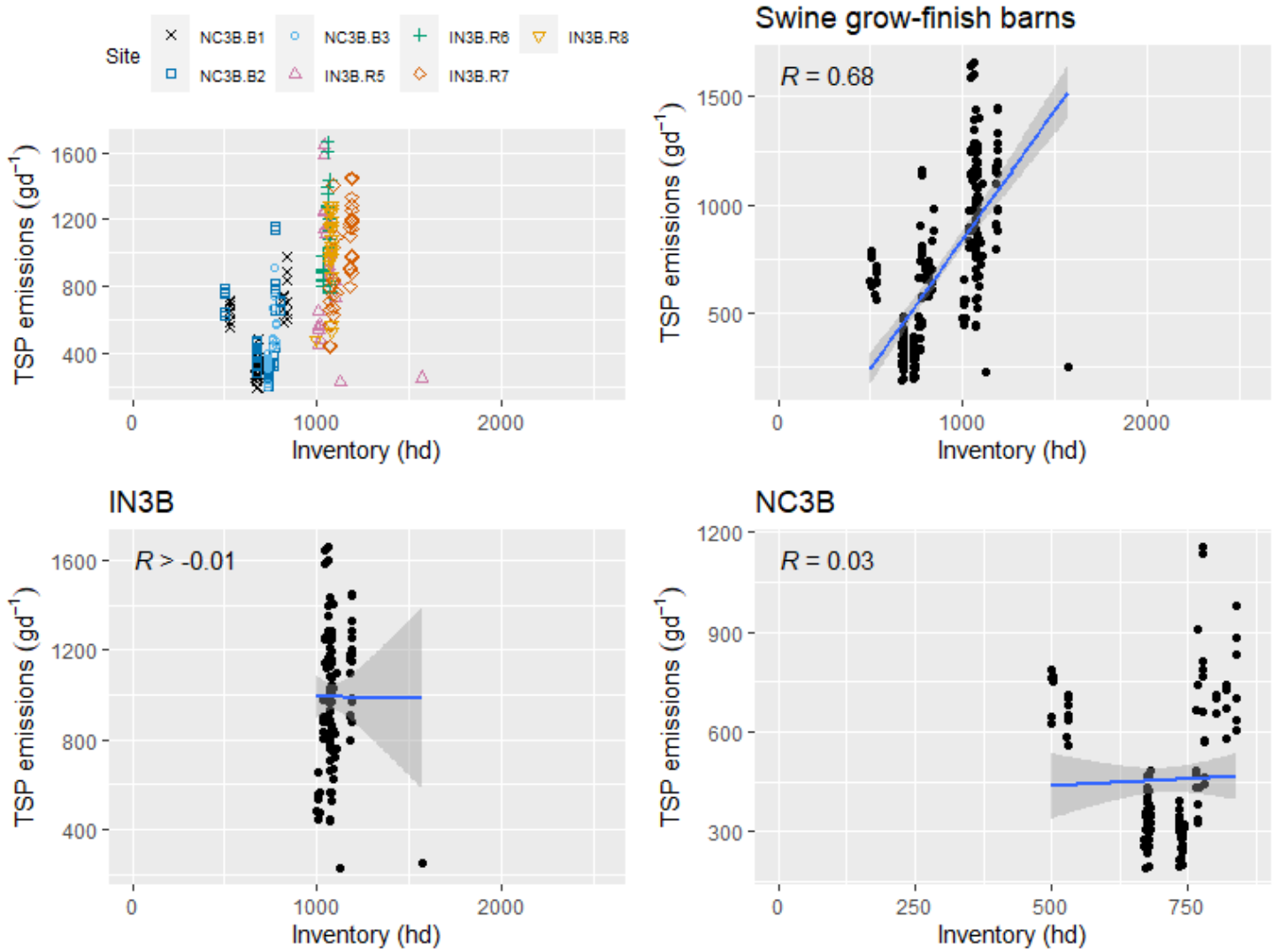


**Figure F.4-49. Scatter plot of swine grow-finish barns TSP emissions (g d$^{-1}$) versus Inventory.**

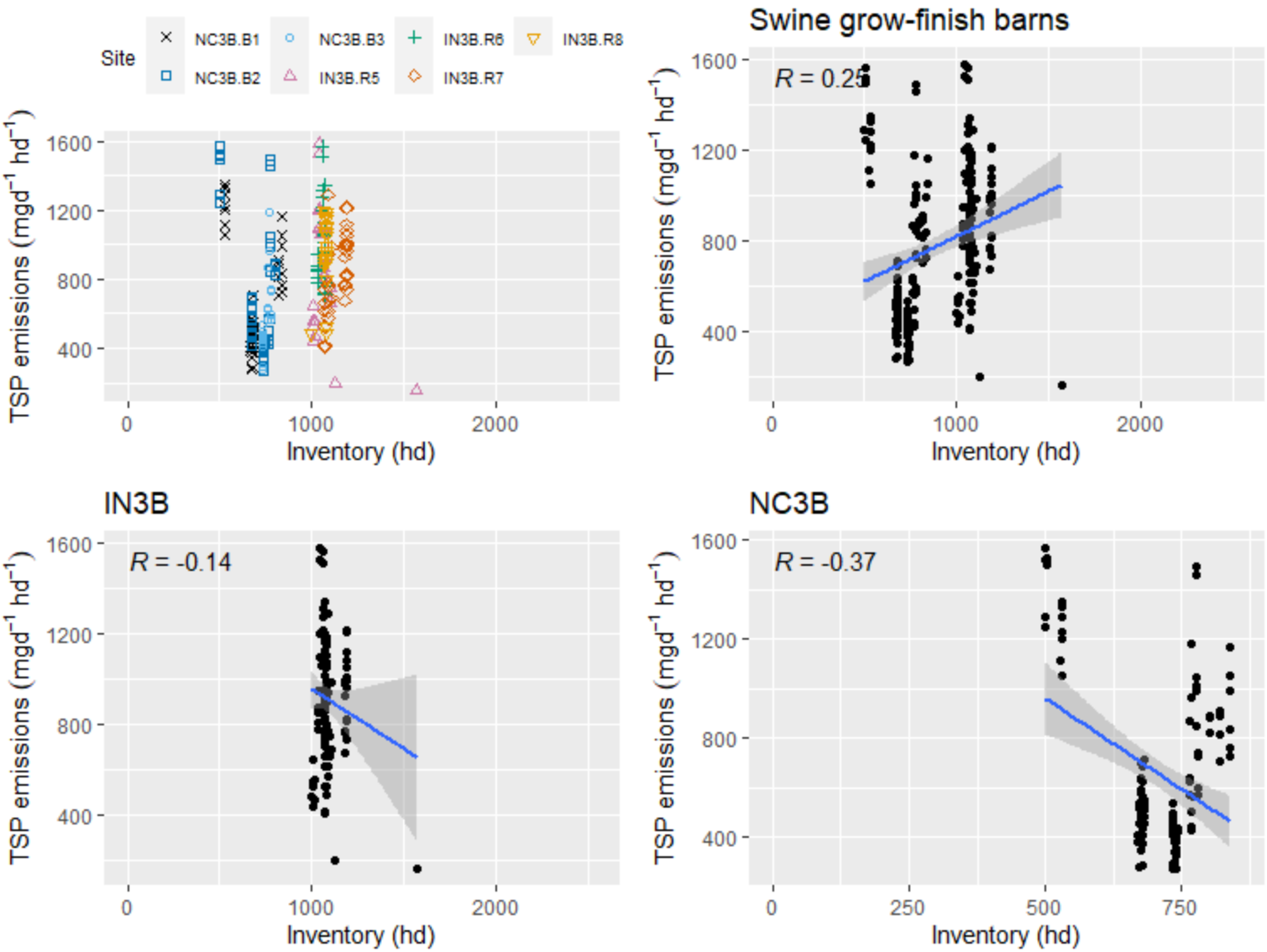


**Figure F.4-50. Scatter plot of swine grow-finish barns TSP emissions (mg d$^{-1}$hd$^{-1}$) versus Inventory.**

F.4.1.5.2 Average animal weight

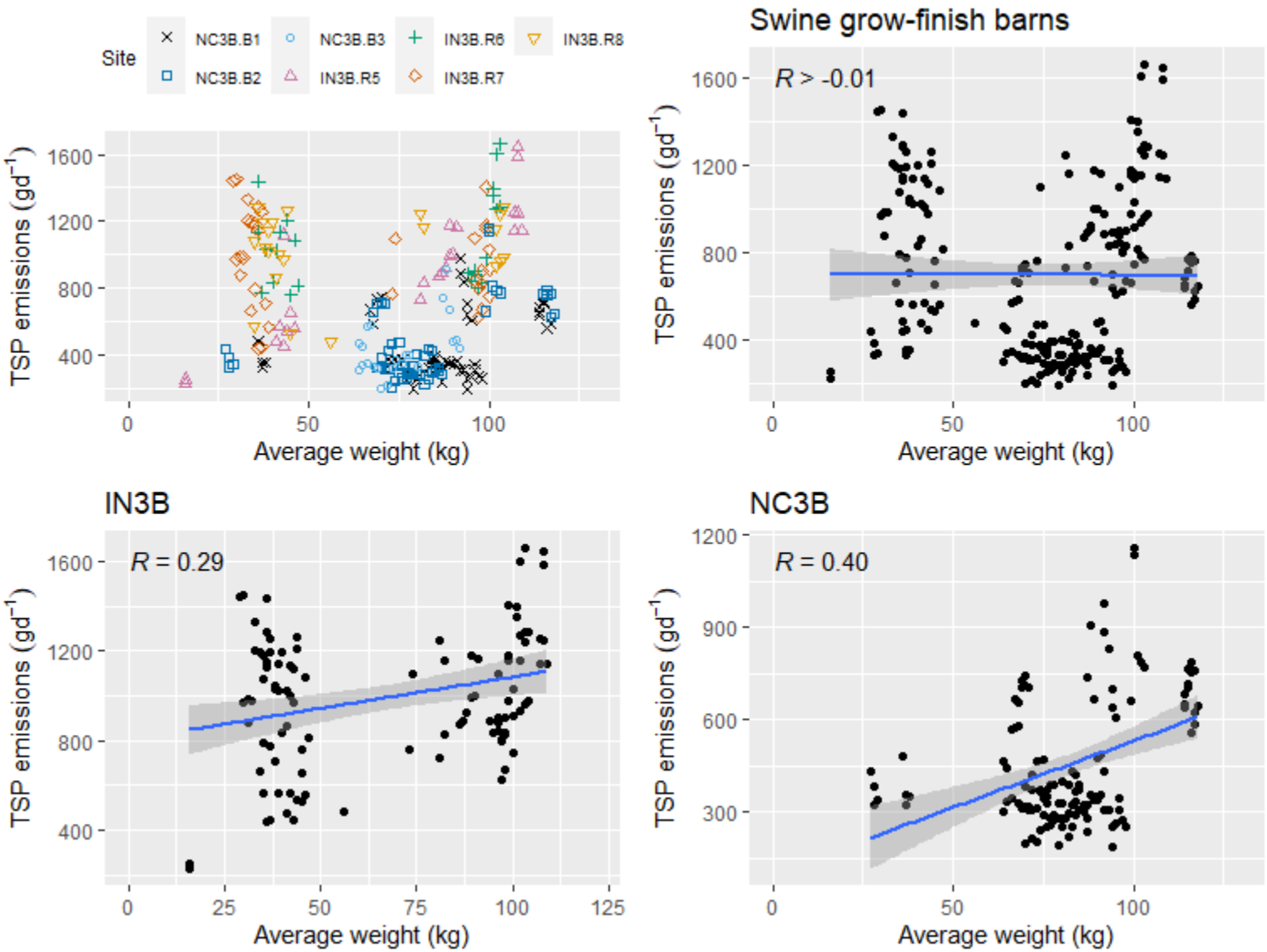


**Figure F.4-51. Scatter plot of swine grow-finish barns TSP emissions (g d$^{-1}$) versus average animal weight.**

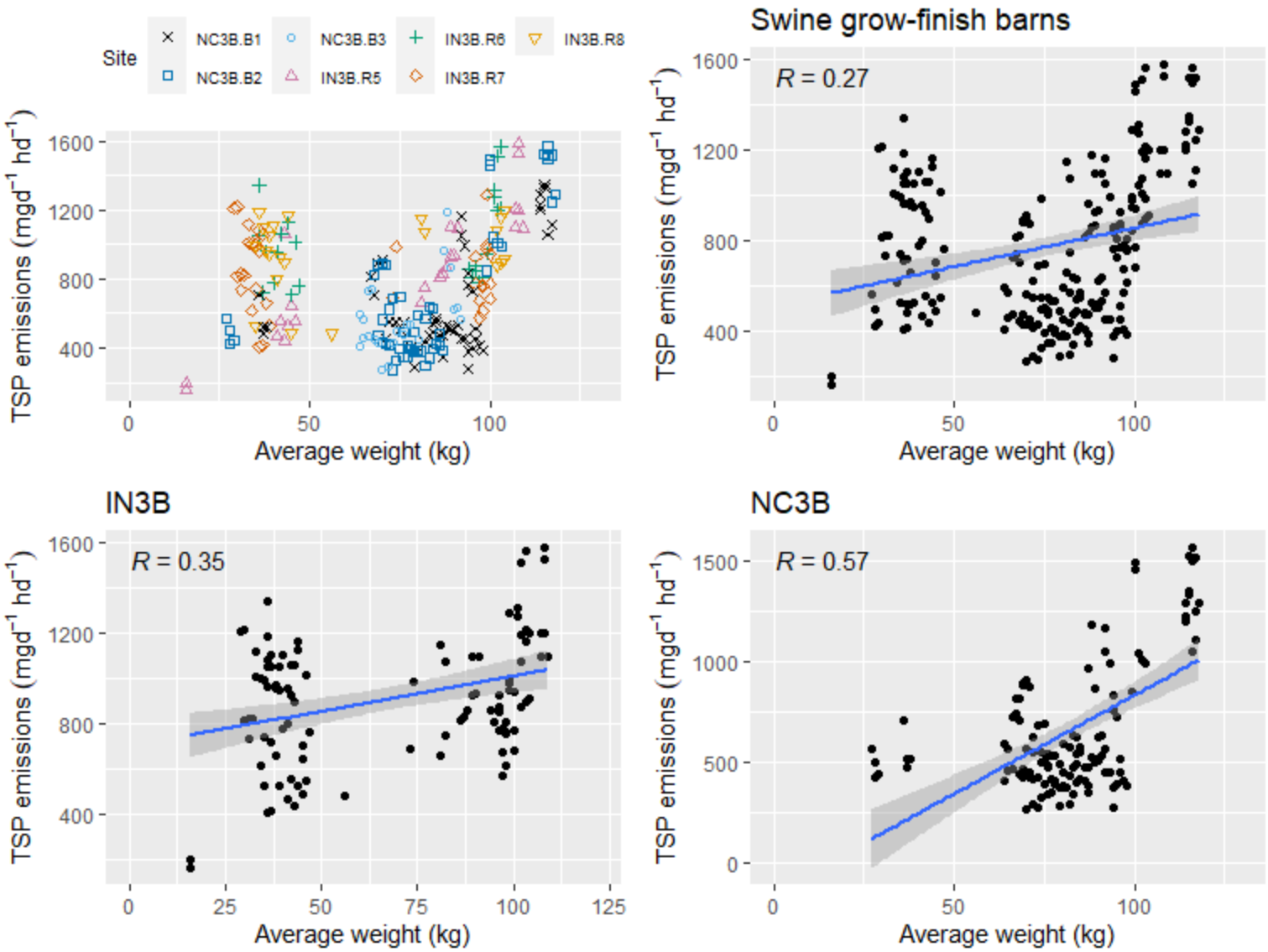


**Figure F.4-52. Scatter plot of swine grow-finish barns TSP emissions (mg d$^{-1}$hd$^{-1}$) versus average animal weight.**

F.4.1.5.3 Live animal weight

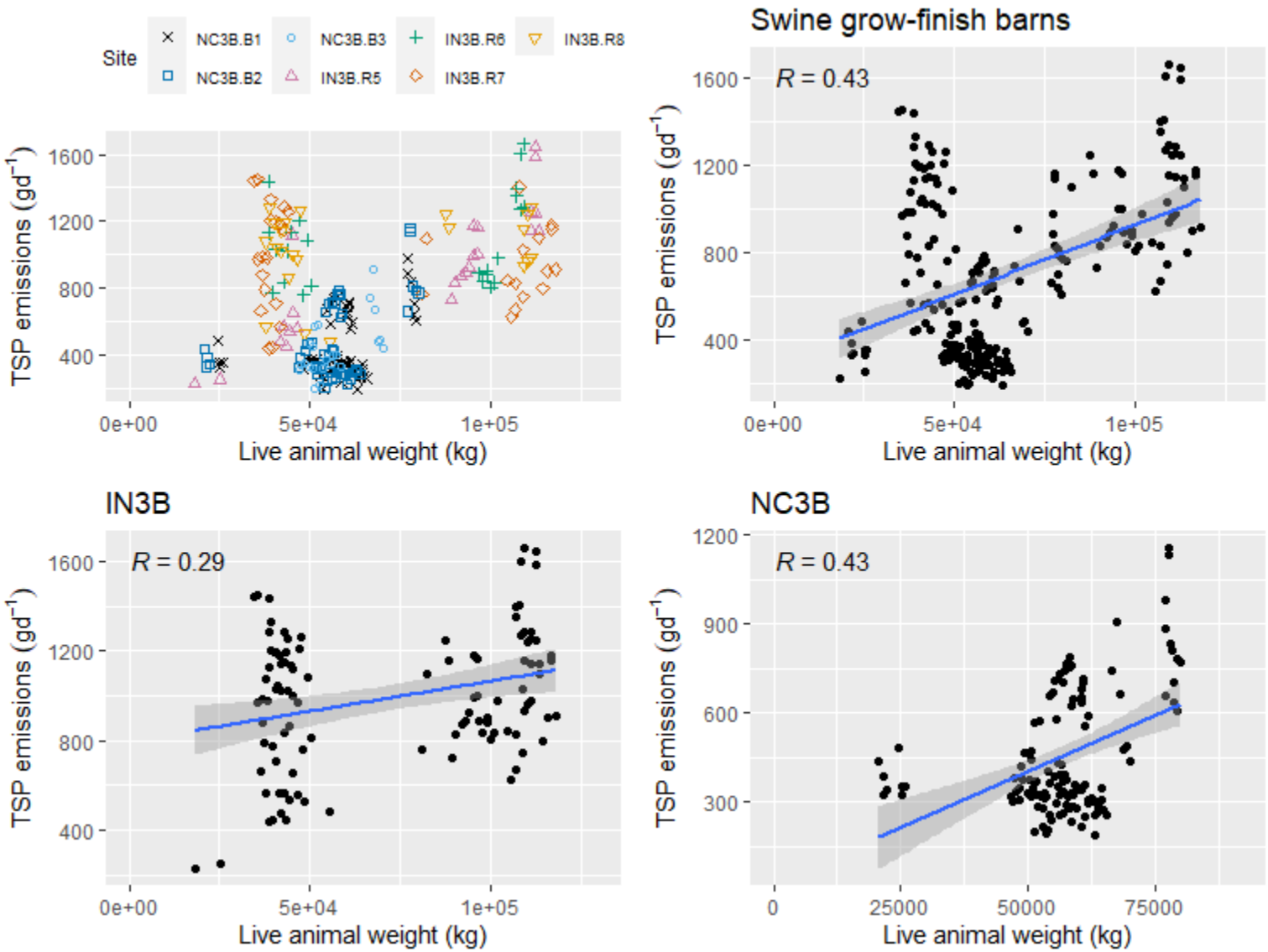


**Figure F.4-53. Scatter plot of swine grow-finish barns TSP emissions (g d$^{-1}$)versus live animal weight.**

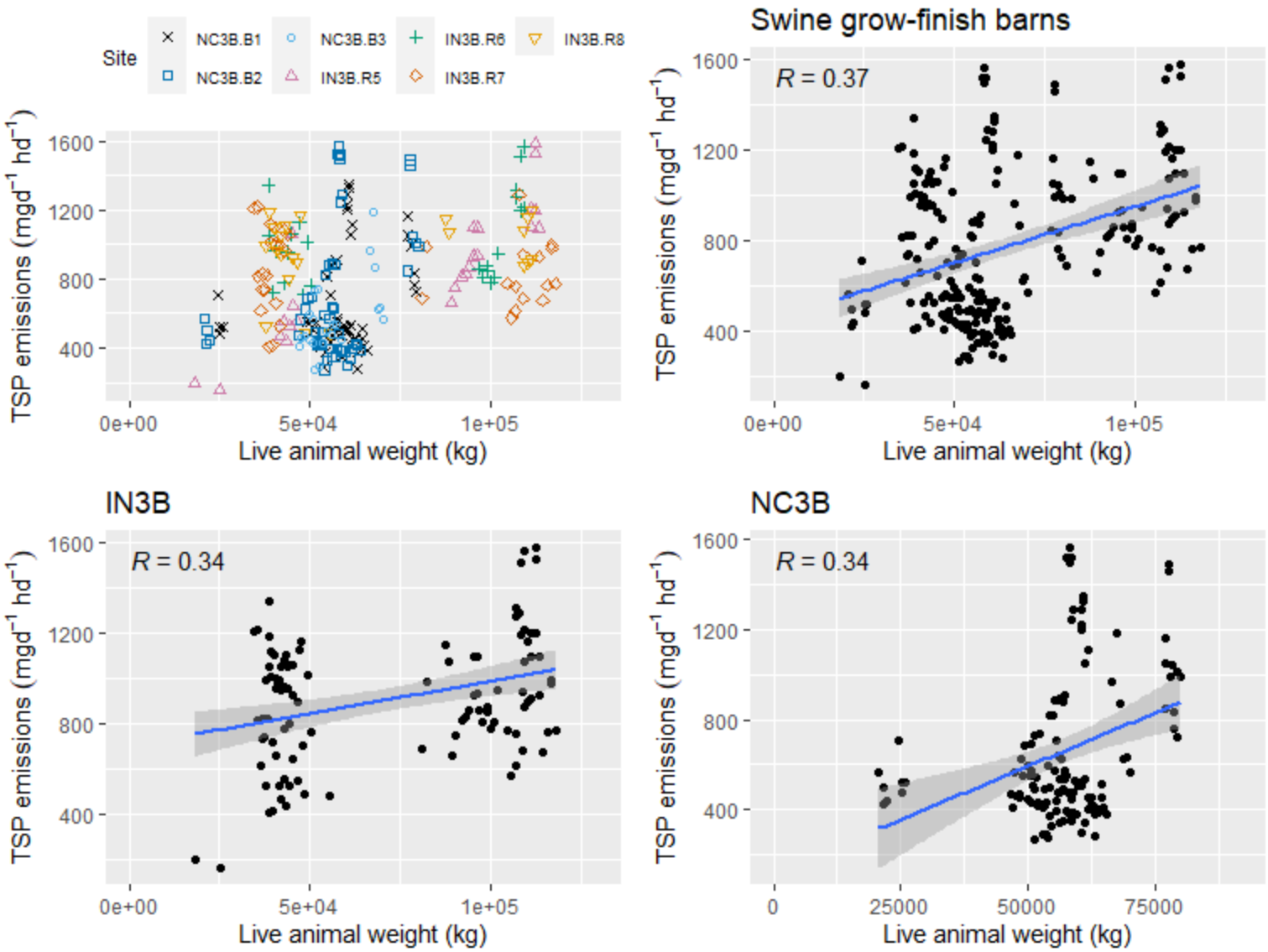


**Figure F.4-54. Scatter plot of swine grow-finish barns TSP emissions (mg d$^{-1}$hd$^{-1}$) versus live animal weight.**

F.4.1.5.4 Exhaust temperature

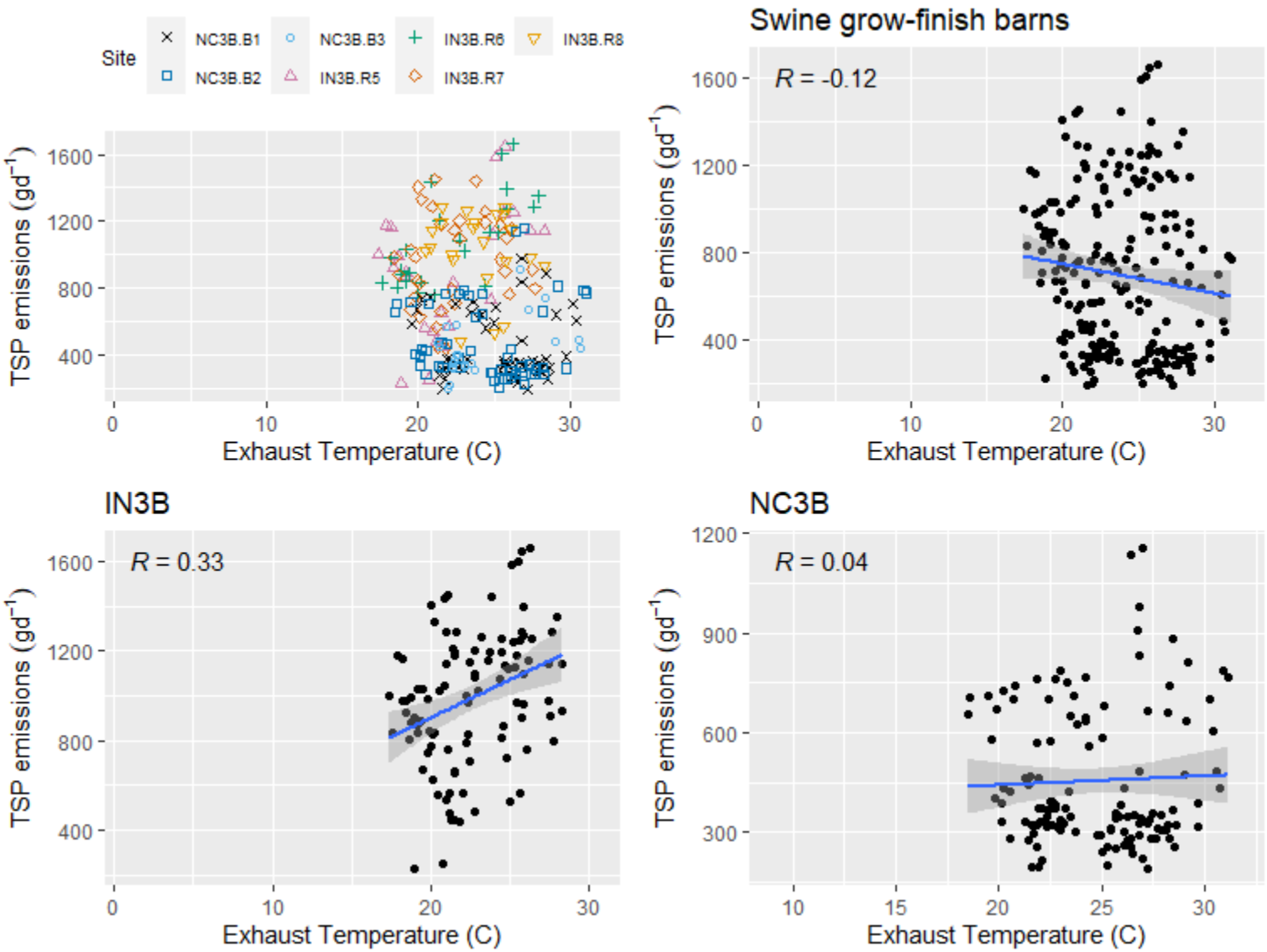


**Figure F.4-55. Scatter plot of swine grow-finish barns TSP emissions (g d$^{-1}$) versus exhaust temperature.**

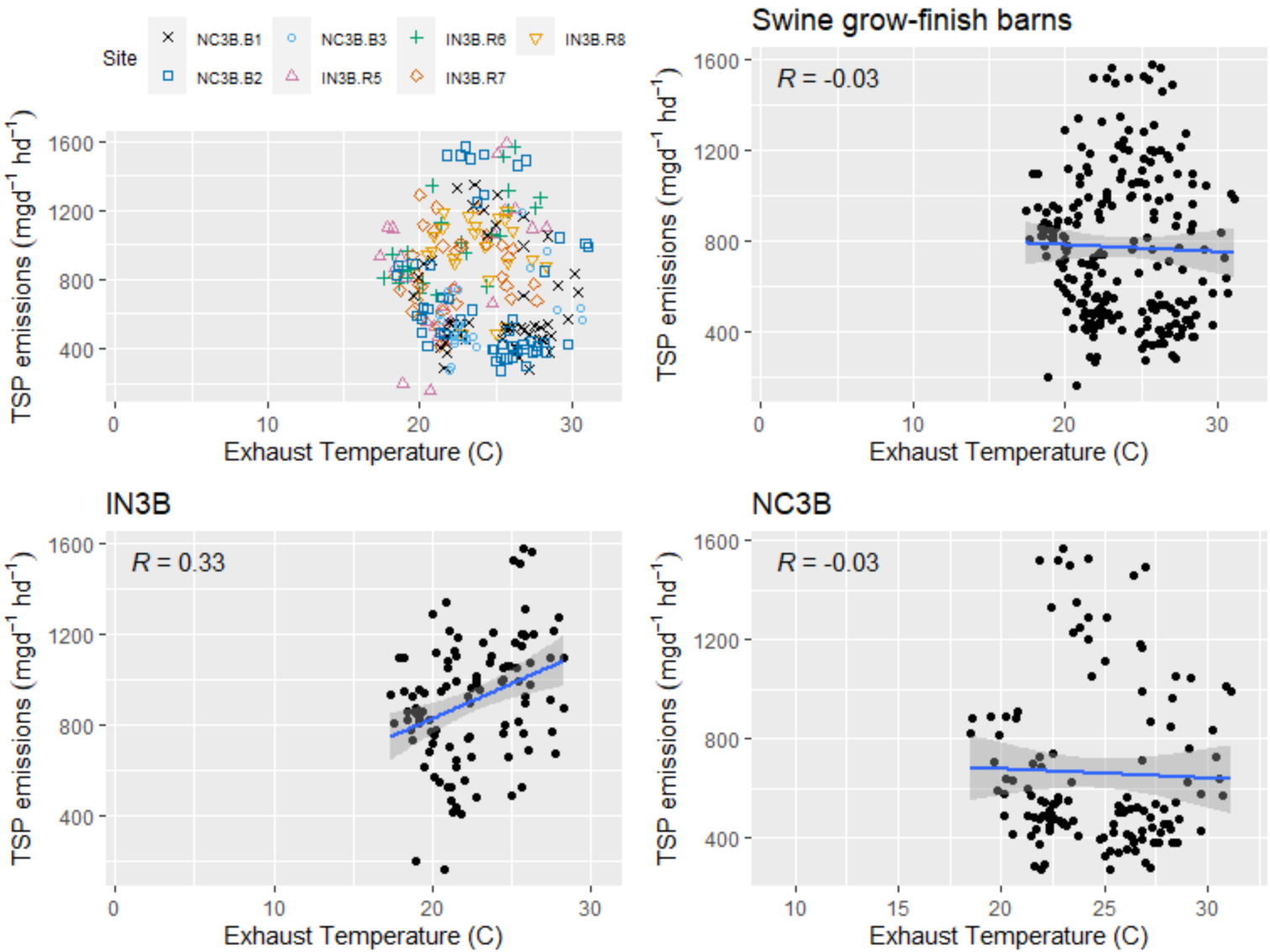


**Figure F.4-56. Scatter plot of swine grow-finish barns TSP emissions (mg d$^{-1}$hd$^{-1}$) versus exhaust temperature.**

F.4.1.5.5 Exhaust relative humidity

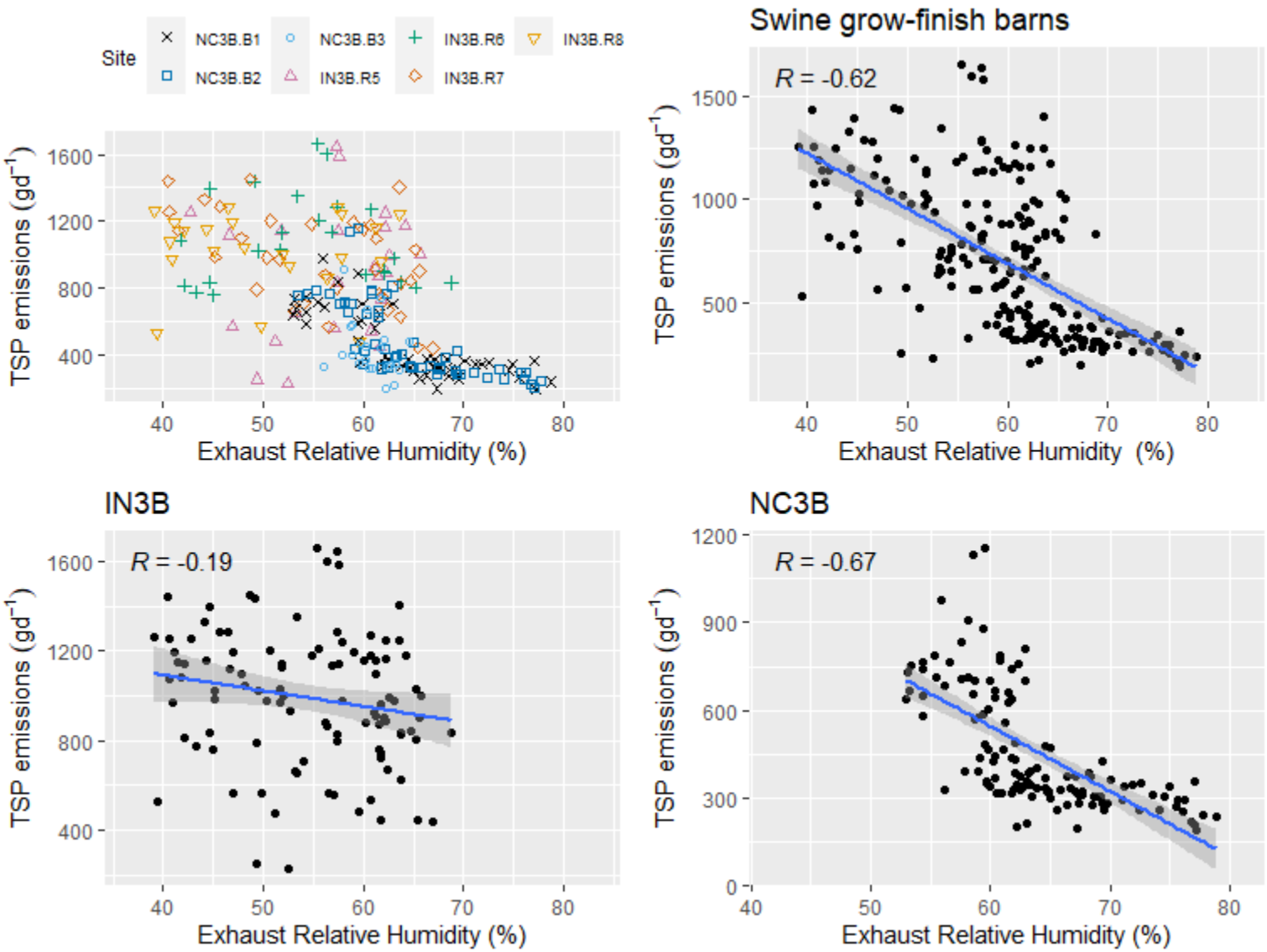


**Figure F.4-57. Scatter plot of swine grow-finish barns TSP emissions (g d$^{-1}$) versus exhaust relative humidity.**

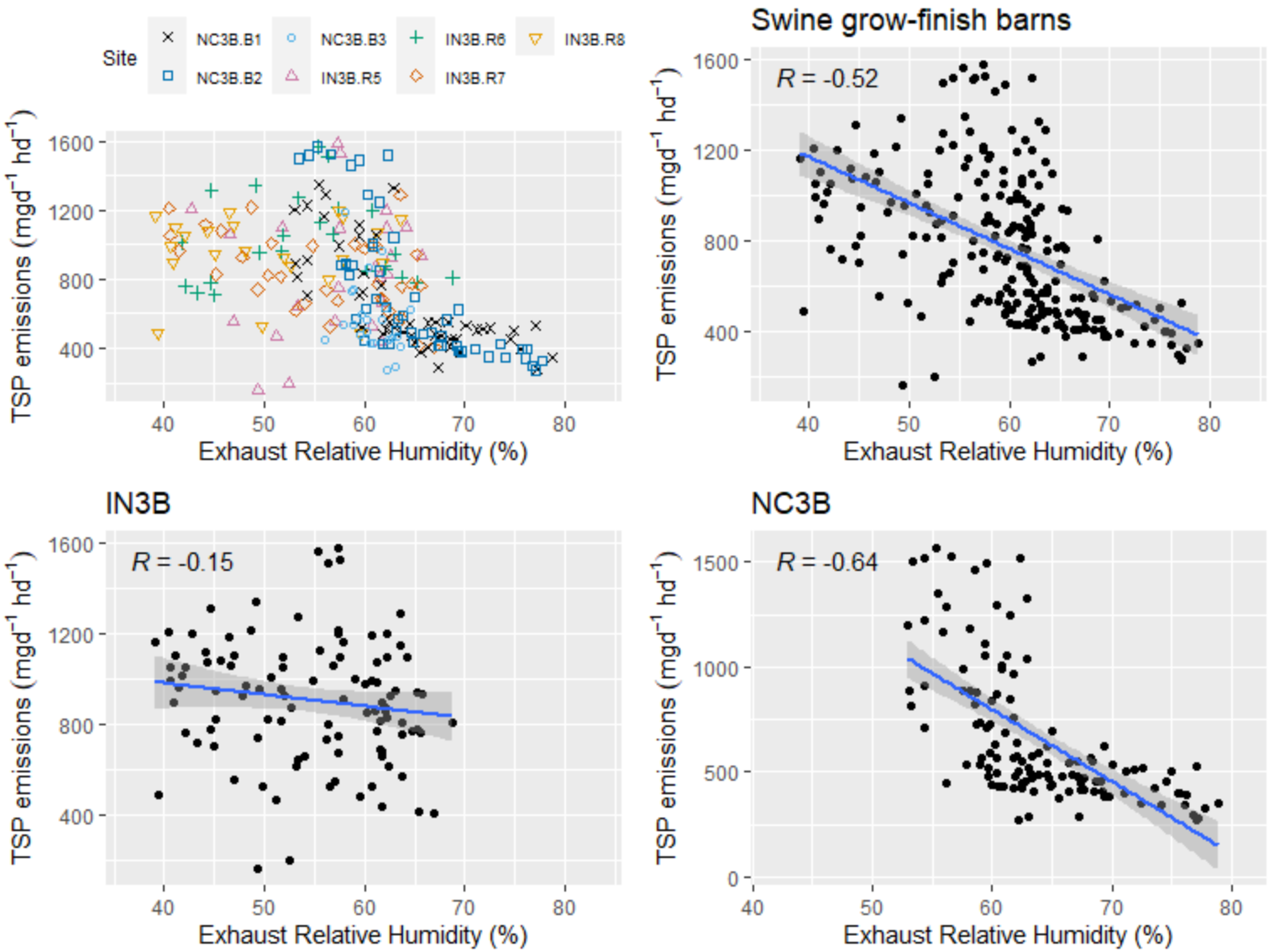


**Figure F.4-58. Scatter plot of swine grow-finish barns TSP emissions (mg d$^{-1}$hd$^{-1}$) versus exhaust relative humidity.**

F.4.1.5.6 Airflow

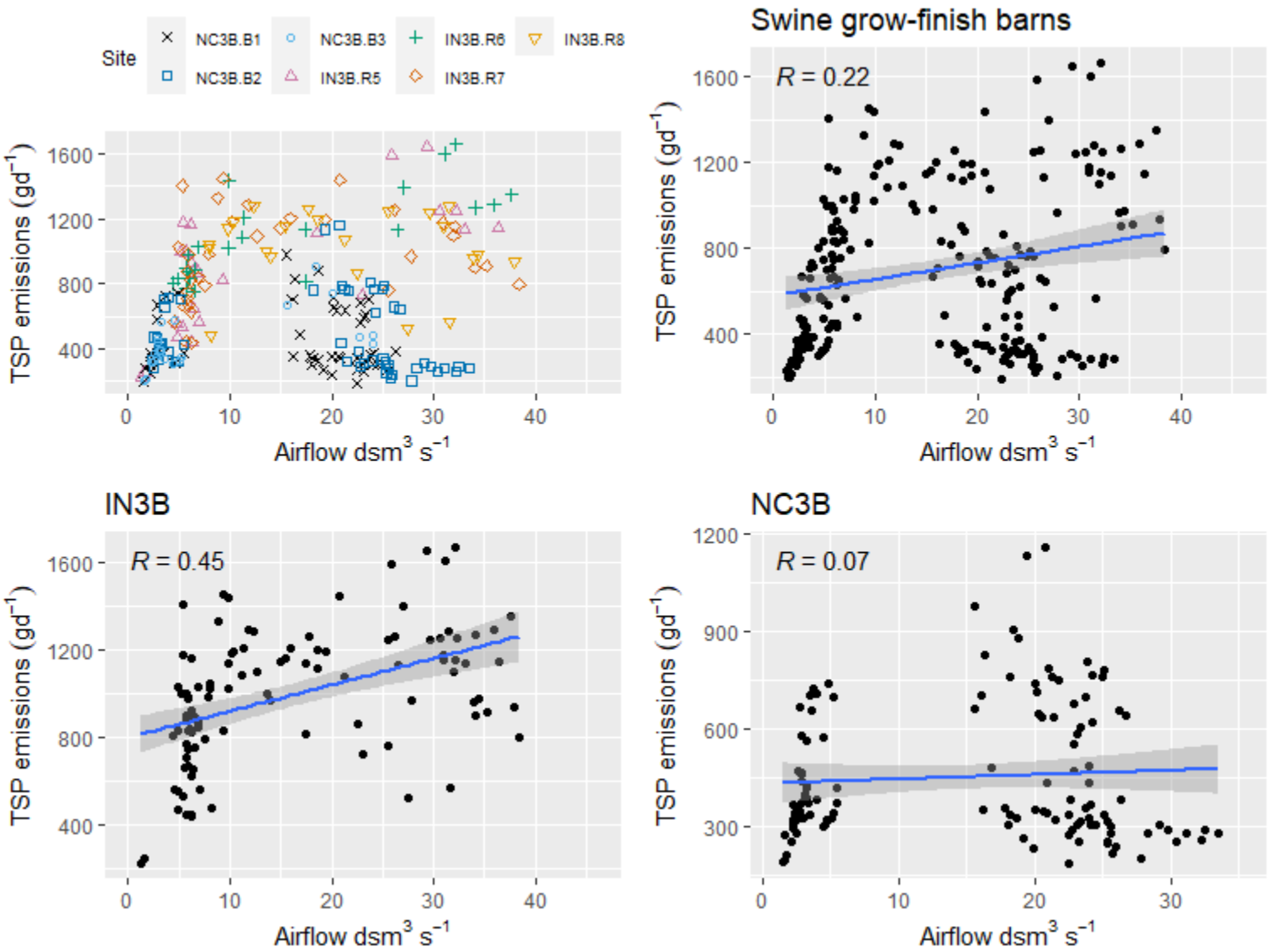


**Figure F.4-59. Scatter plot of swine grow-finish barns TSP emissions (g d$^{-1}$) versus airflow.**

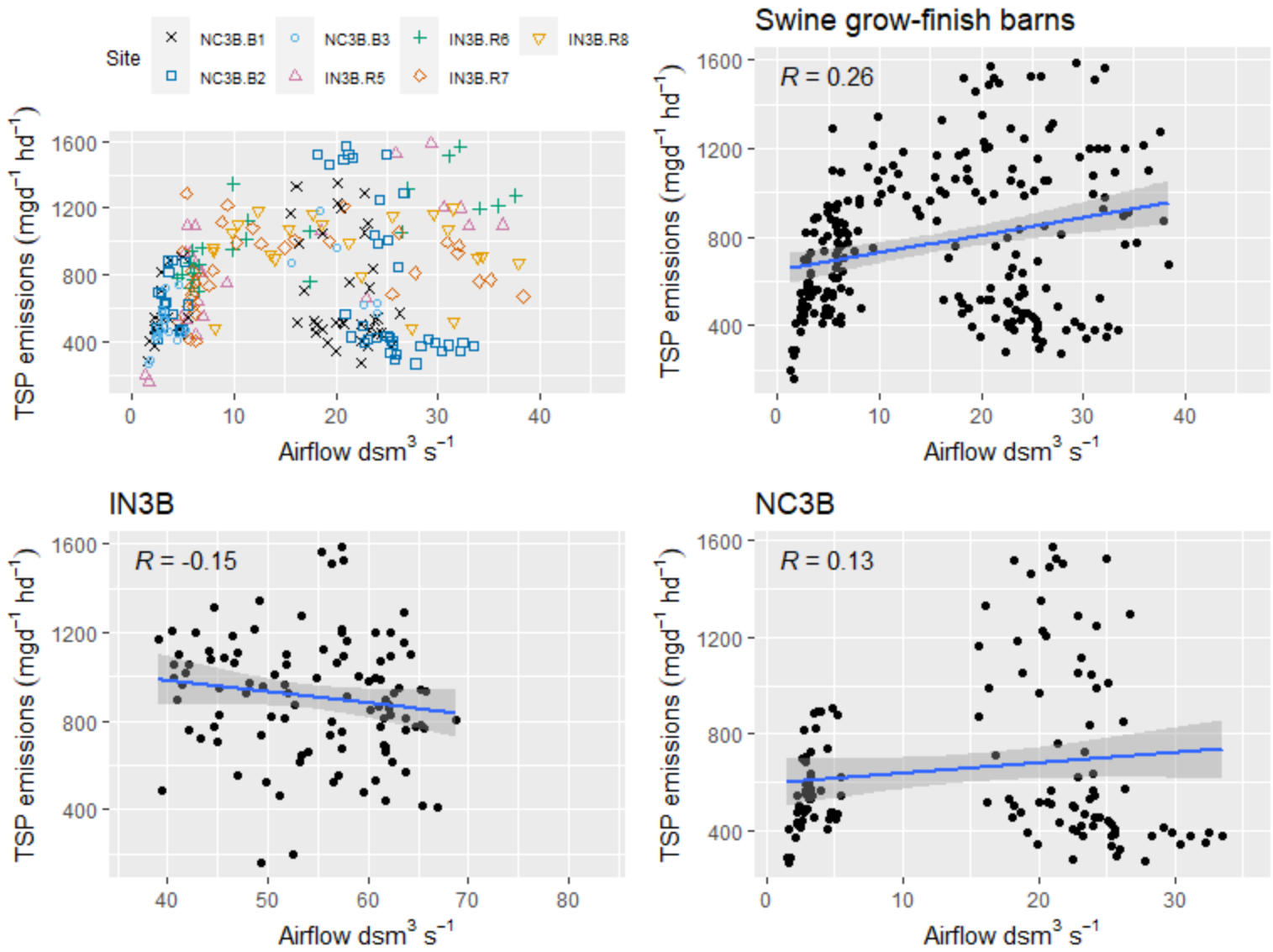


**Figure F.4-60. Scatter plot of swine grow-finish barns TSP emissions (mg d$^{-1}$hd$^{-1}$) versus airflow.**

### *F.4.2 Ambient*

**Table F.4.2. Summary of swine grow-finish barns $R^2$ values for ambient parameters.**

| Pollutant | Parameter | R | $R^2$ | Strength | Figure |
|---|---|---|---|---|---|
| $NH_3$ ($kgd^{-1}$) | Ambient Temperature (°C) | -0.03 | 0.00 | slight or weak | F.4-61 |
| $NH_3$ ($gd^{-1}hd^{-1}$) | Ambient Temperature (°C) | 0.00 | 0.00 | slight or weak | F.4-62 |
| $NH_3$ ($kgd^{-1}$) | Ambient Relative humidity (%) | 0.05 | 0.00 | slight or weak | F.4-63 |
| $NH_3$ ($gd^{-1}hd^{-1}$) | Ambient Relative humidity (%) | 0.14 | 0.02 | slight or weak | F.4-64 |
| $NH_3$ ($kgd^{-1}$) | Barometric Pressure (kPa) | -0.38 | 0.14 | slight or weak | F.4-65 |
| $NH_3$ ($gd^{-1}hd^{-1}$) | Barometric Pressure (kPa) | -0.08 | 0.01 | slight or weak | F.4-66 |
| $H_2S$ ($gd^{-1}$) | Ambient Temperature (°C) | -0.13 | 0.02 | slight or weak | F.4-67 |
| $H_2S$ ($mgd^{-1}hd^{-1}$) | Ambient Temperature (°C) | -0.09 | 0.01 | slight or weak | F.4-68 |
| $H_2S$ ($gd^{-1}$) | Ambient Relative humidity (%) | 0.09 | 0.01 | slight or weak | F.4-69 |
| $H_2S$ ($mgd^{-1}hd^{-1}$) | Ambient Relative humidity (%) | 0.11 | 0.01 | slight or weak | F.4-70 |
| $H_2S$ ($gd^{-1}$) | Barometric Pressure (kPa) | -0.35 | 0.12 | slight or weak | F.4-71 |
| $H_2S$ ($mgd^{-1}hd^{-1}$) | Barometric Pressure (kPa) | -0.23 | 0.06 | slight or weak | F.4-72 |
| $PM_{10}$ ($gd^{-1}$) | Ambient Temperature (°C) | 0.07 | 0.01 | slight or weak | F.4-73 |
| $PM_{10}$ ($mgd^{-1}hd^{-1}$) | Ambient Temperature (°C) | 0.14 | 0.02 | slight or weak | F.4-74 |
| $PM_{10}$ ($gd^{-1}$) | Ambient Relative humidity (%) | -0.26 | 0.07 | slight or weak | F.4-75 |
| $PM_{10}$ ($mgd^{-1}hd^{-1}$) | Ambient Relative humidity (%) | -0.11 | 0.01 | slight or weak | F.4-76 |
| $PM_{10}$ ($gd^{-1}$) | Barometric Pressure (kPa) | -0.12 | 0.01 | slight or weak | F.4-77 |
| $PM_{10}$ ($mgd^{-1}hd^{-1}$) | Barometric Pressure (kPa) | 0.05 | 0.00 | slight or weak | F.4-78 |
| $PM_{2.5}$ ($gd^{-1}$) | Ambient Temperature (°C) | 0.11 | 0.01 | slight or weak | F.4-79 |
| $PM_{2.5}$ ($mgd^{-1}hd^{-1}$) | Ambient Temperature (°C) | 0.15 | 0.02 | slight or weak | F.4-80 |
| $PM_{2.5}$ ($gd^{-1}$) | Ambient Relative humidity (%) | -0.09 | 0.01 | slight or weak | F.4-81 |
| $PM_{2.5}$ ($mgd^{-1}hd^{-1}$) | Ambient Relative humidity (%) | -0.02 | 0.00 | slight or weak | F.4-82 |
| $PM_{2.5}$ ($gd^{-1}$) | Barometric Pressure (kPa) | 0.34 | 0.12 | slight or weak | F.4-83 |
| $PM_{2.5}$ ($mgd^{-1}hd^{-1}$) | Barometric Pressure (kPa) | 0.33 | 0.11 | slight or weak | F.4-84 |
| TSP ($gd^{-1}$) | Ambient Temperature (°C) | -0.15 | 0.02 | slight or weak | F.4-85 |
| TSP ($mgd^{-1}hd^{-1}$) | Ambient Temperature (°C) | 0.02 | 0.00 | slight or weak | F.4-86 |
| TSP ($gd^{-1}$) | Ambient Relative humidity (%) | -0.34 | 0.12 | slight or weak | F.4-87 |
| TSP ($mgd^{-1}hd^{-1}$) | Ambient Relative humidity (%) | -0.31 | 0.10 | slight or weak | F.4-88 |
| TSP ($gd^{-1}$) | Barometric Pressure (kPa) | -0.60 | 0.36 | modest | F.4-89 |
| TSP ($mgd^{-1}hd^{-1}$) | Barometric Pressure (kPa) | -0.23 | 0.05 | slight or weak | F.4-90 |

### *F.4.2.1 Ammonia ($NH_3$)*

F.4.2.1.1 Ambient temperature

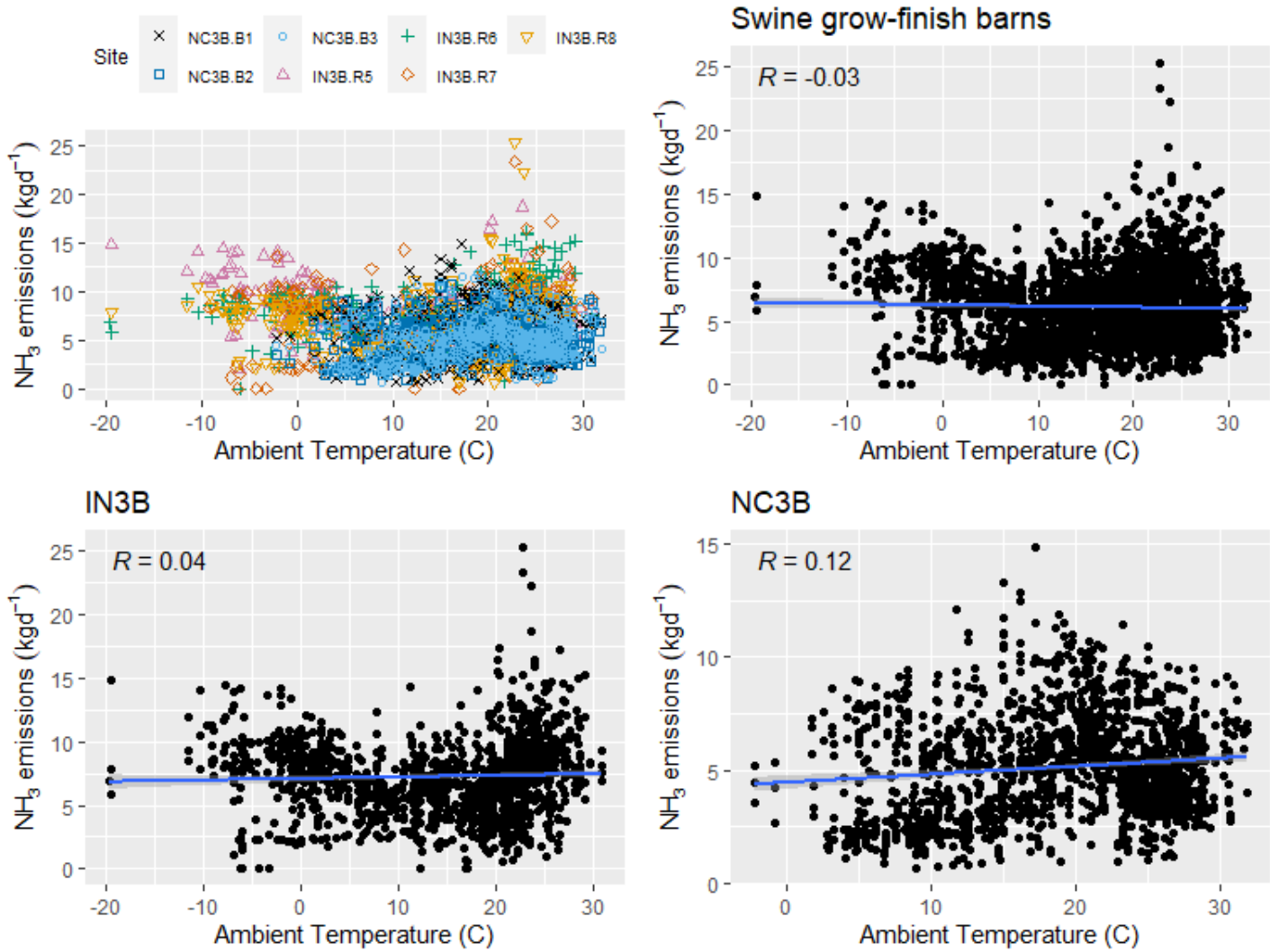


**Figure F.4-61. Scatter plot of swine grow-finish barns $NH_3$ emissions (kg $d^{-1}$) versus ambient temperature.**

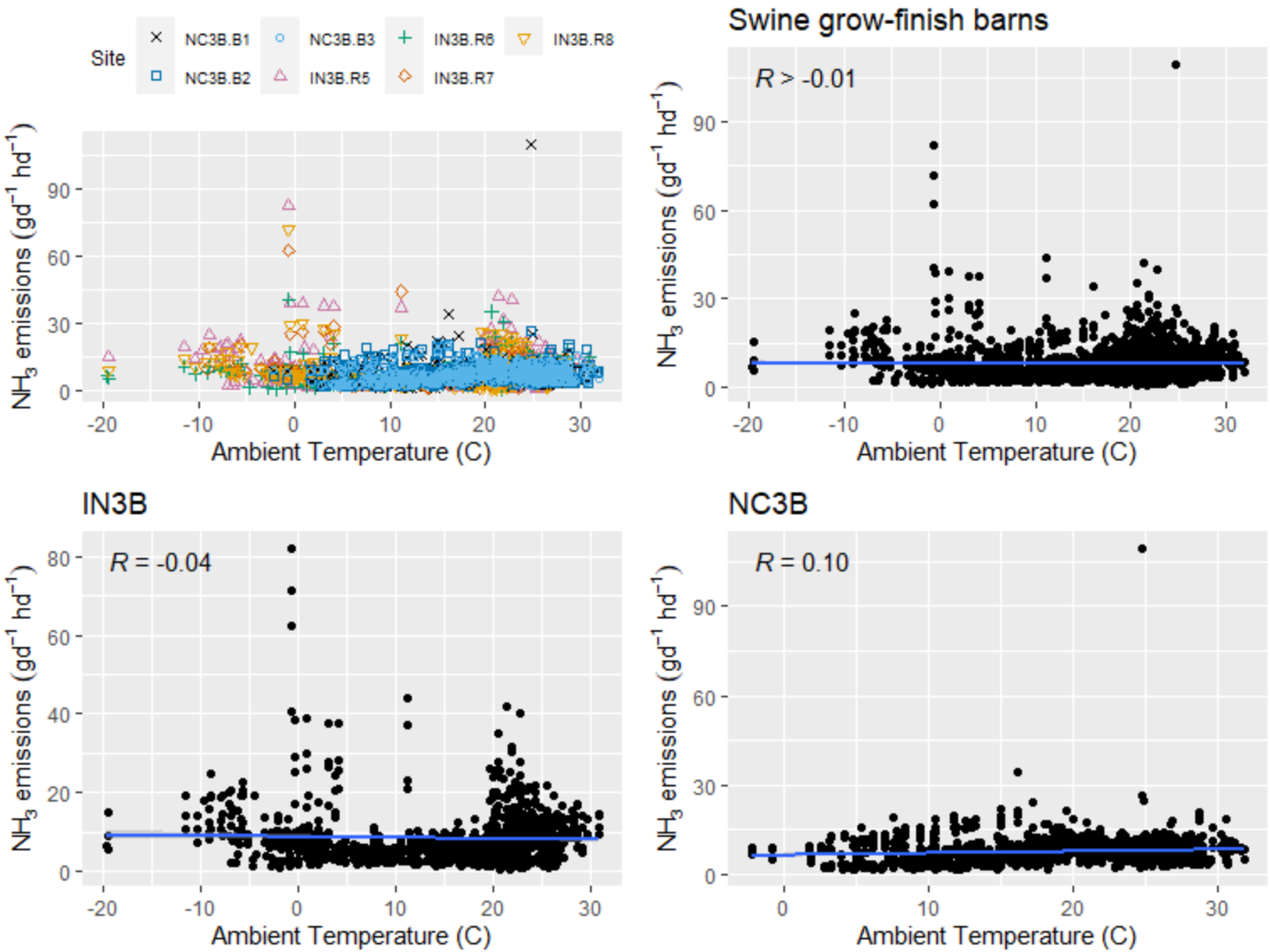


**Figure F.4-62. Scatter plot of swine grow-finish barns $NH_3$ emissions (g $d^{-1}hd^{-1}$) versus ambient temperature.**

F.4.2.1.2 Ambient relative humidity

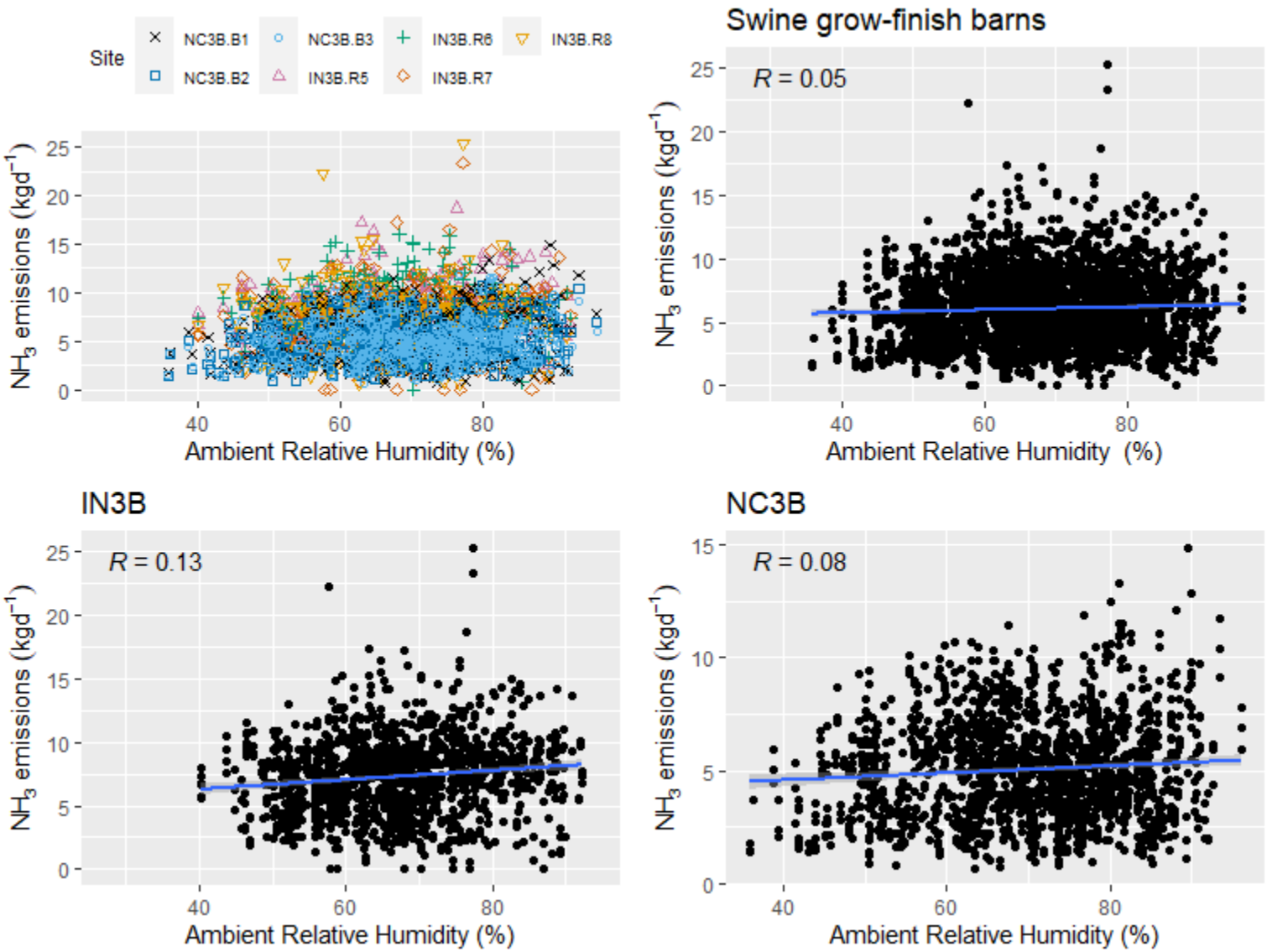


**Figure F.4-63. Scatter plot of swine grow-finish barns $NH_3$ emissions (kg $d^{-1}$) versus ambient relative humidity.**

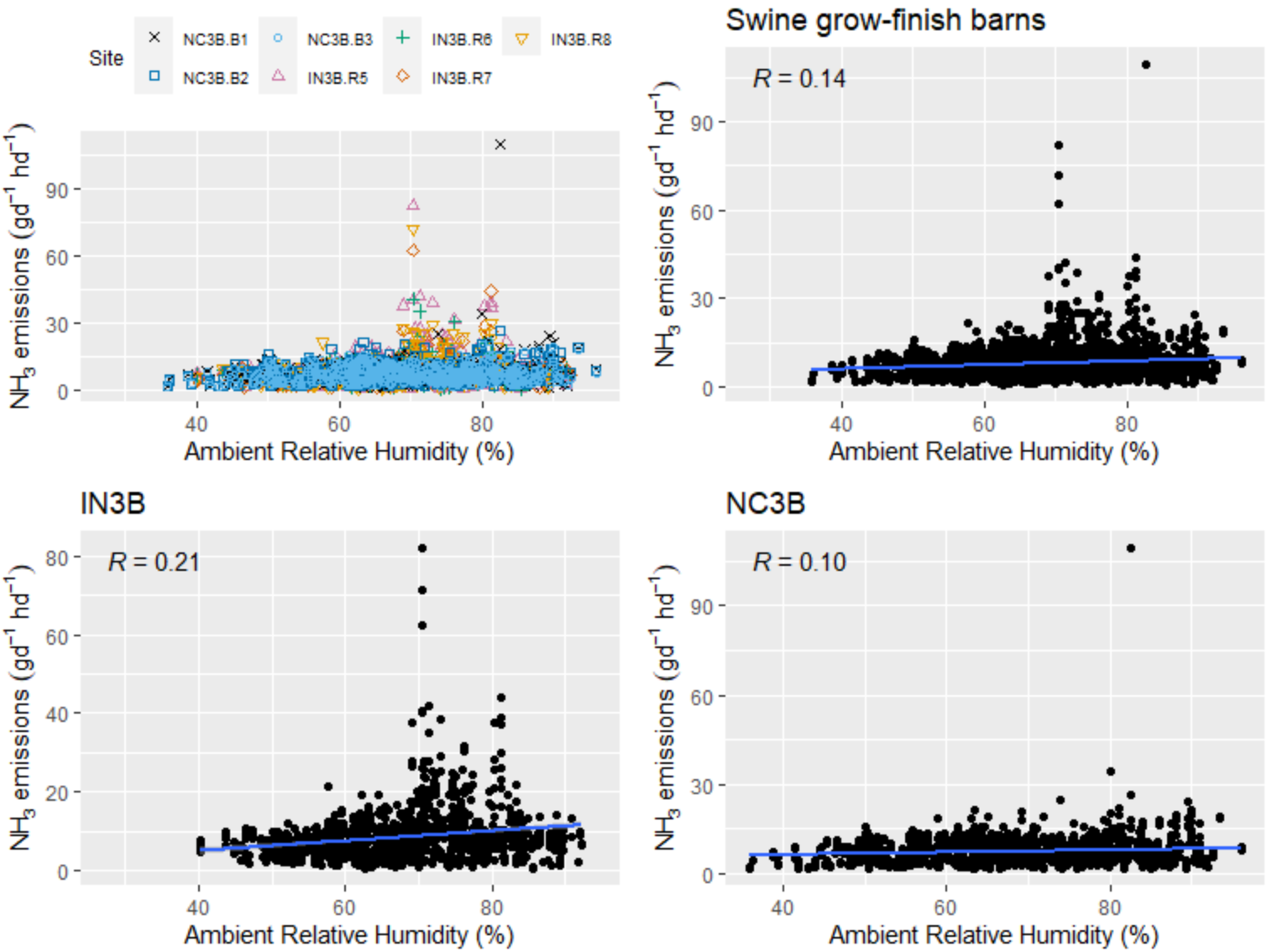


**Figure F.4-64. Scatter plot of swine grow-finish barns $NH_3$ emissions (g $d^{-1}hd^{-1}$) versus ambient relative humidity.**

F.4.2.1.3 Air pressure

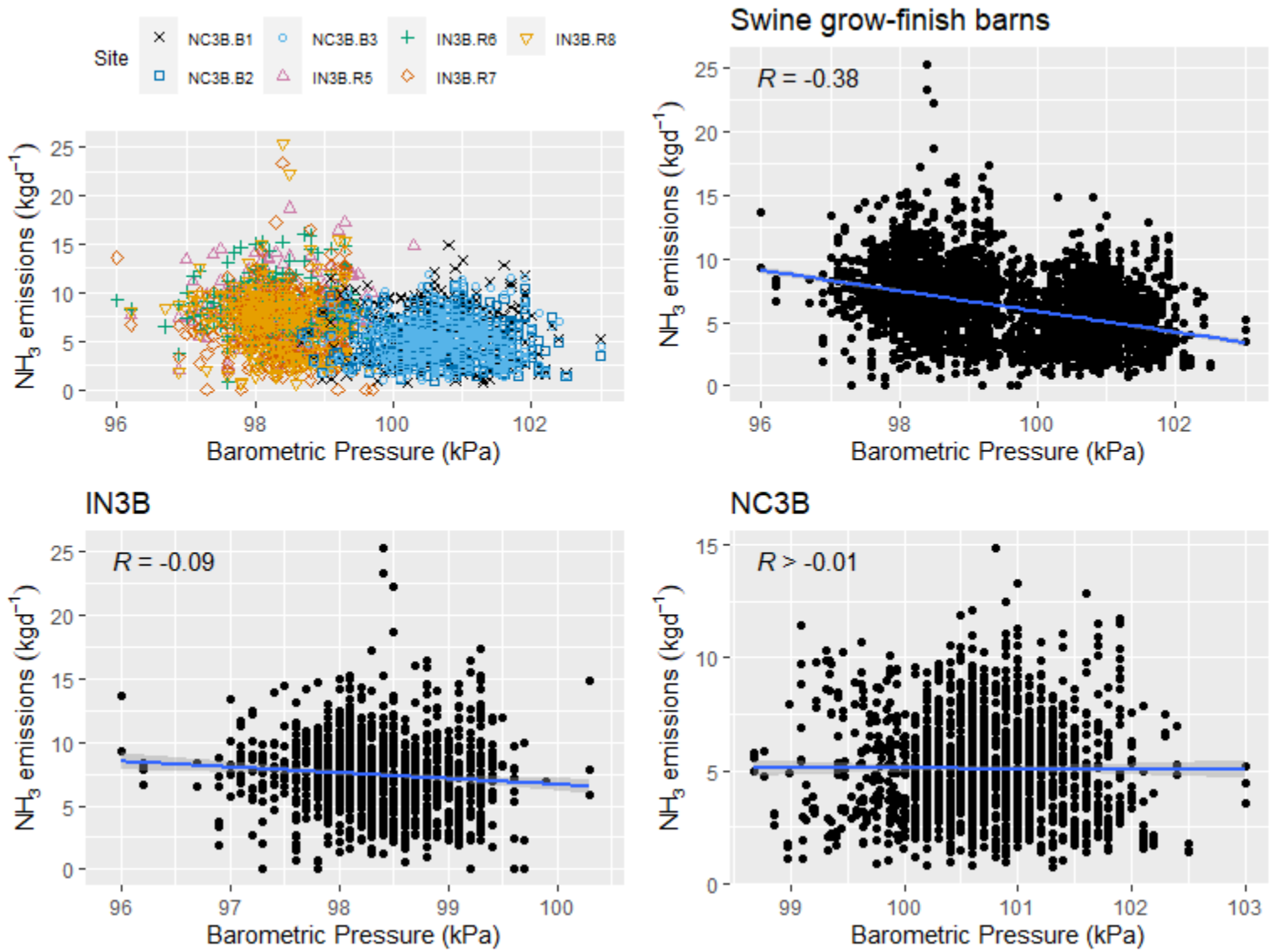


**Figure F.4-65. Scatter plot of swine grow-finish barns $NH_3$ emissions (kg $d^{-1}$) versus air pressure.**

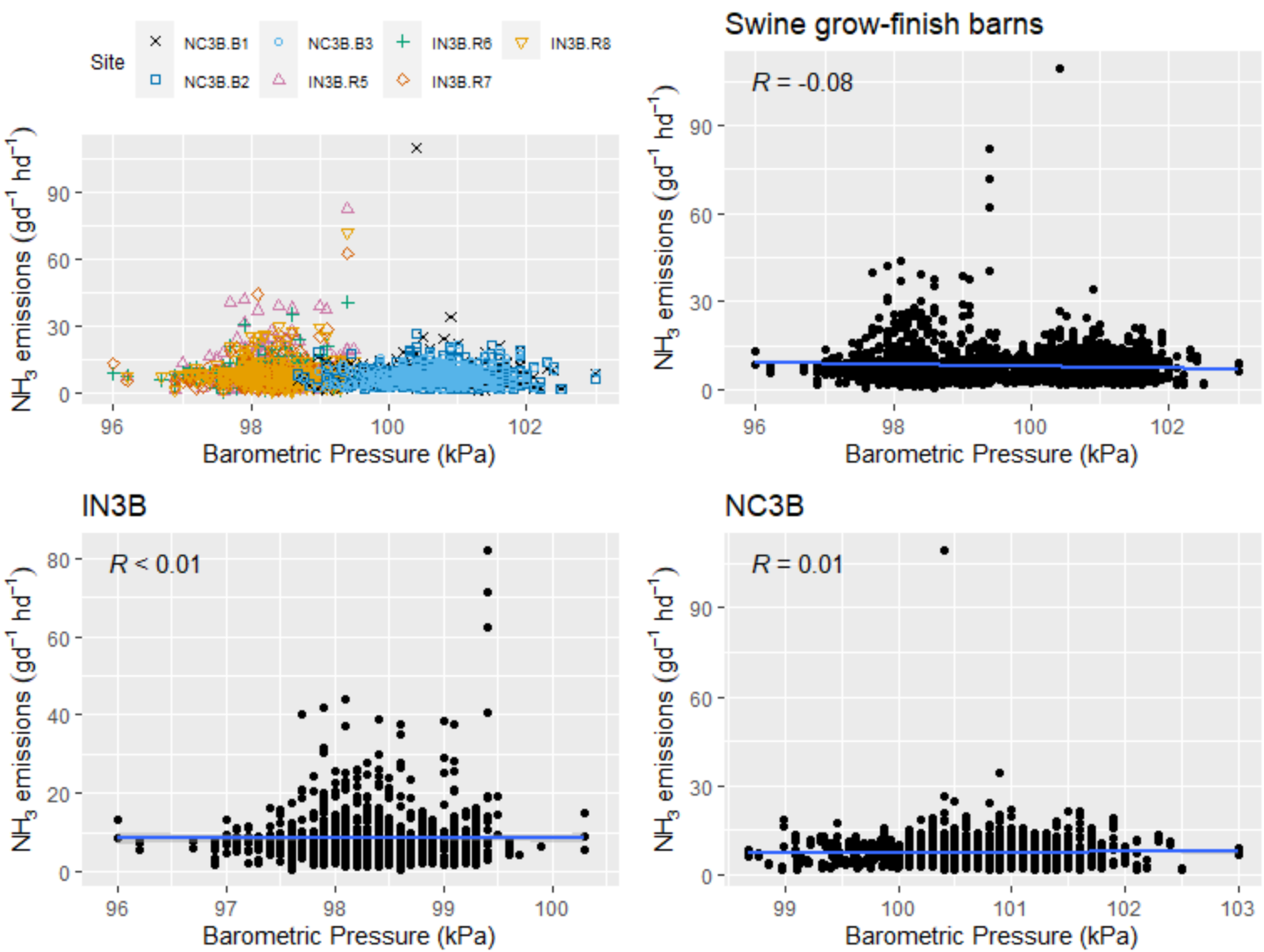


**Figure F.4-66. Scatter plot of swine grow-finish barns $NH_3$ emissions (g $d^{-1}hd^{-1}$) versus air pressure.**

### *F.4.2.2 Hydrogen Sulfide ($H_2S$)*

F.4.2.2.1 Ambient temperature

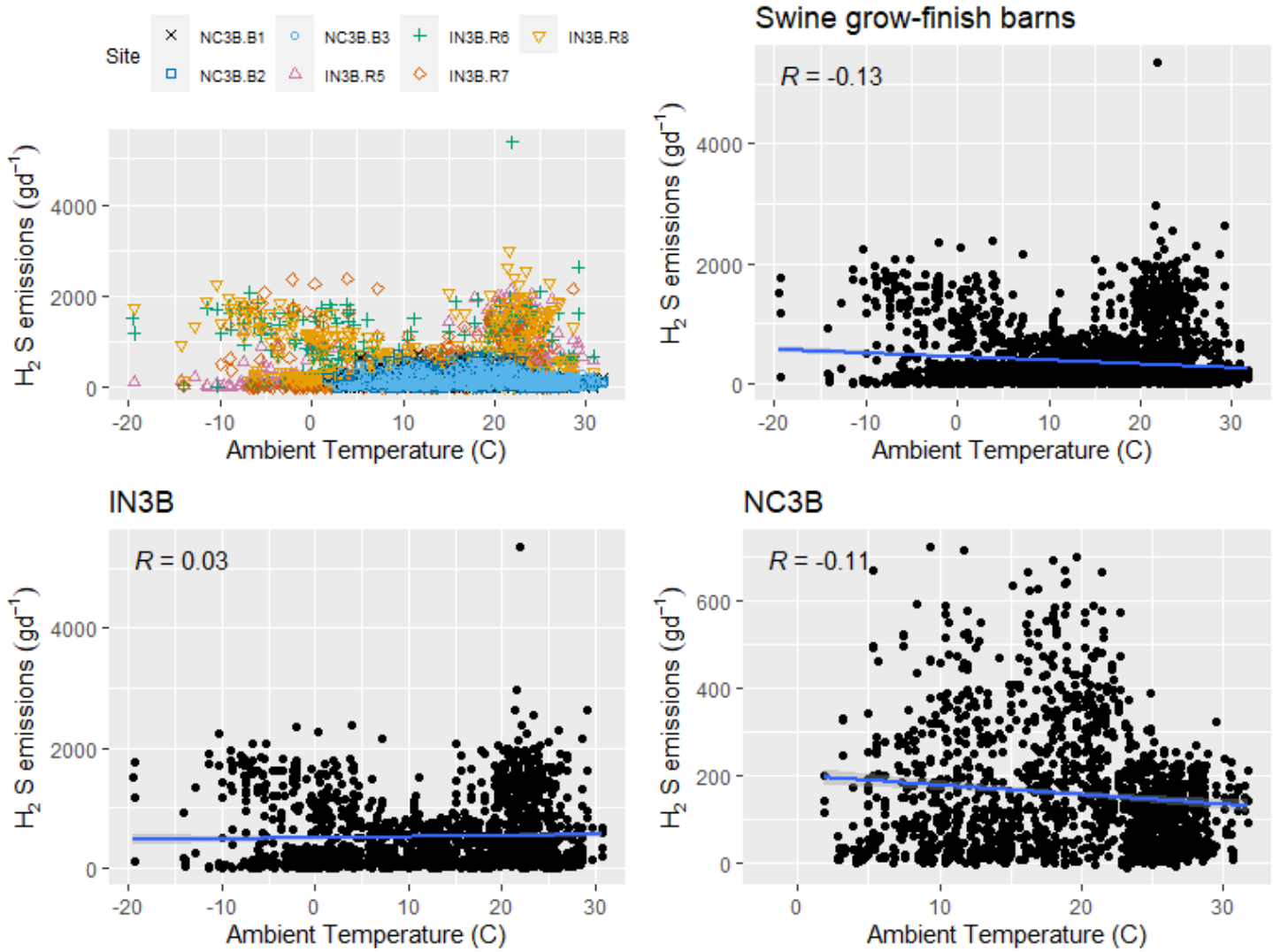


**Figure F.4-67 Scatter plot of swine grow-finish barns $H_2S$ emissions (g $d^{-1}$) versus ambient temperature.**

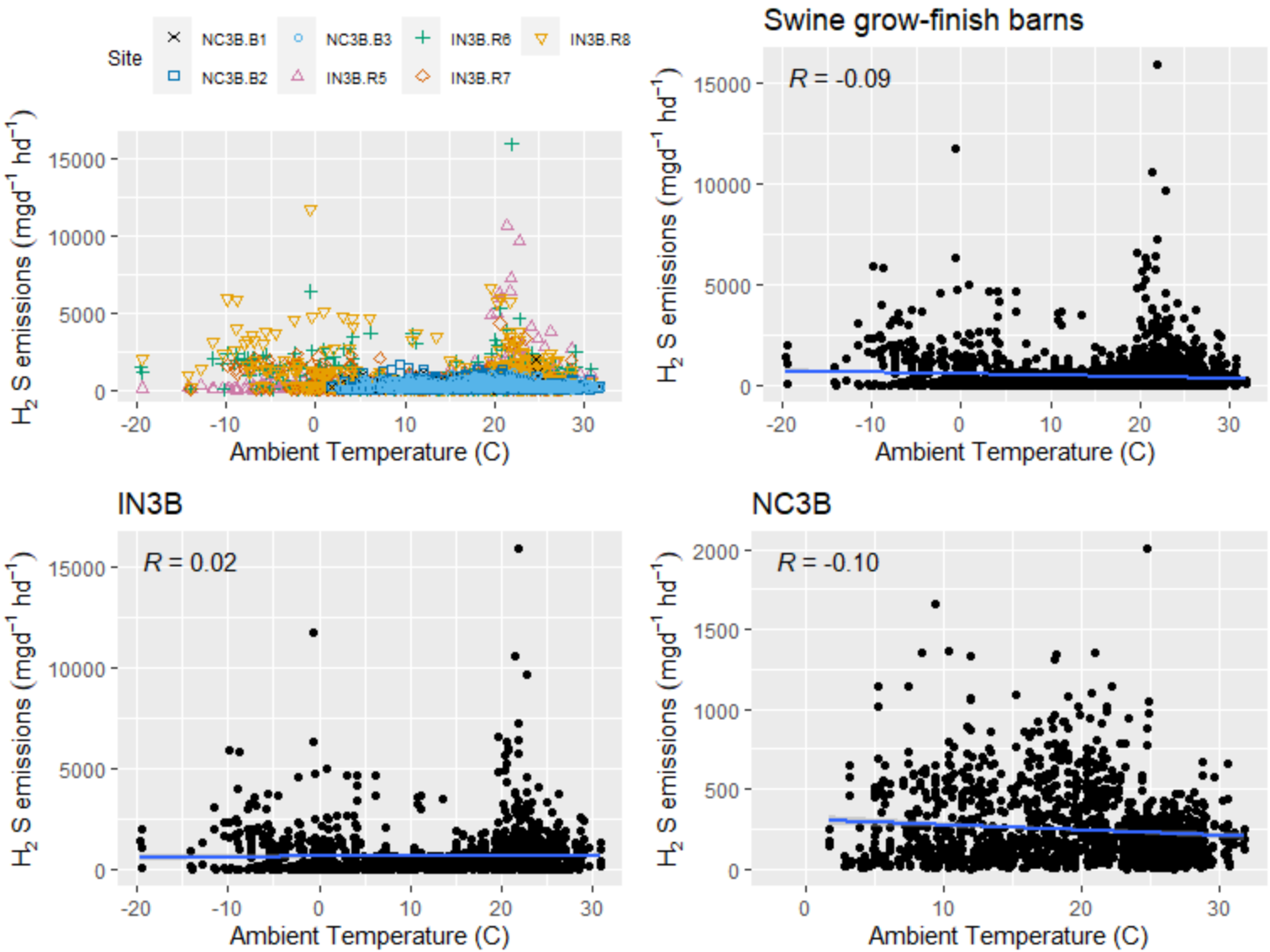


**Figure F.4-68. Scatter plot of swine grow-finish barns $H_2S$ emissions (mg $d^{-1}hd^{-1}$) versus ambient temperature.**

F.4.2.2.2 Ambient relative humidity

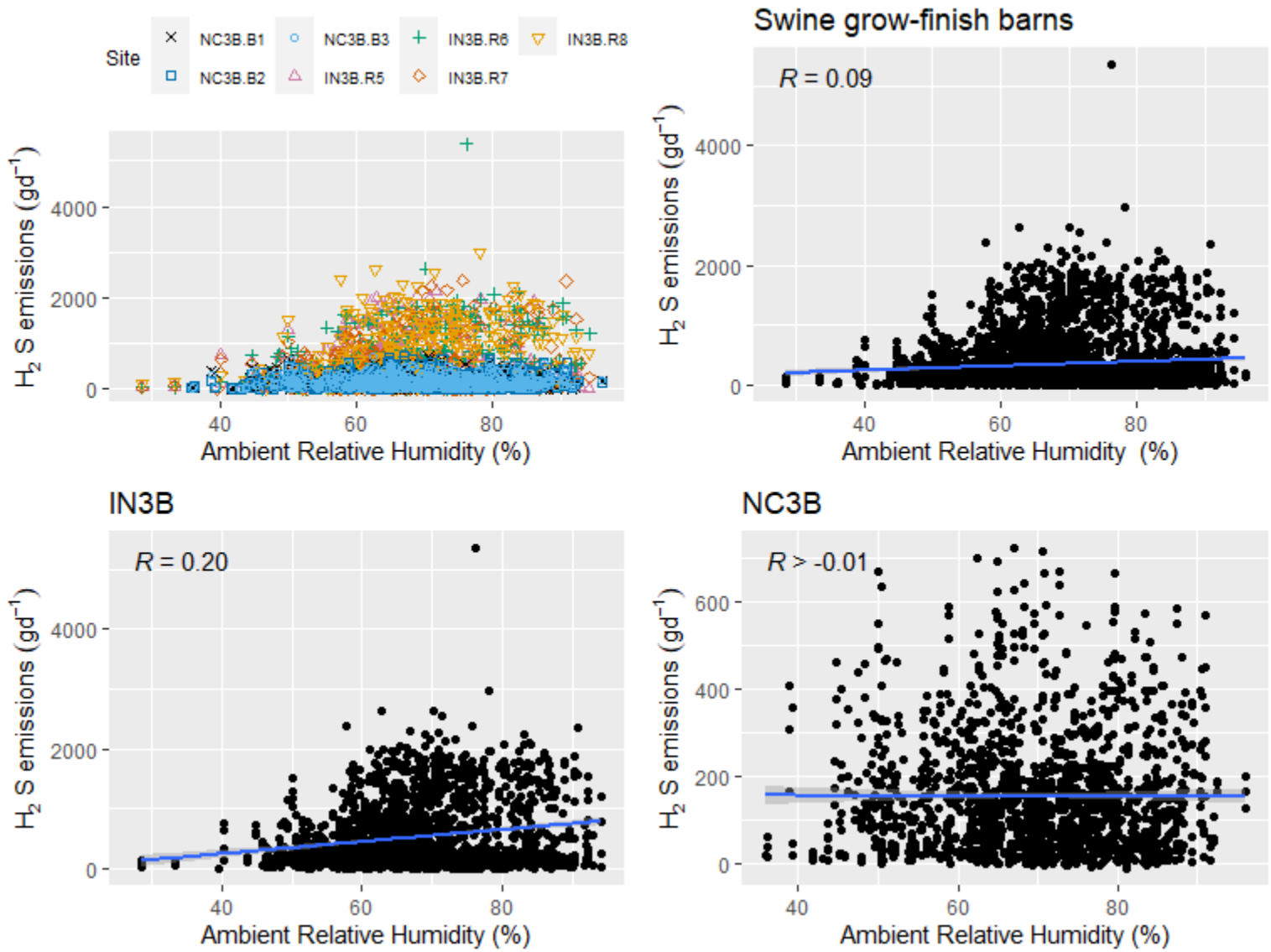


**Figure F.4-69. Scatter plot of swine grow-finish barns $H_2S$ emissions (g $d^{-1}$) versus ambient relative humidity.**

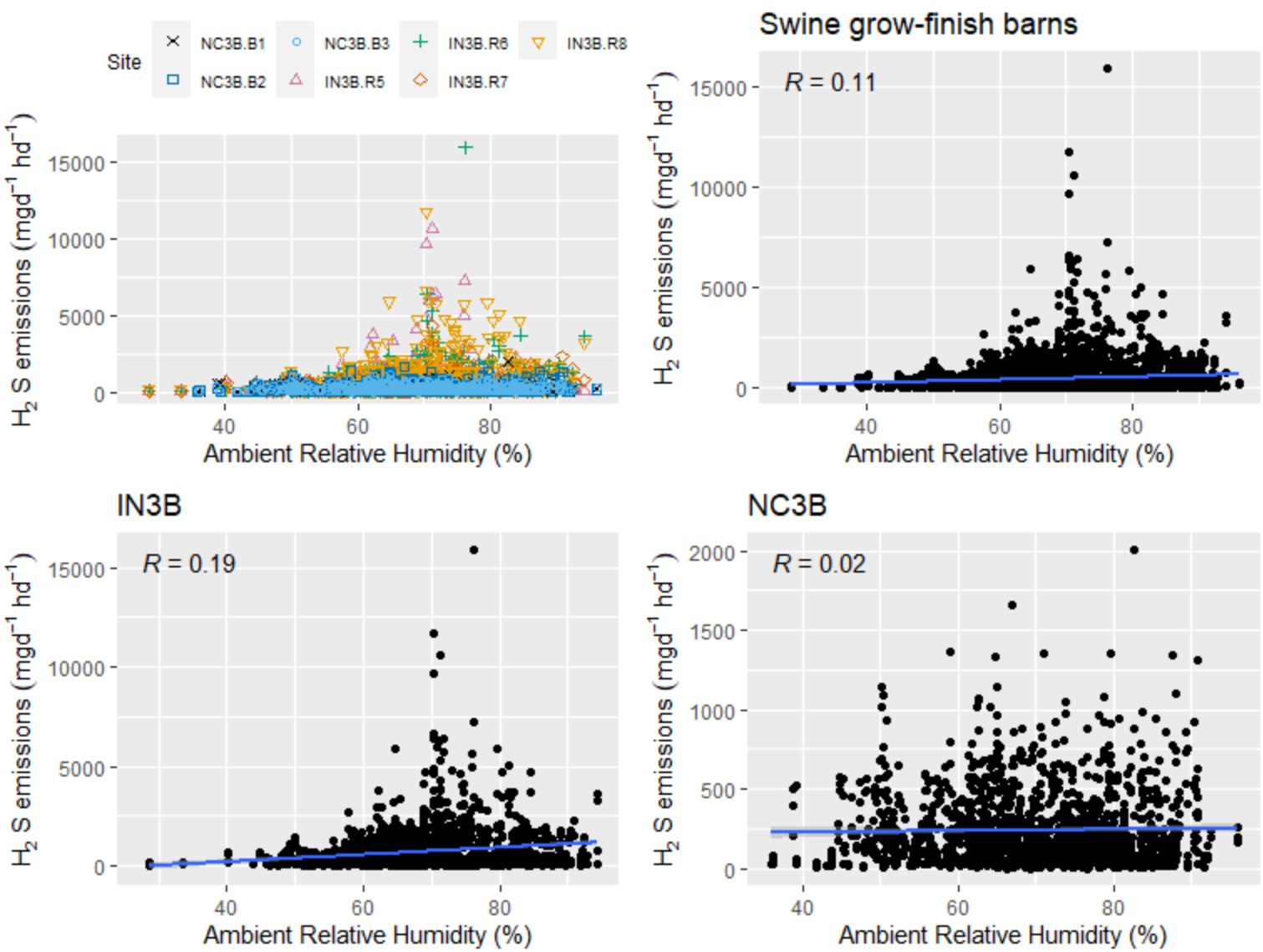


**Figure F.4-70. Scatter plot of swine grow-finish barns $H_2S$ emissions (mg $d^{-1}hd^{-1}$) versus ambient relative humidity.**

F.4.2.2.3 Air pressure

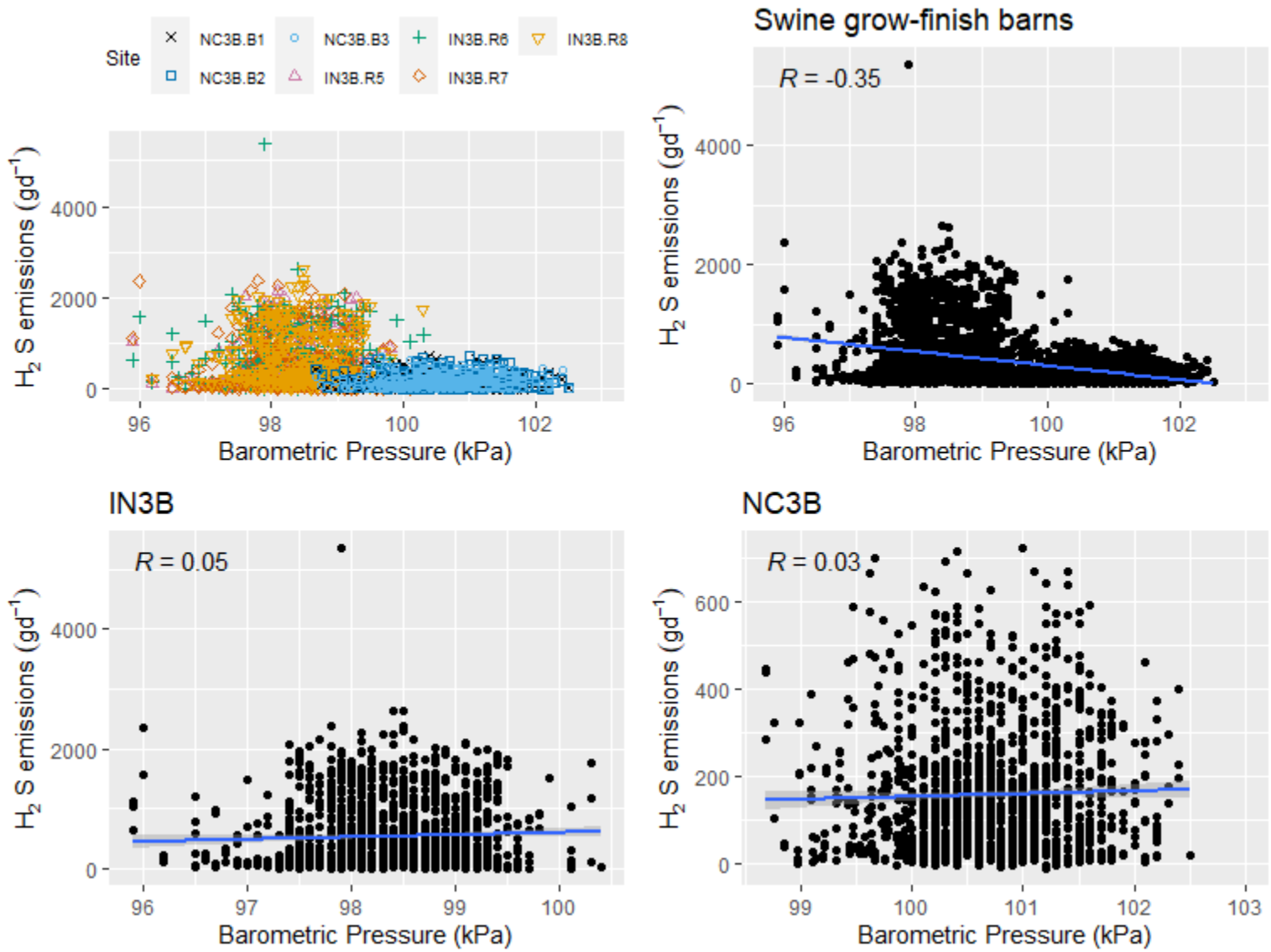


**Figure F.4-71. Scatter plot of swine grow-finish barns $H_2S$ emissions (g $d^{-1}$) versus air pressure.**

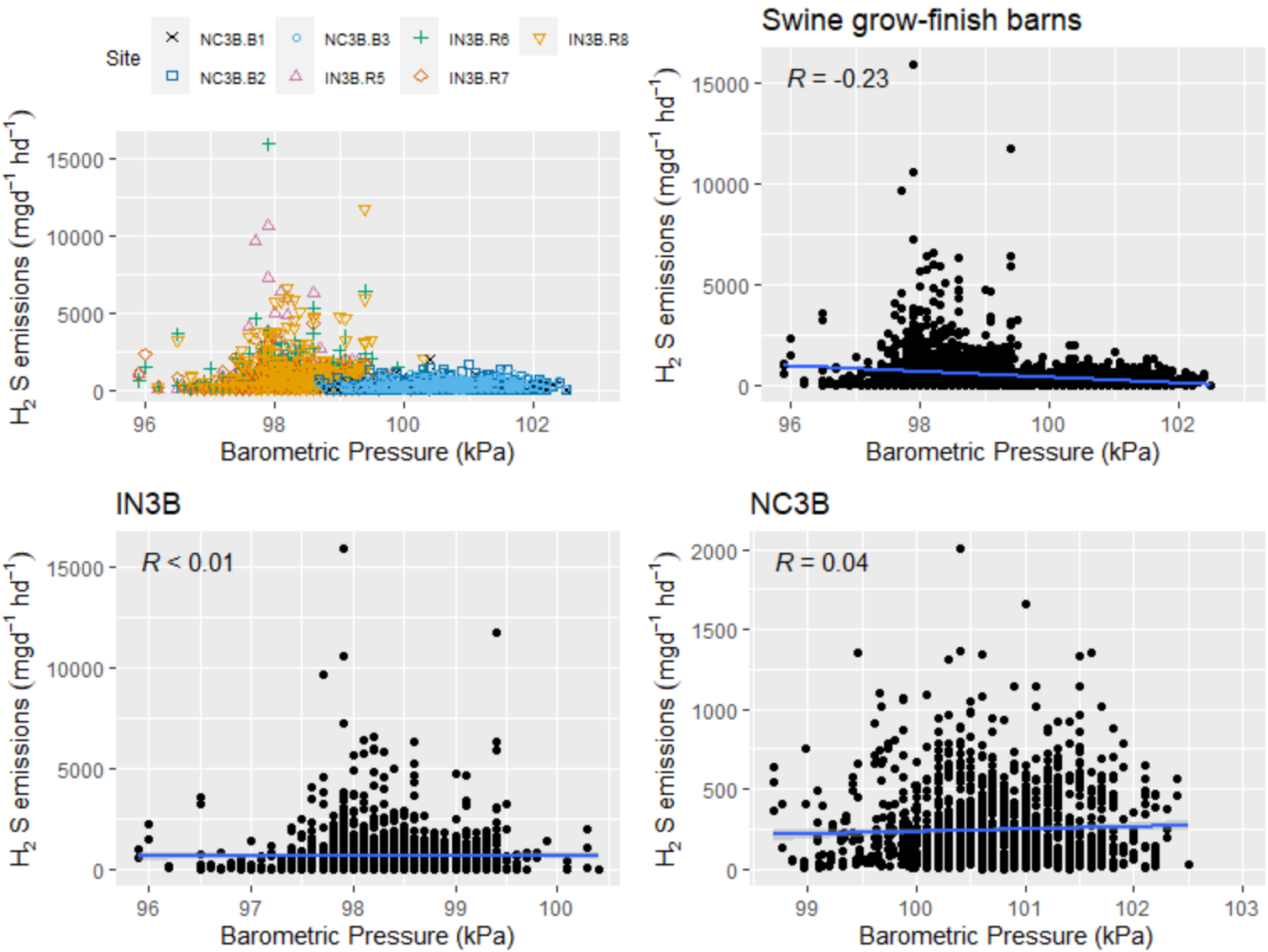


**Figure F.4-72. Scatter plot of swine grow-finish barns $H_2S$ emissions (mg $d^{-1}hd^{-1}$) versus air pressure.**

### *F.4.2.3 Particulate Matter ($PM_{10}$)*

F.4.2.3.1 Ambient temperature

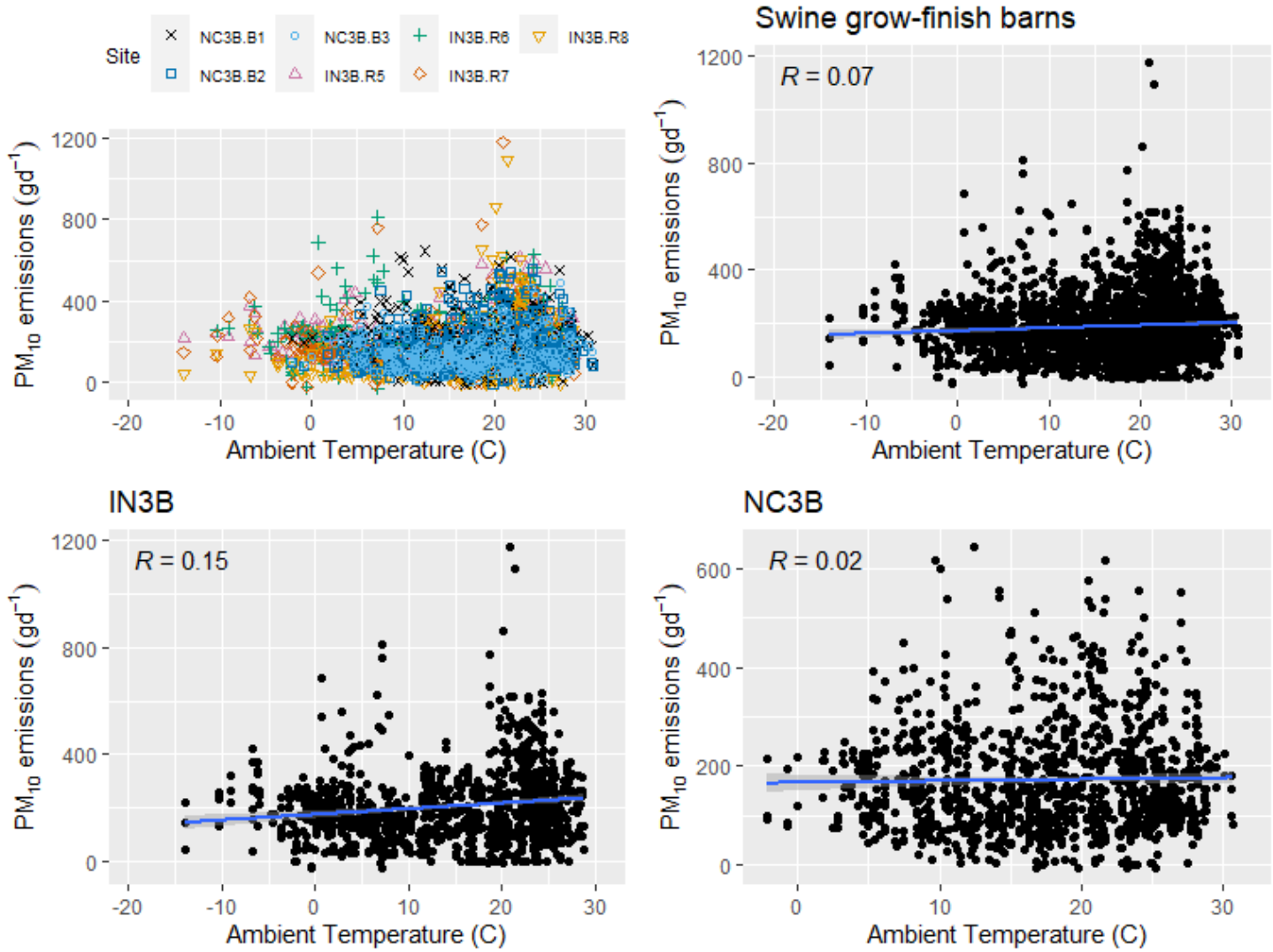


**Figure F.4-73. Scatter plot of swine grow-finish barns $PM_{10}$ emissions (g $d^{-1}$) versus ambient temperature.**

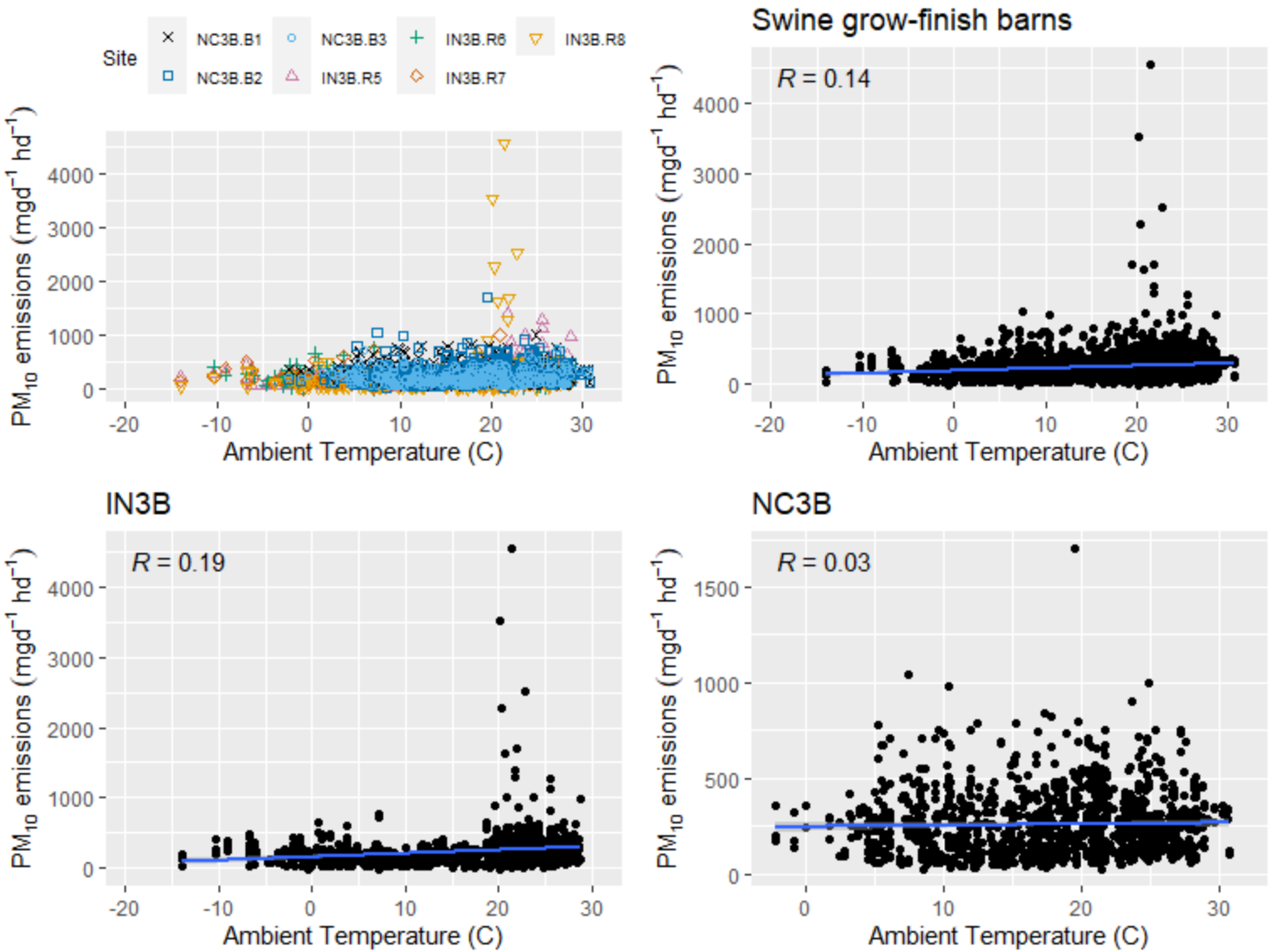


**Figure F.4-74. Scatter plot of swine grow-finish barns $PM_{10}$ emissions (mg $d^{-1}hd^{-1}$) versus ambient temperature.**

F.4.2.3.2 Ambient relative humidity

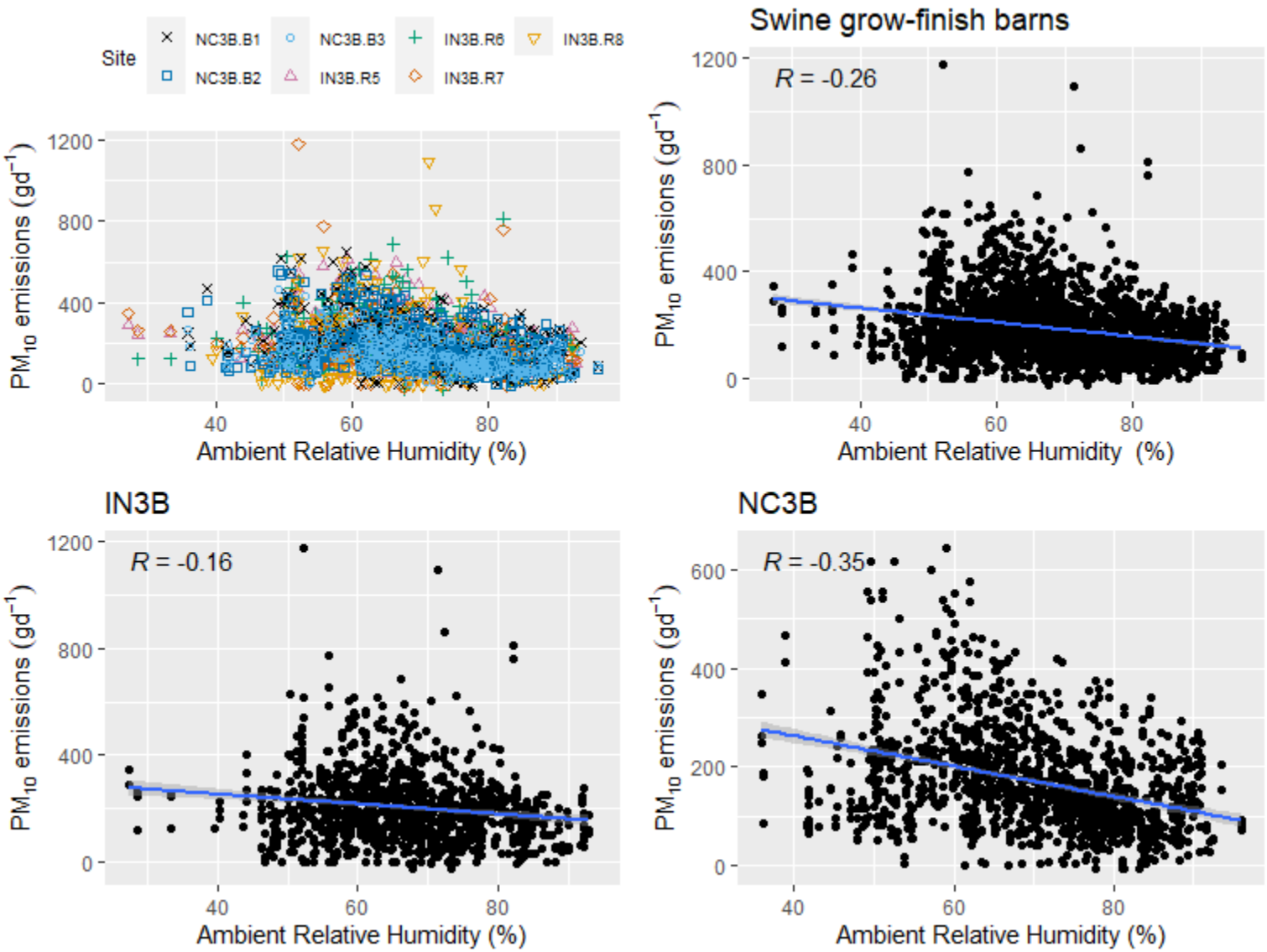


**Figure F.4-75. Scatter plot of swine grow-finish barns $PM_{10}$ emissions (g $d^{-1}$) versus ambient relative humidity.**

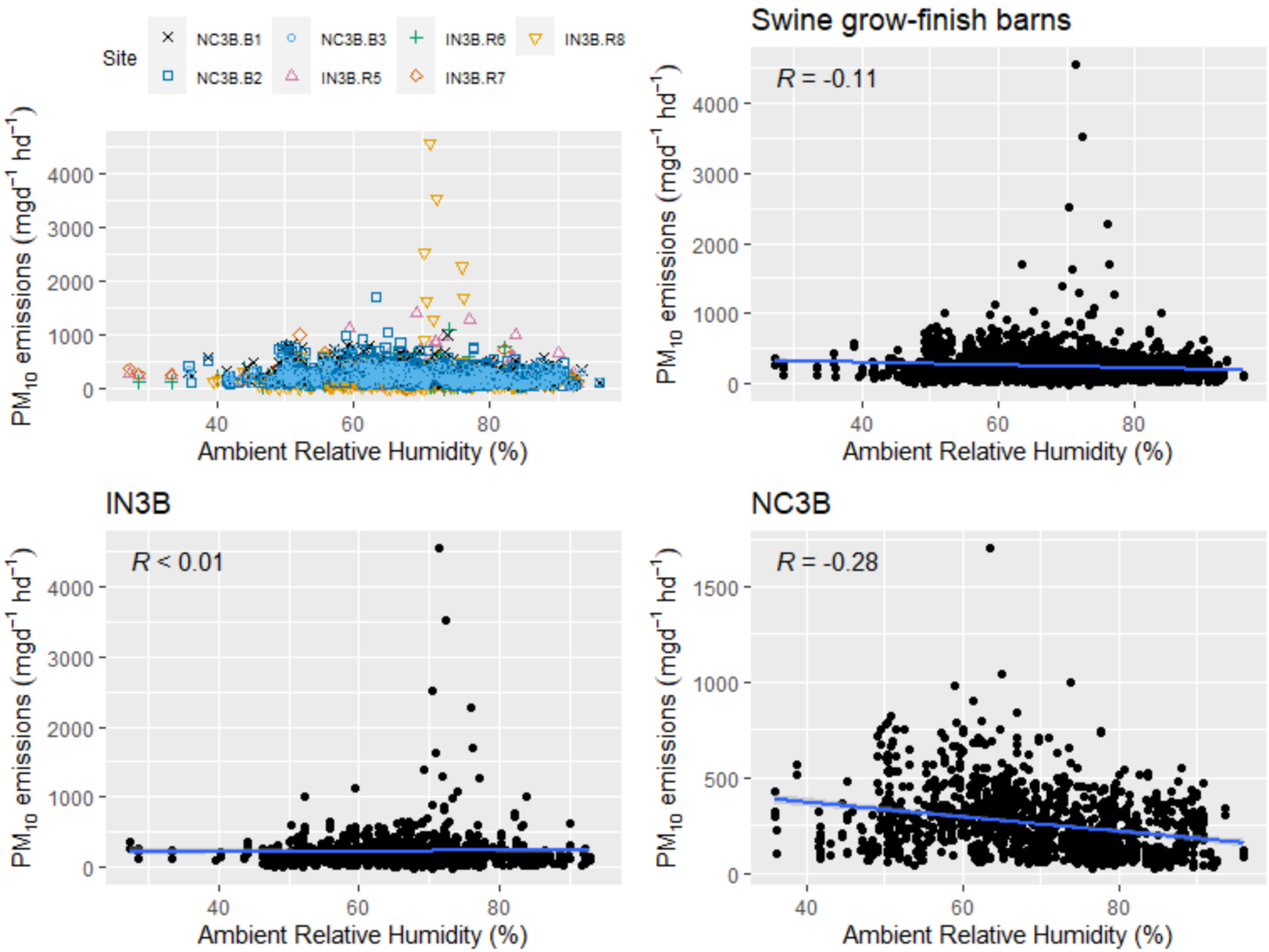


**Figure F.4-76 Scatter plot of swine grow-finish barns $PM_{10}$ emissions (mg $d^{-1}hd^{-1}$) versus ambient relative humidity.**

F.4.2.3.3 Air pressure

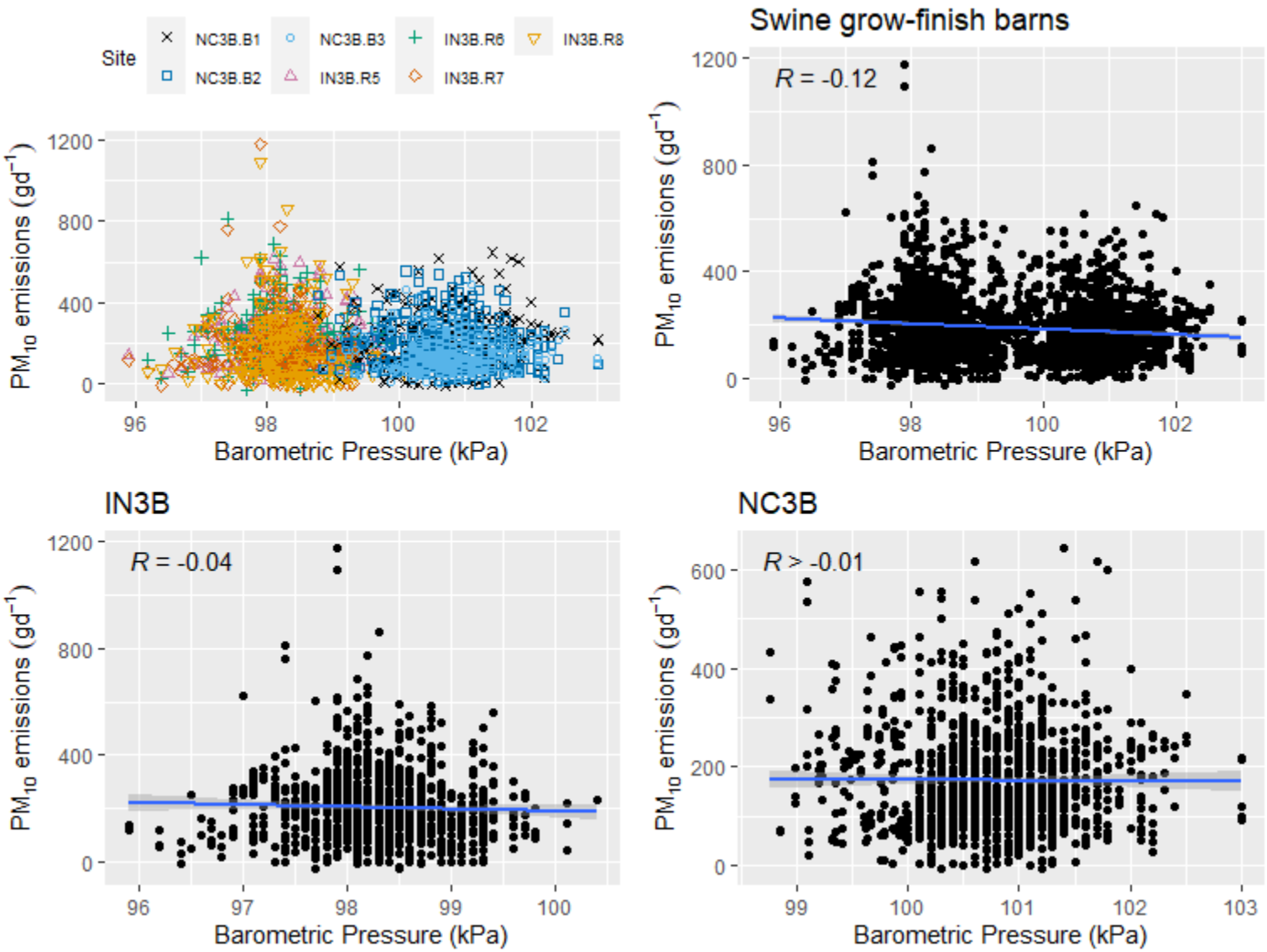


**Figure F.4-77. Scatter plot of swine grow-finish barns $PM_{10}$ emissions (g $d^{-1}$) versus air pressure.**

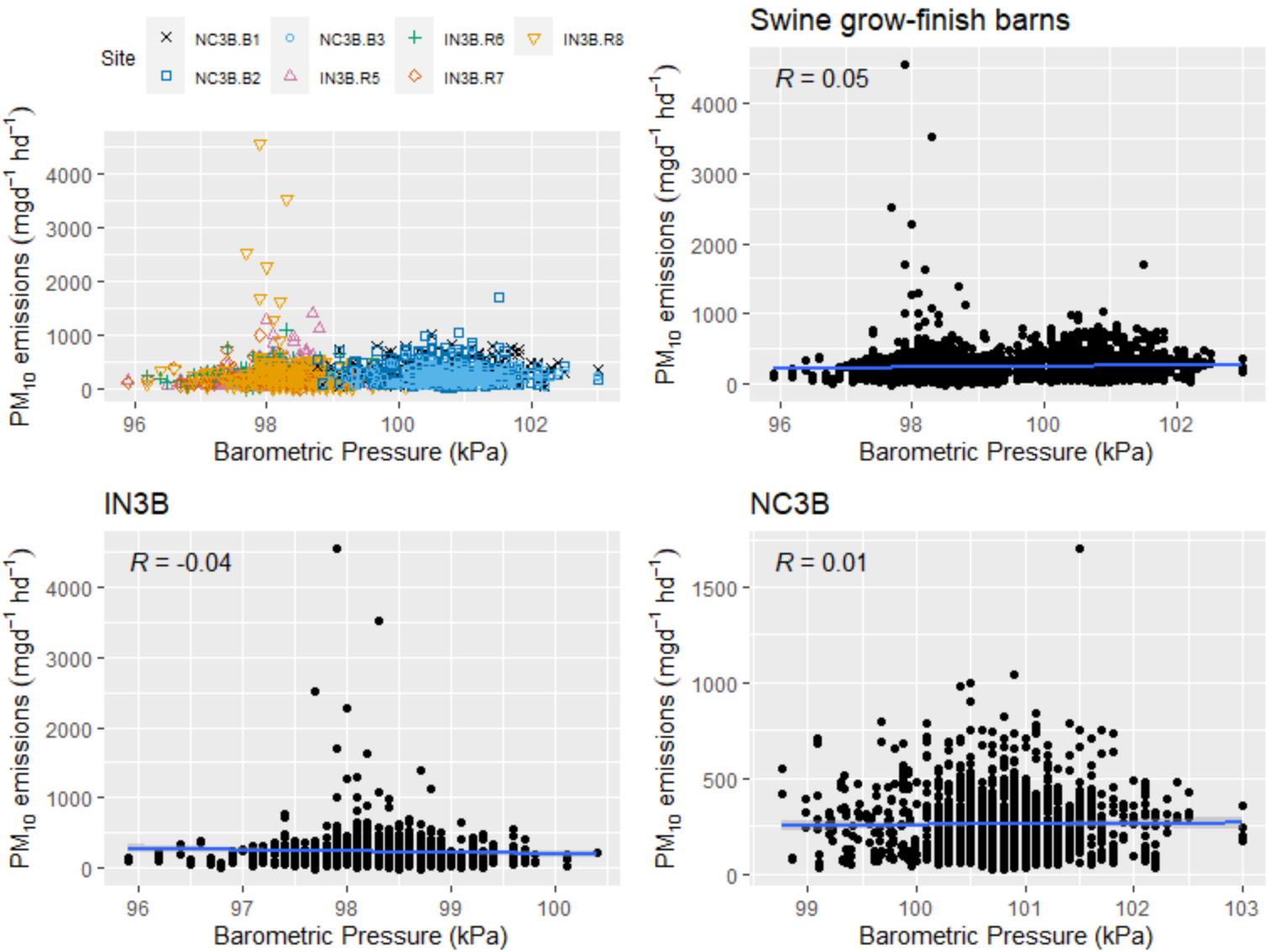


**Figure F.4-78. Scatter plot of swine grow-finish barns $PM_{10}$ emissions (mg $d^{-1}hd^{-1}$) versus air pressure.**

### *F.4.2.4 Particulate Matter ($PM_{2.5}$)*

F.4.2.4.1 Ambient temperature

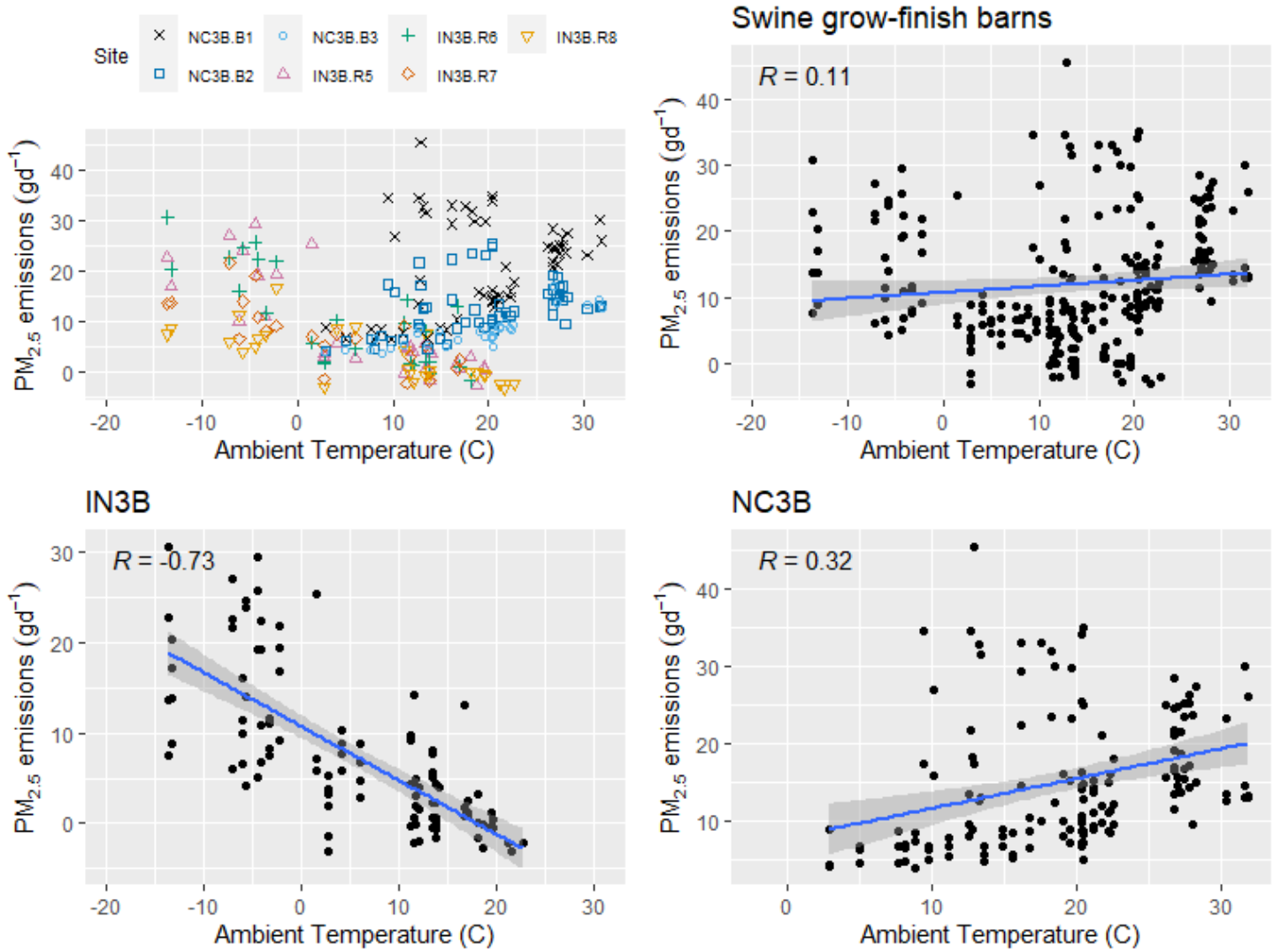


**Figure F.4-79. Scatter plot of swine grow-finish barns $PM_{2.5}$ emissions (g $d^{-1}$) versus ambient temperature.**

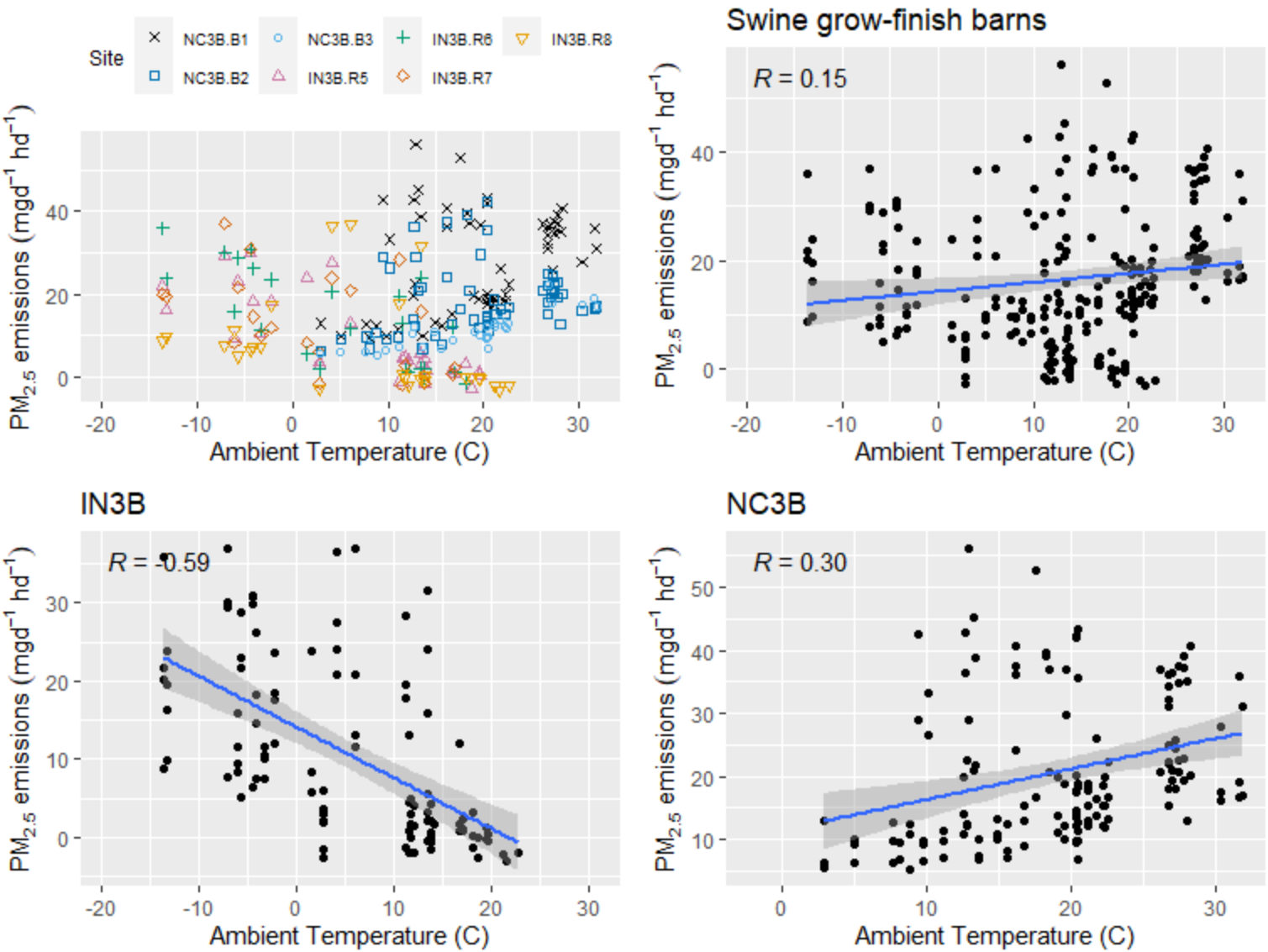


**Figure F.4-80. Scatter plot of swine grow-finish barns $PM_{2.5}$ emissions (mg $d^{-1}hd^{-1}$) versus ambient temperature.**

F.4.2.4.2 Ambient relative humidity

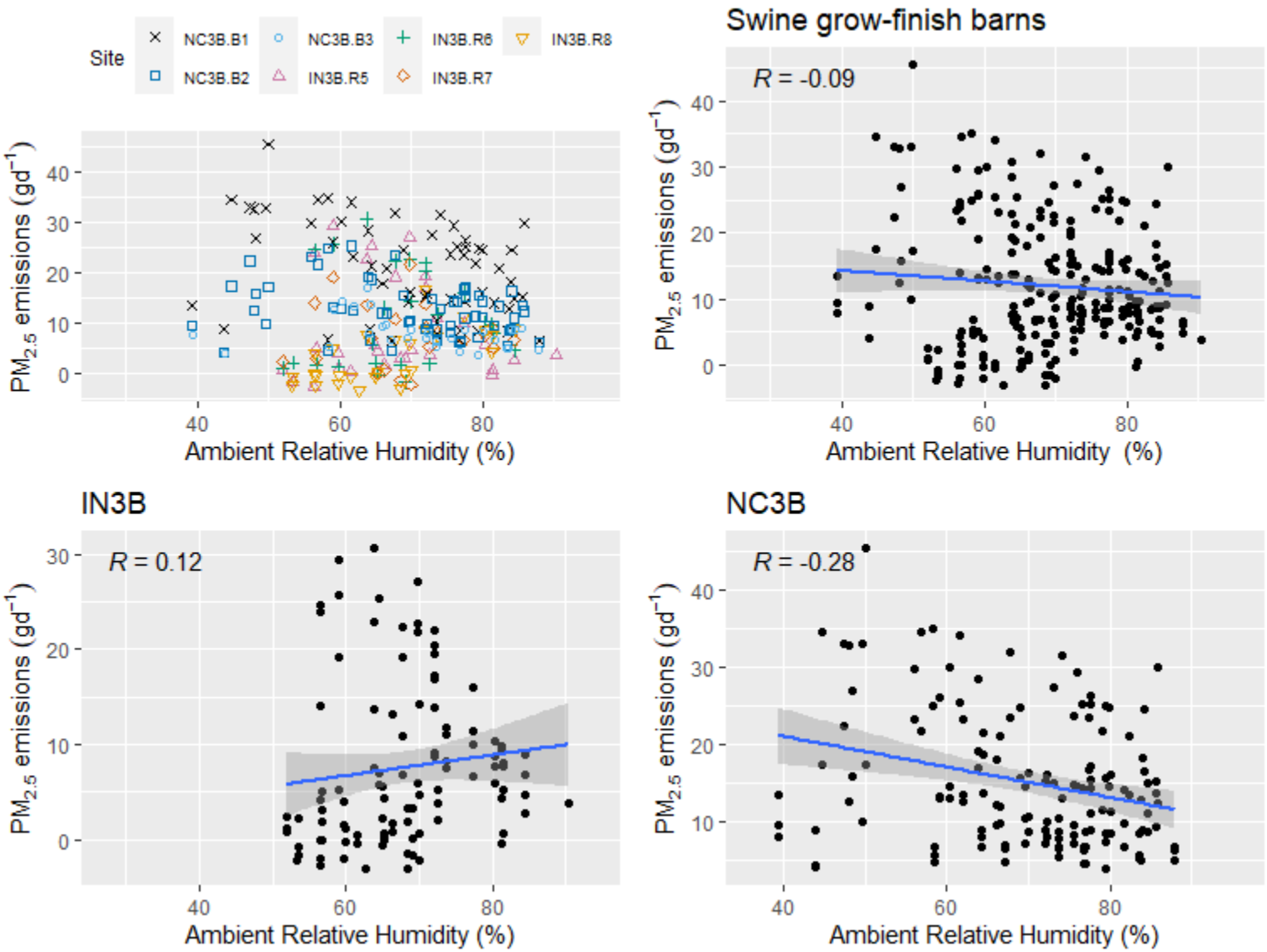


**Figure F.4-81. Scatter plot of swine grow-finish barns $PM_{2.5}$ emissions (g $d^{-1}$) versus ambient relative humidity.**

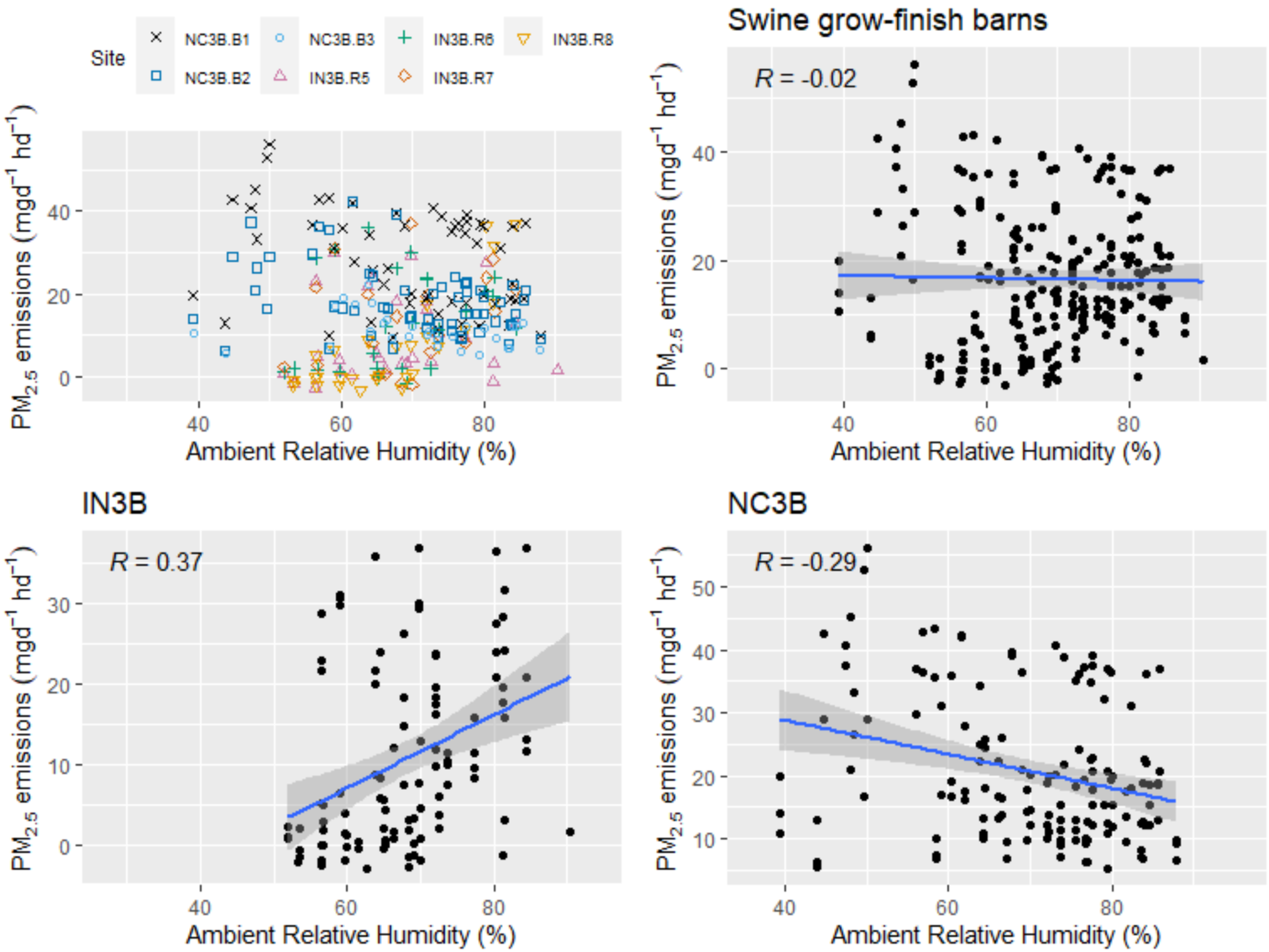


**Figure F.4-82. Scatter plot of swine grow-finish barns $PM_{2.5}$ emissions (mg $d^{-1}hd^{-1}$) versus ambient relative humidity.**

F.4.2.4.3 Air pressure

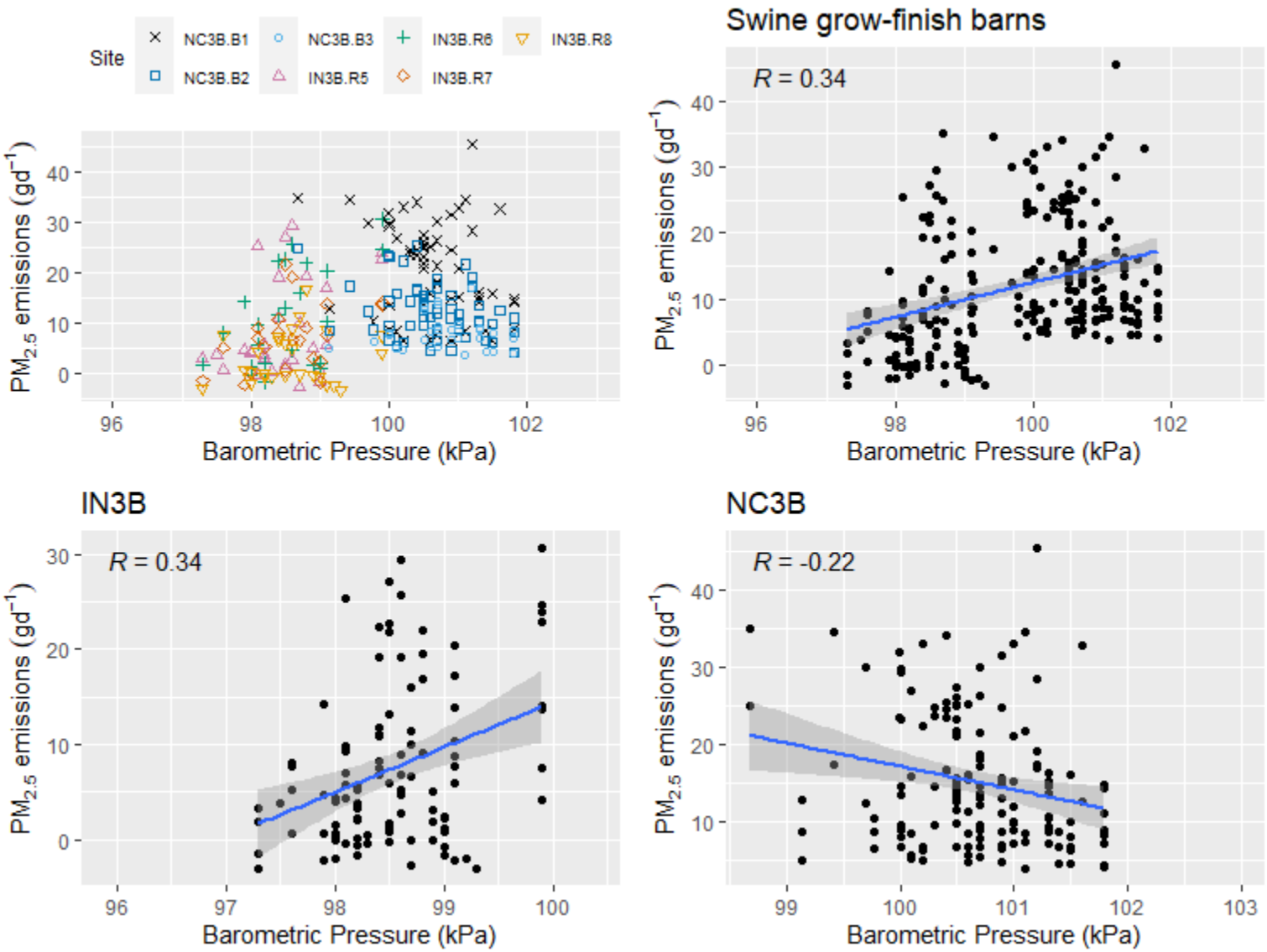


**Figure F.4-83. Scatter plot of swine grow-finish barns $PM_{2.5}$ emissions (g $d^{-1}$) versus air pressure.**

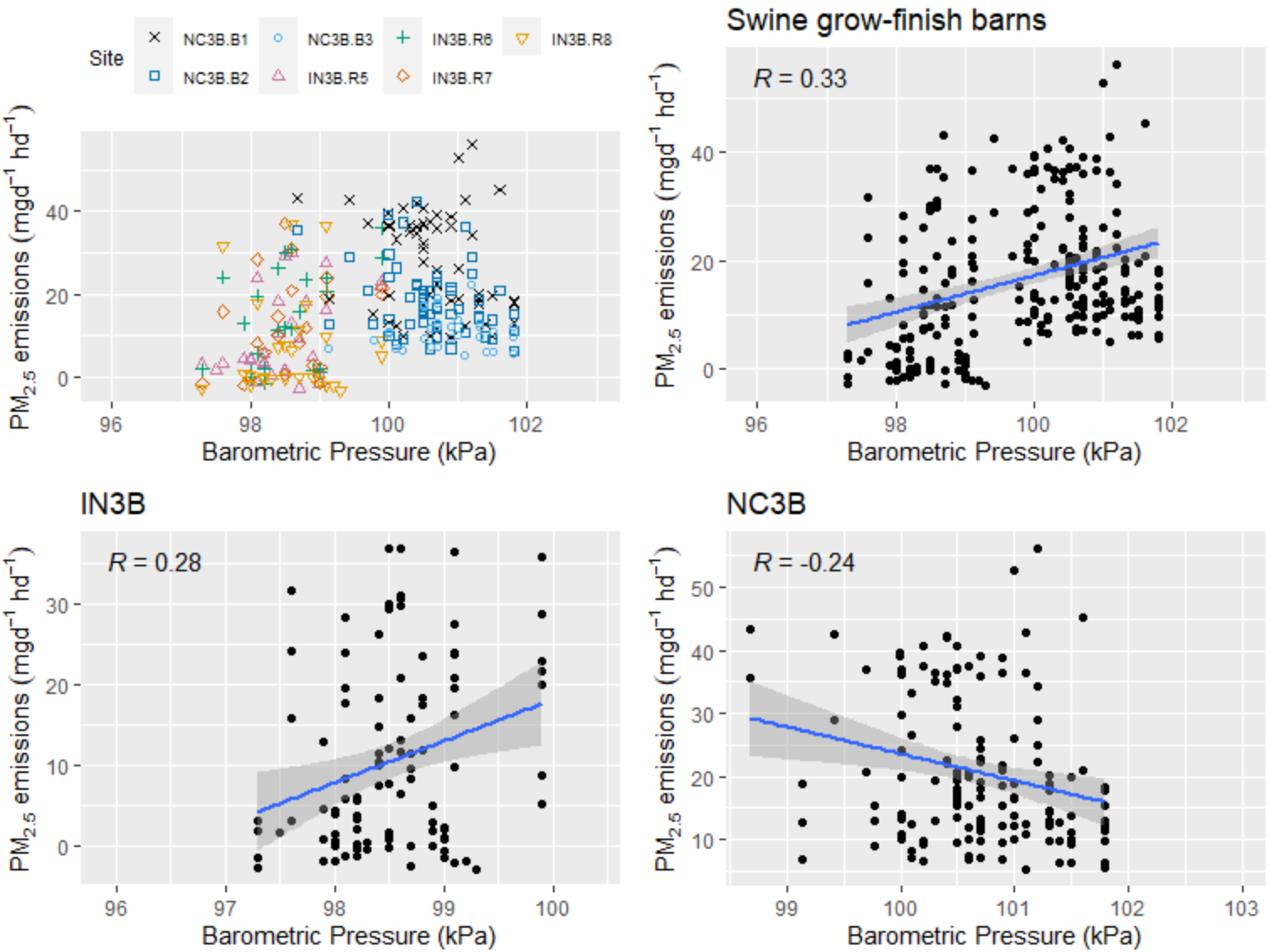


**Figure F.4-84. Scatter plot of swine grow-finish barns $PM_{2.5}$ emissions (mg $d^{-1}hd^{-1}$) versus air pressure.**

### *F.4.2.5 Total Suspended Particulates (TSP)*

F.4.2.5.1 Ambient temperature

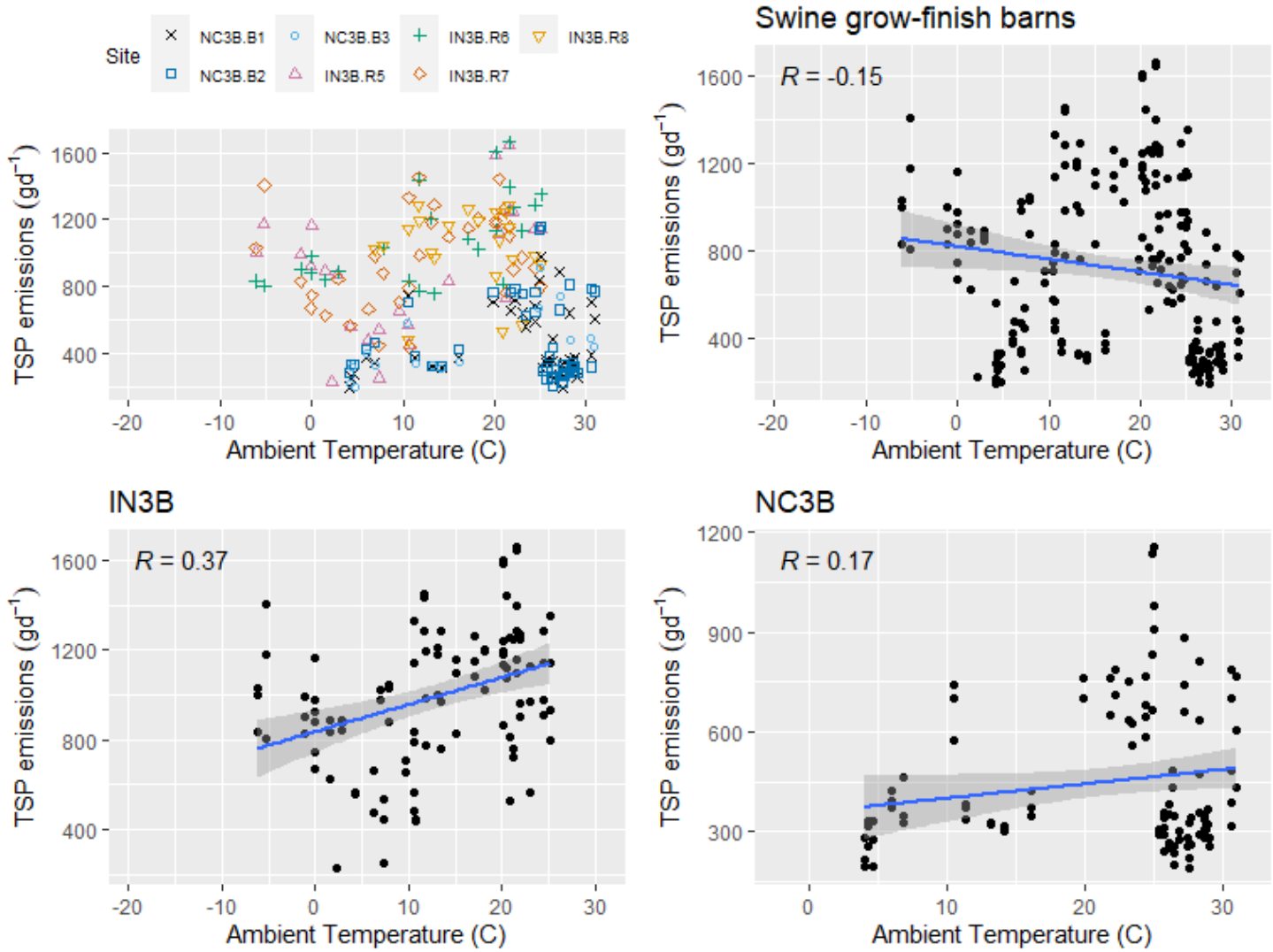


**Figure F.4-85. Scatter plot of swine grow-finish barns TSP emissions (g d$^{-1}$) versus ambient temperature.**

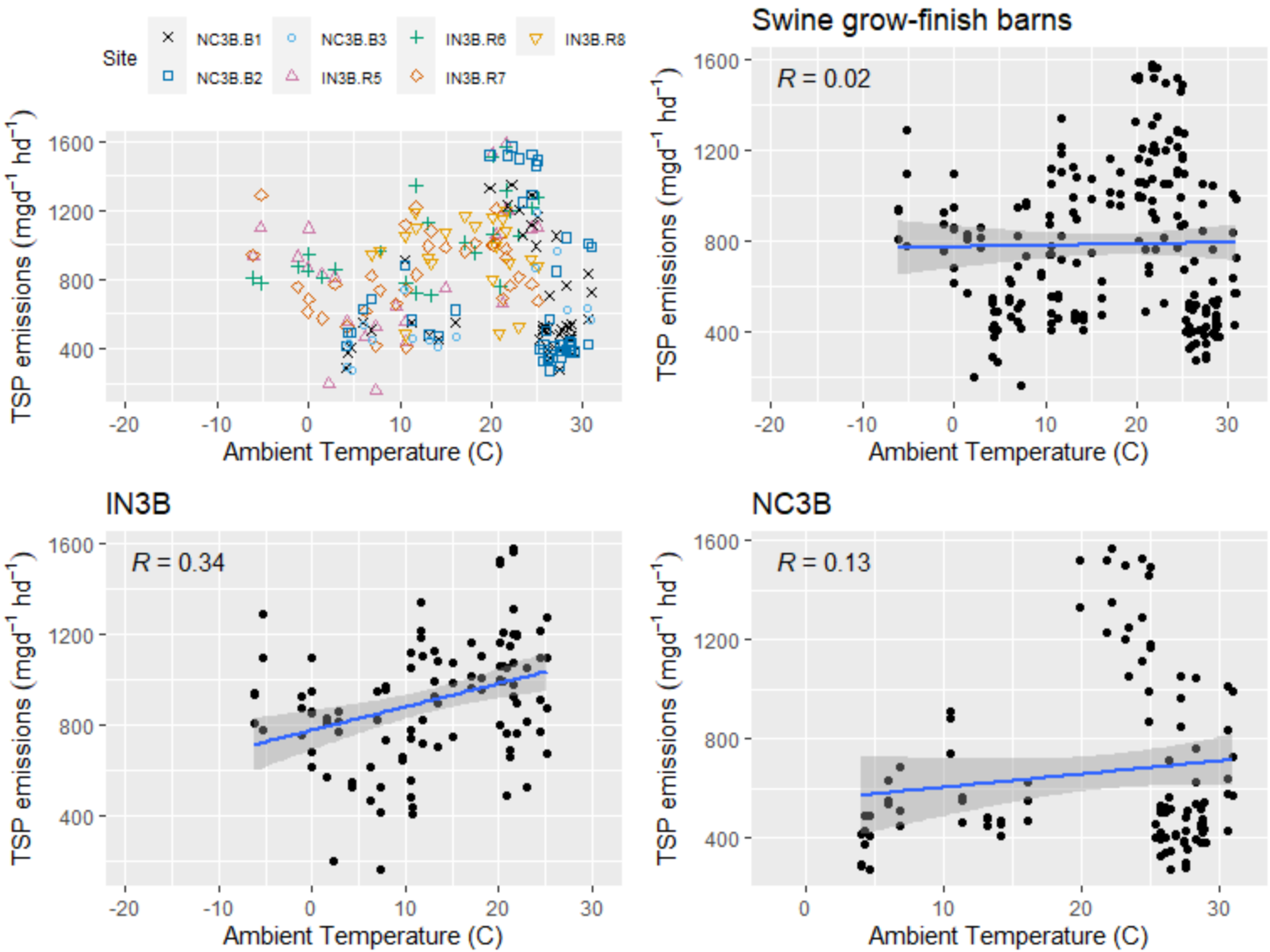


**Figure F.4-86. Scatter plot of swine grow-finish barns TSP emissions (mg d$^{-1}$hd$^{-1}$) versus ambient temperature.**

F.4.2.5.2 Ambient relative humidity

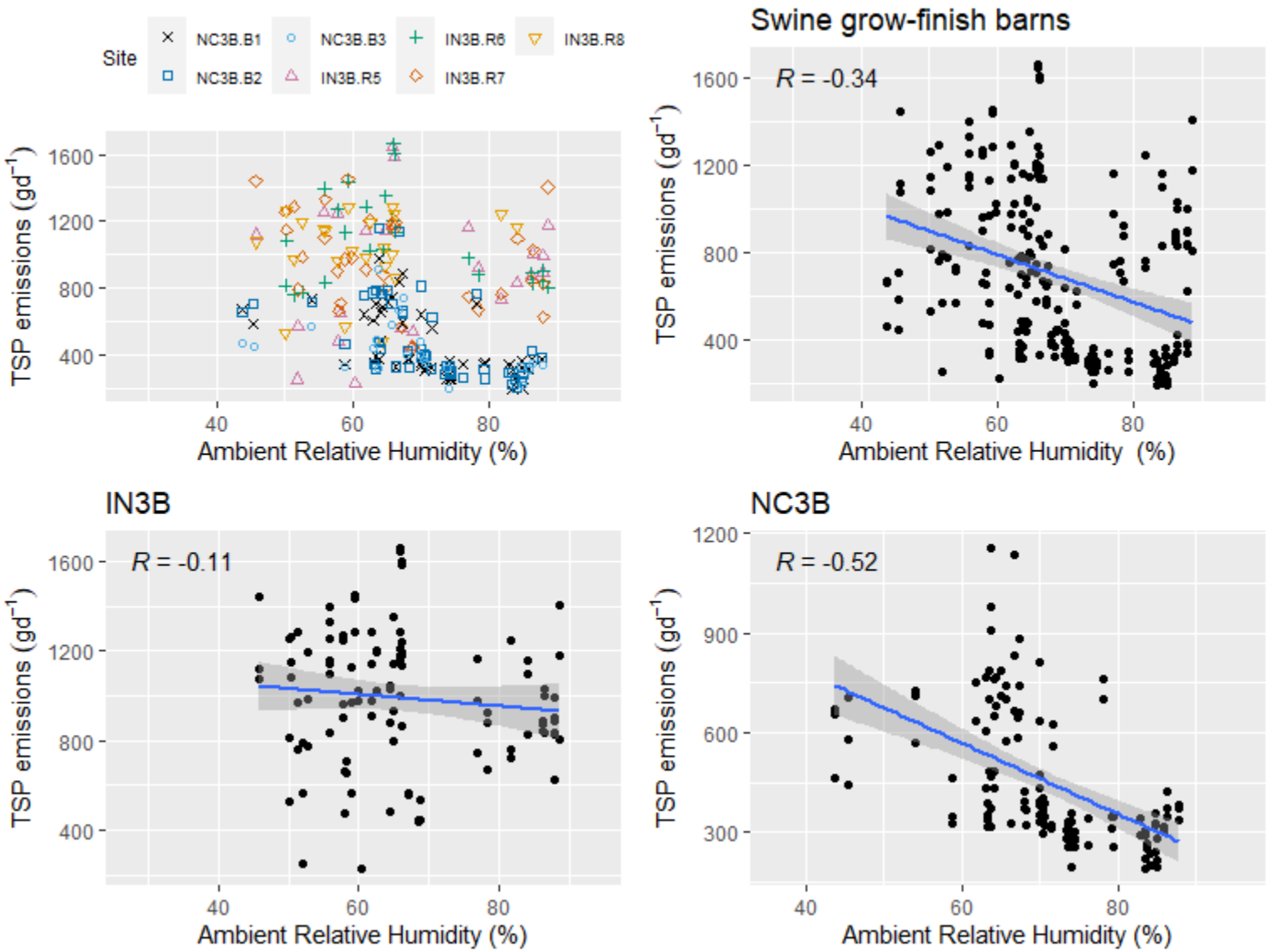


**Figure F.4-87. Scatter plot of swine grow-finish barns TSP emissions (g d$^{-1}$) versus ambient relative humidity.**

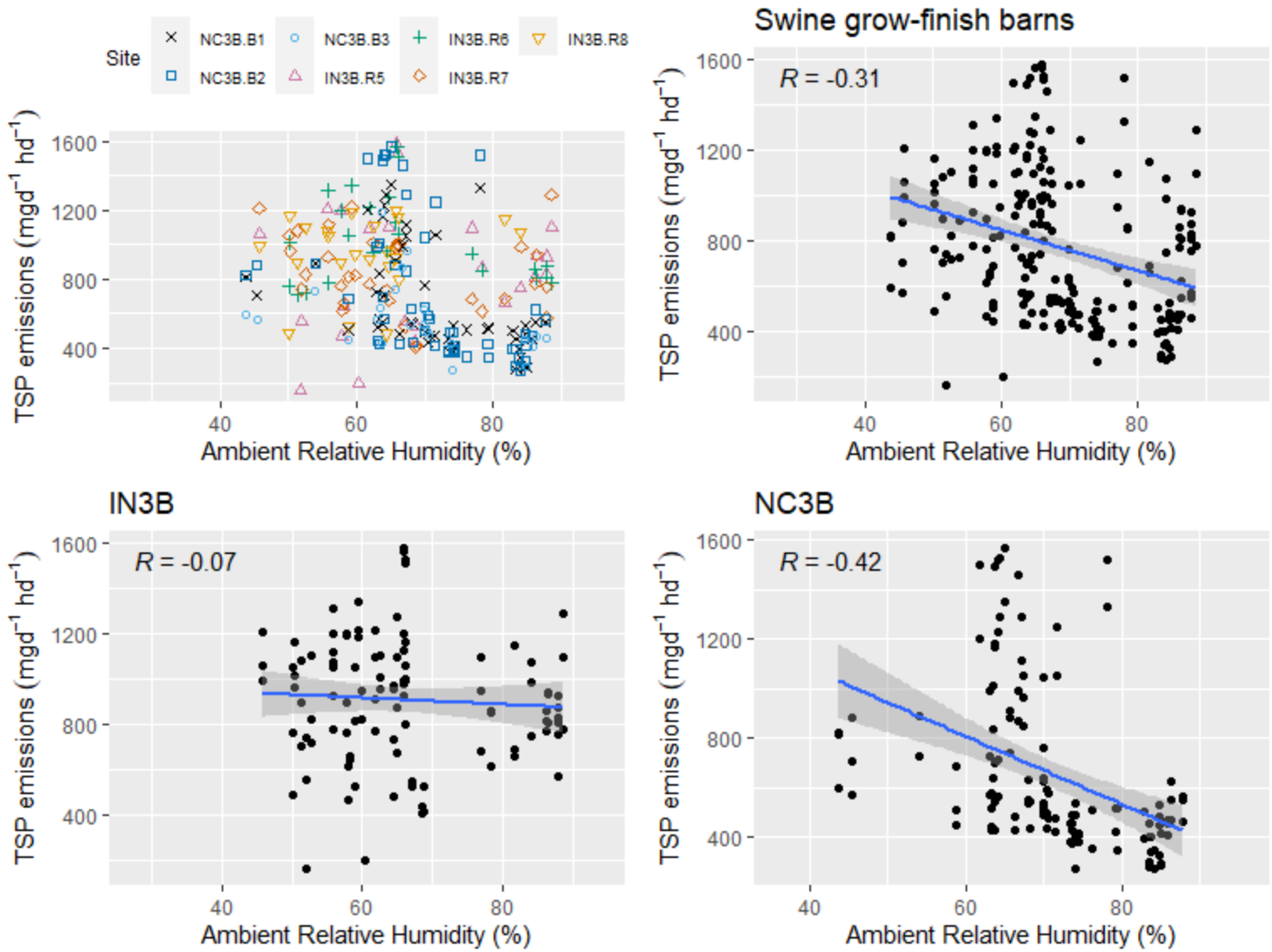


**Figure F.4-88. Scatter plot of swine grow-finish barns TSP emissions (mg $d^{-1}hd^{-1}$) versus ambient relative humidity.**

F.4.2.5.3 Air pressure

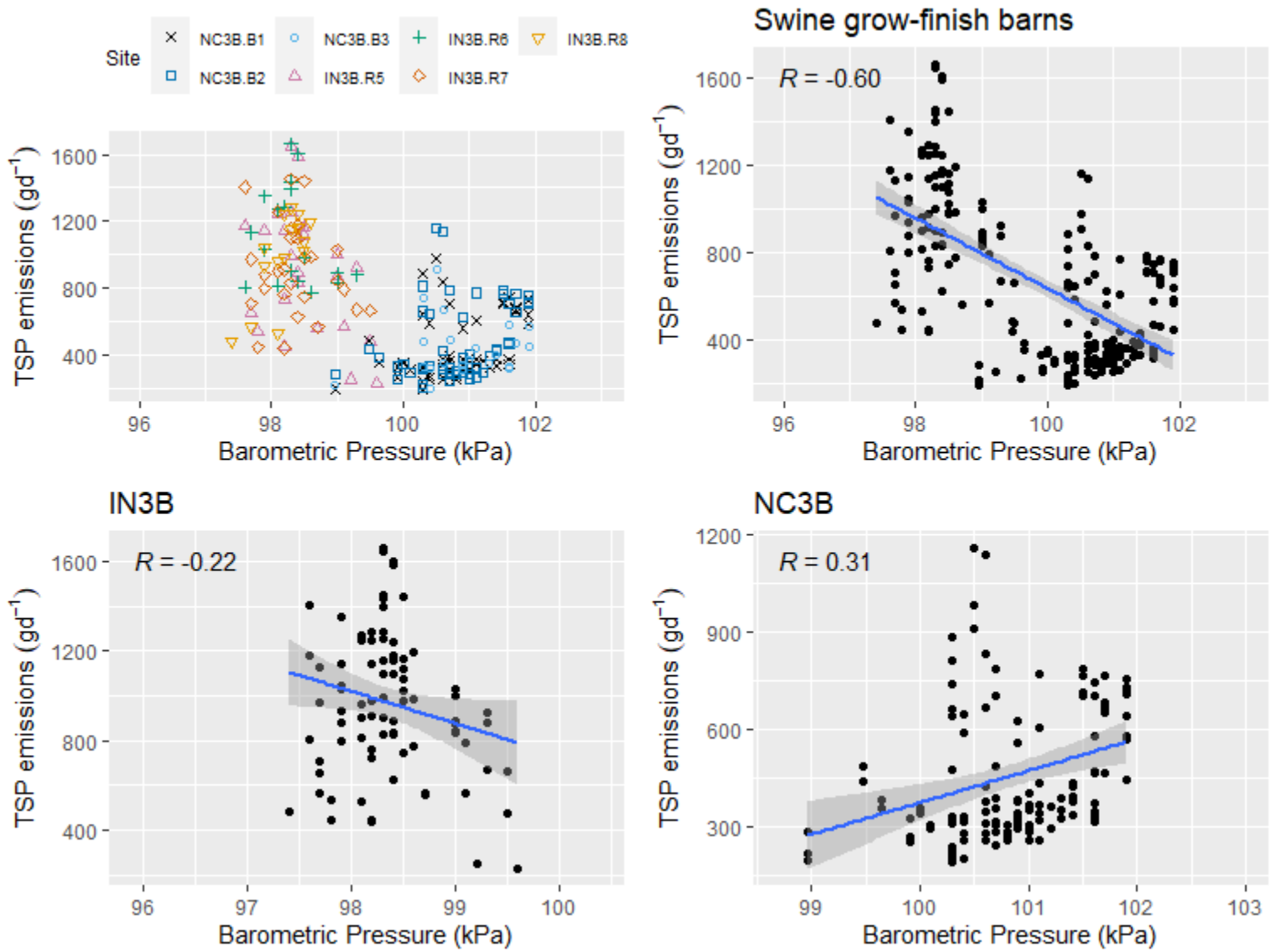


**Figure F.4-89. Scatter plot of swine grow-finish barns TSP emissions (g d$^{-1}$) versus air pressure.**

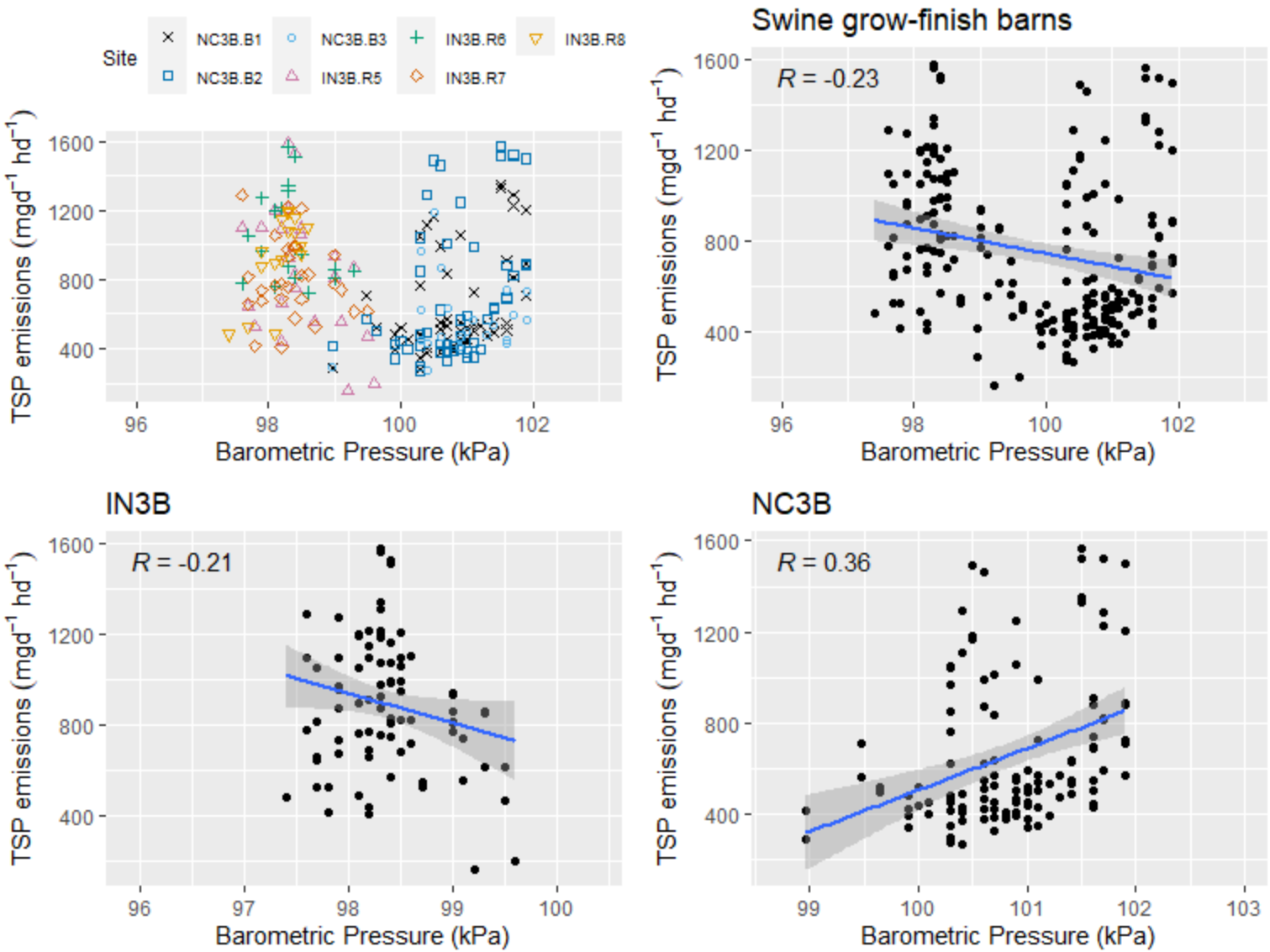


**Figure F.4-90. Scatter plot of swine grow-finish barns TSP emissions (mg d$^{-1}$hd$^{-1}$) versus air pressure.**

## F.5 Lagoons

### *F.5.1 Environmental*

**Table F.5.1. Summary of swine lagoons $R^2$ values for environmental parameters.**

| Pollutant | Parameter | R | $R^2$ | Strength | Figure |
|---|---|---|---|---|---|
| $NH_3$ ($kgd^{-1}$) | Lagoon Temperature (°C) | 0.57 | 0.32 | modest | F.5-1 |
| $NH_3$ ($kgd^{-1}m^{-2}$) | Lagoon Temperature (°C) | 0.64 | 0.41 | moderate | F.5-2 |
| $NH_3$ ($kgd^{-1}$) | Oxidation reduction potential (mV) | -0.33 | 0.11 | slight or weak | F.5-3 |
| $NH_3$ ($kgd^{-1}m^{-2}$) | Oxidation reduction potential (mV) | -0.29 | 0.08 | slight or weak | F.5-4 |
| $NH_3$ ($kgd^{-1}$) | pH | -0.14 | 0.02 | slight or weak | F.5-5 |
| $NH_3$ ($kgd^{-1}m^{-2}$) | pH | -0.15 | 0.02 | slight or weak | F.5-6 |
| $H_2S$ ($gd^{-1}$) | Lagoon Temperature (°C) | -0.03 | 0.00 | slight or weak | F.5-7 |
| $H_2S$ ($gd^{-1}m^{-2}$) | Lagoon Temperature (°C) | -0.02 | 0.00 | slight or weak | F.5-8 |
| $H_2S$ ($gd^{-1}$) | Oxidation reduction potential (mV) | 0.08 | 0.01 | slight or weak | F.5-9 |
| $H_2S$ ($gd^{-1}m^{-2}$) | Oxidation reduction potential (mV) | 0.02 | 0.00 | slight or weak | F.5-10 |
| $H_2S$ ($gd^{-1}$) | pH | -0.17 | 0.03 | slight or weak | F.5-11 |
| $H_2S$ ($gd^{-1}m^{-2}$) | pH | -0.20 | 0.04 | slight or weak | F.5-12 |

### *F.5.1.1 Ammonia ($NH_3$)*

F.5.1.1.1 Lagoon temperature

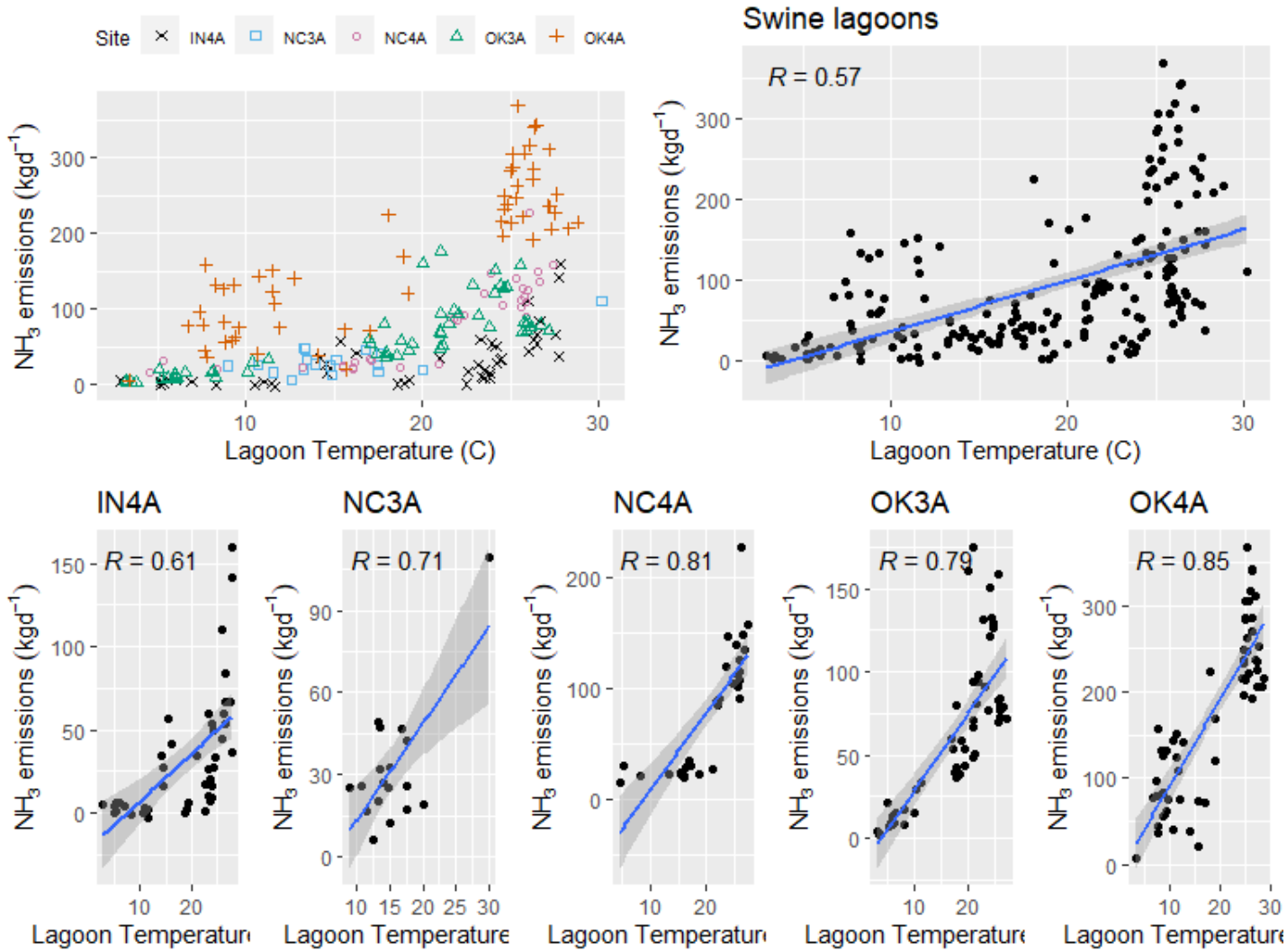


**Figure F.5-1. Scatter plot of swine lagoons $NH_3$ emissions (kg $d^{-1}$) versus lagoon temperature.**

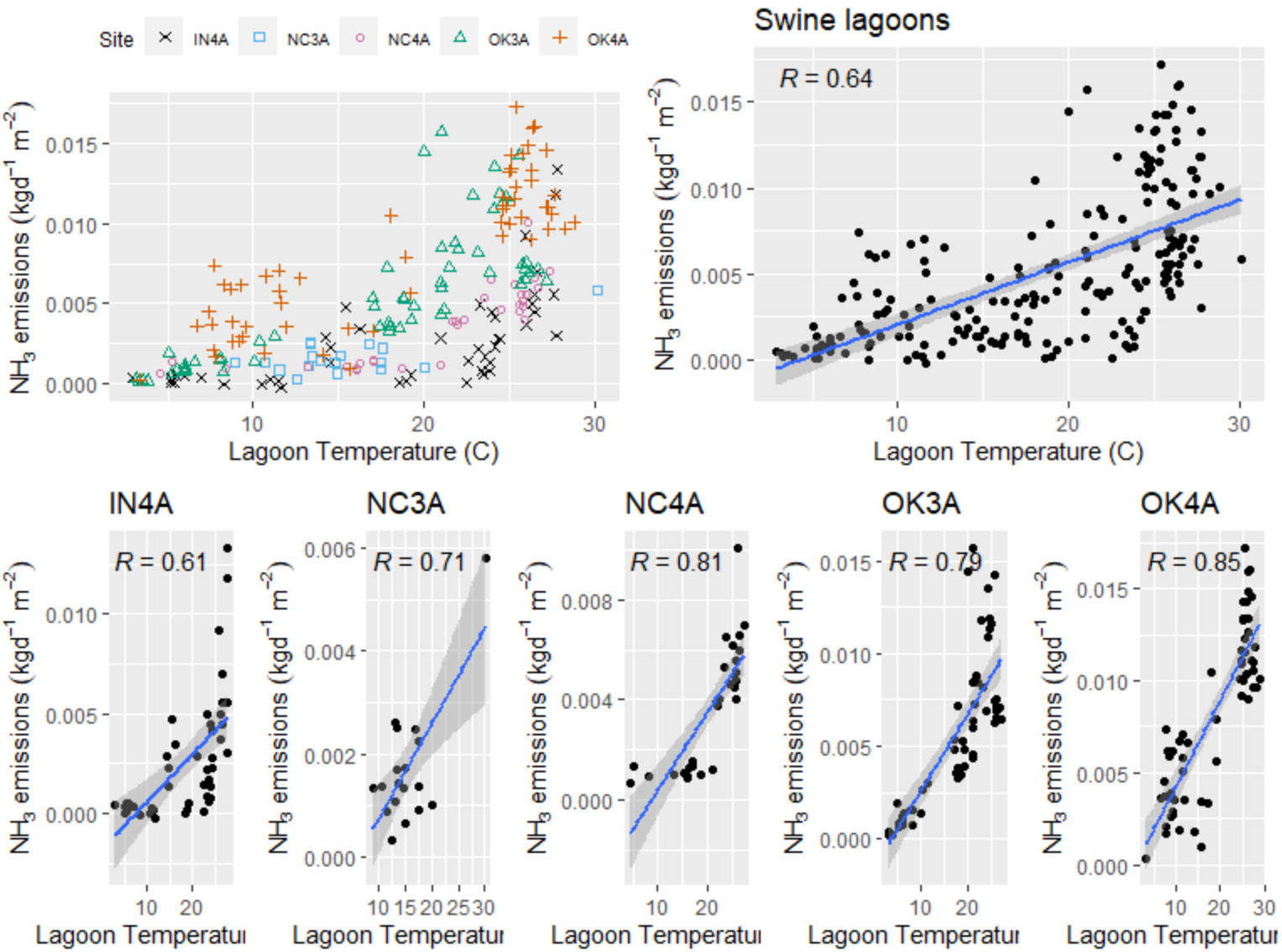


**Figure F.5-2. Scatter plot of swine lagoons $NH_3$ emissions (kg $d^{-1}m^{-2}$) versus lagoon temperature.**

F.5.1.1.2 Oxidation reduction potential

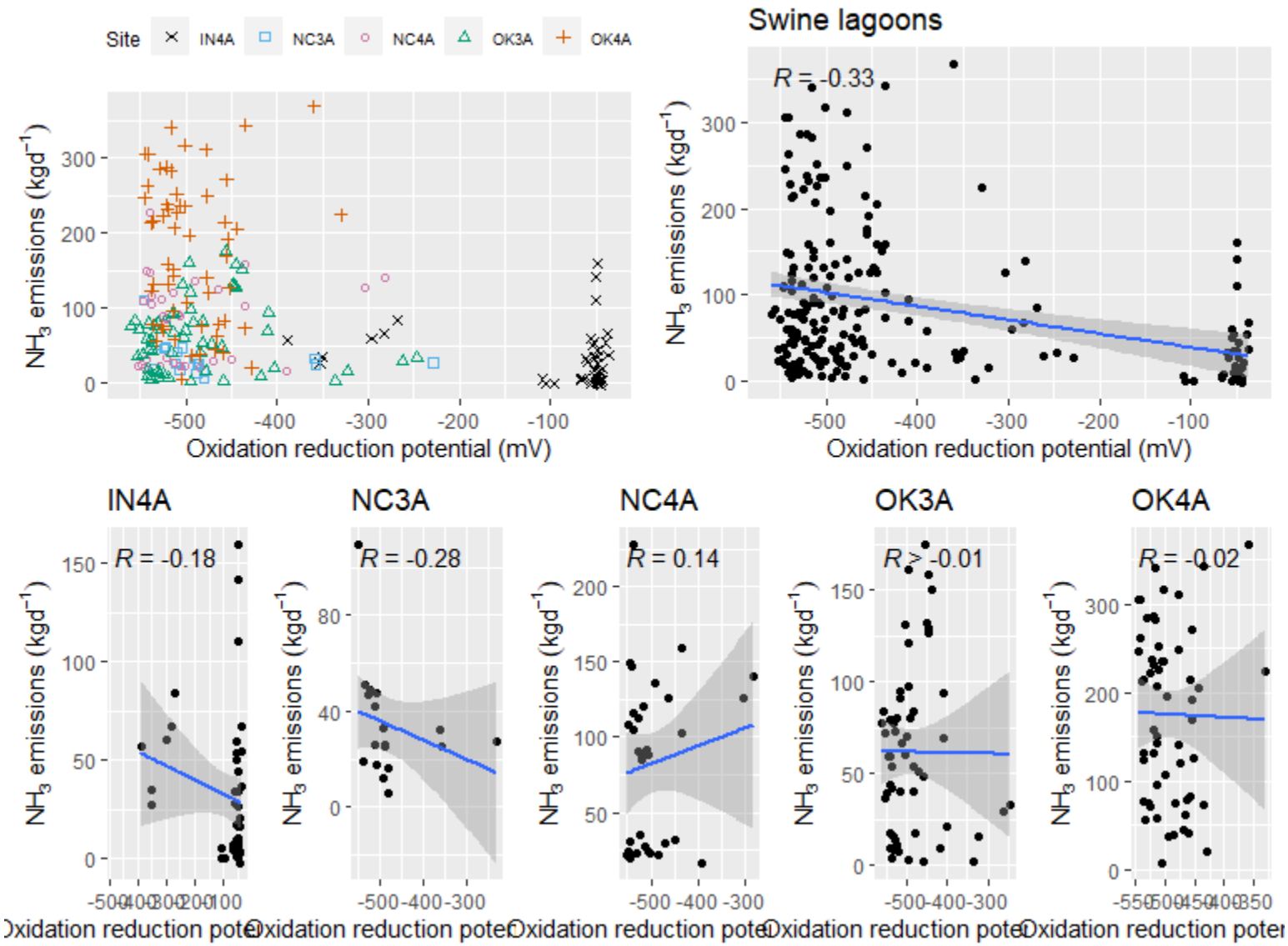


**Figure F.5-3. Scatter plot of swine lagoons $NH_3$ emissions (kg $d^{-1}$) versus ORP.**

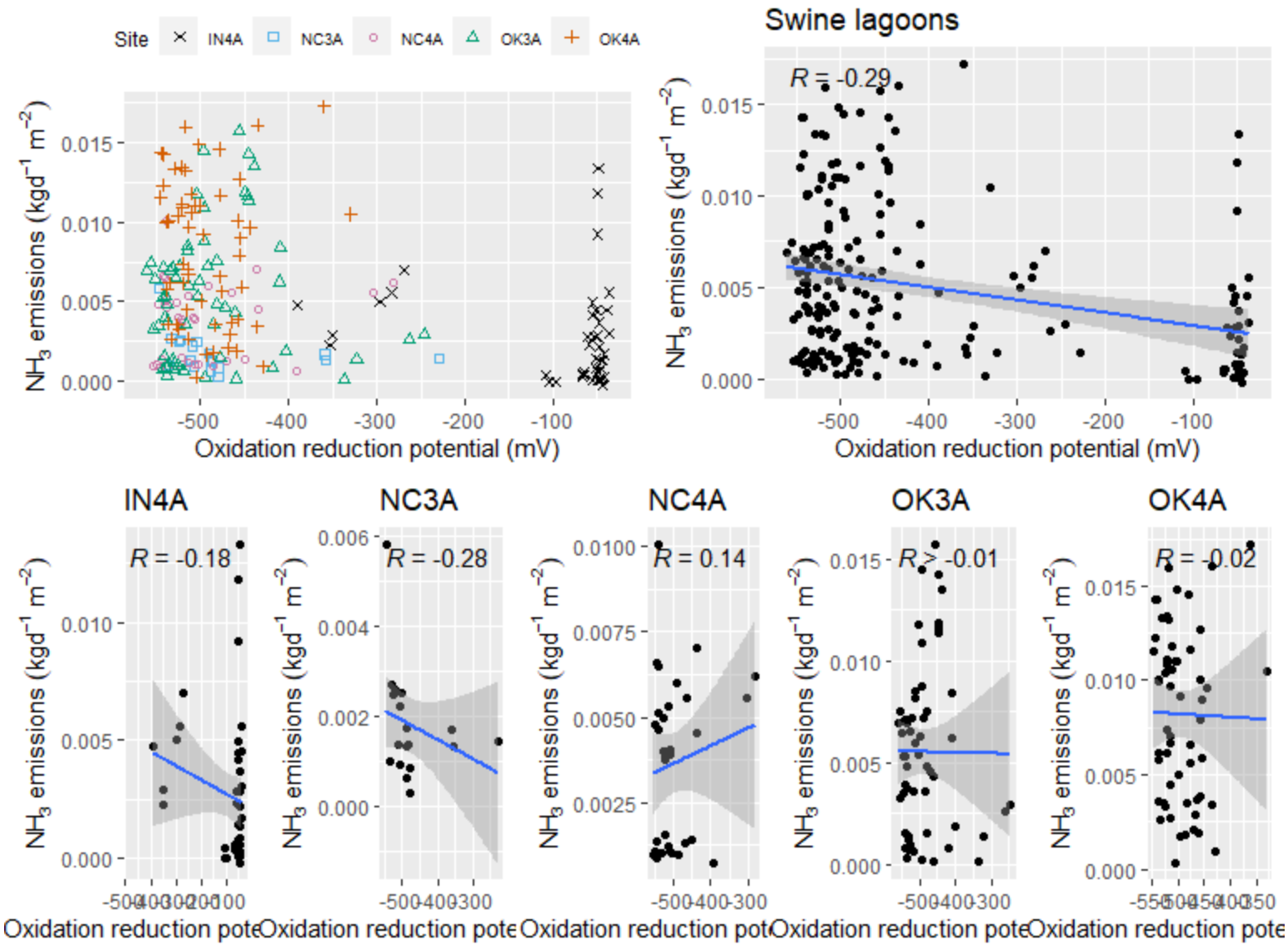


**Figure F.5-4. Scatter plot of swine lagoons $NH_3$ emissions (g $d^{-1}m^{-2}$) versus ORP.**

F.5.1.1.3 pH

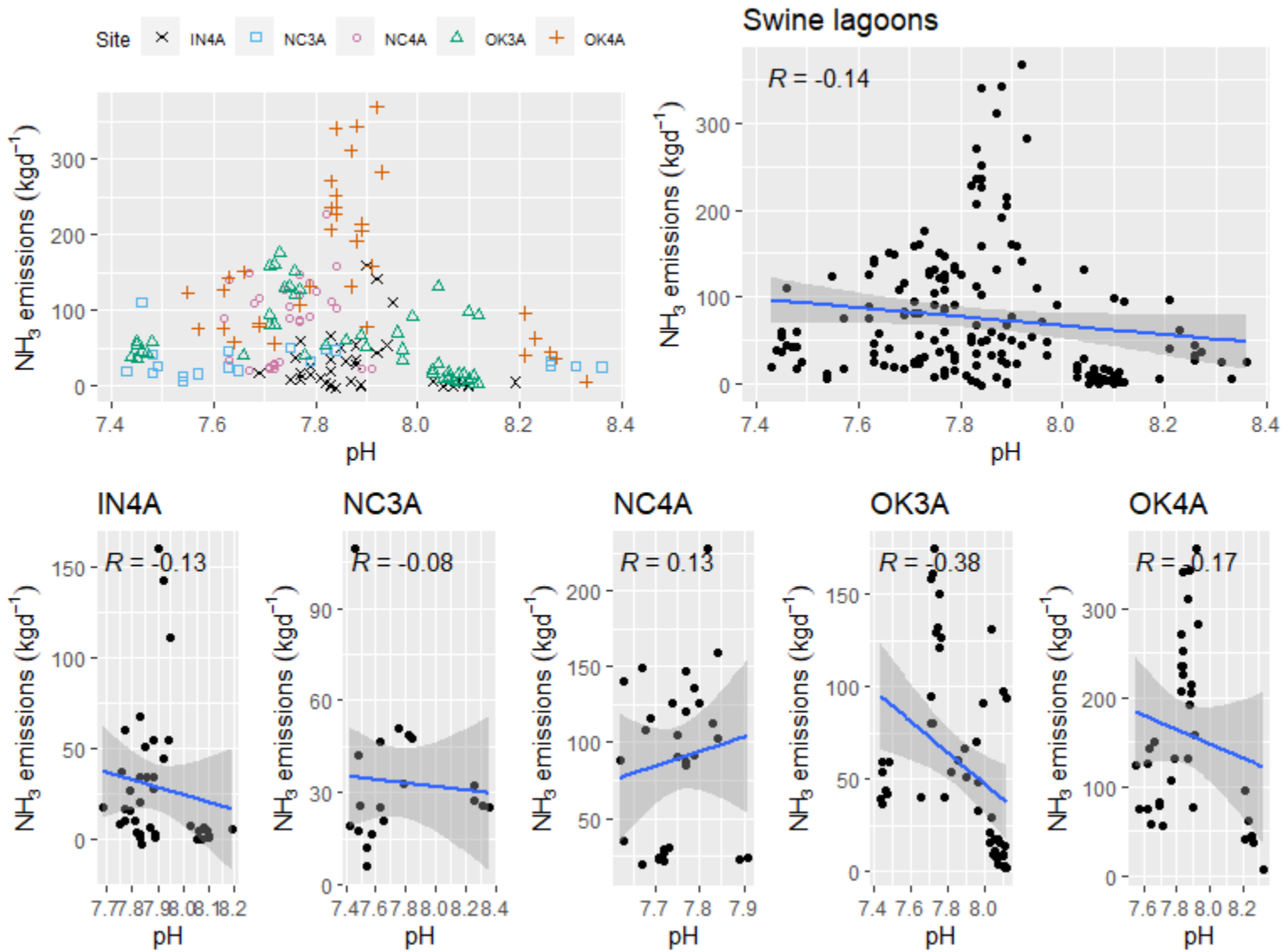


**Figure F.5-5. Scatter plot of swine lagoons $NH_3$ emissions (kg $d^{-1}$) versus pH.**

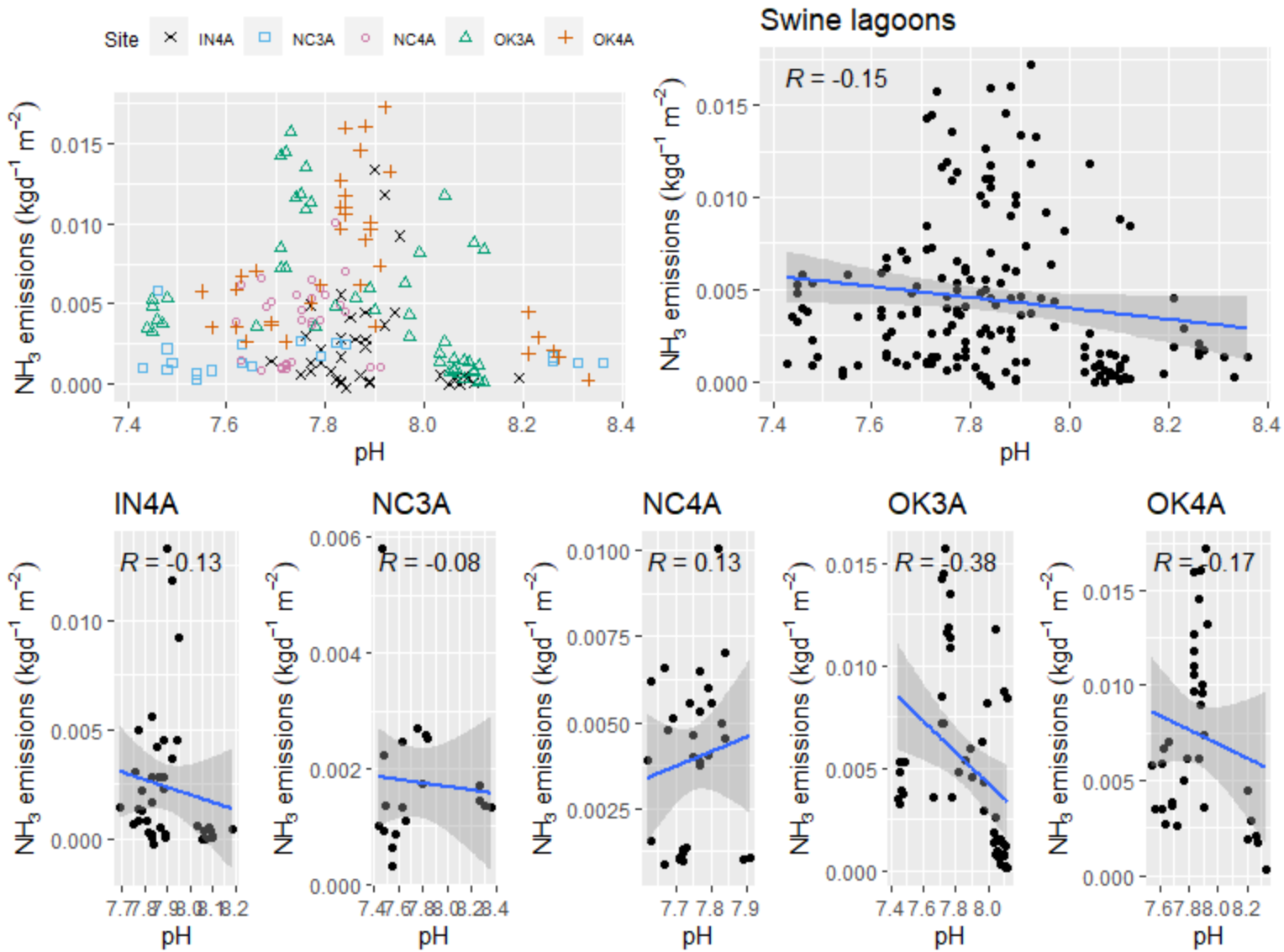


**Figure F.5-6. Scatter plot of swine lagoons $NH_3$ emissions (kg $d^{-1}m^{-2}$) versus pH.**

### *F.5.1.2 Hydrogen Sulfide ($H_2S$)*

F.5.1.2.1 Lagoon temperature

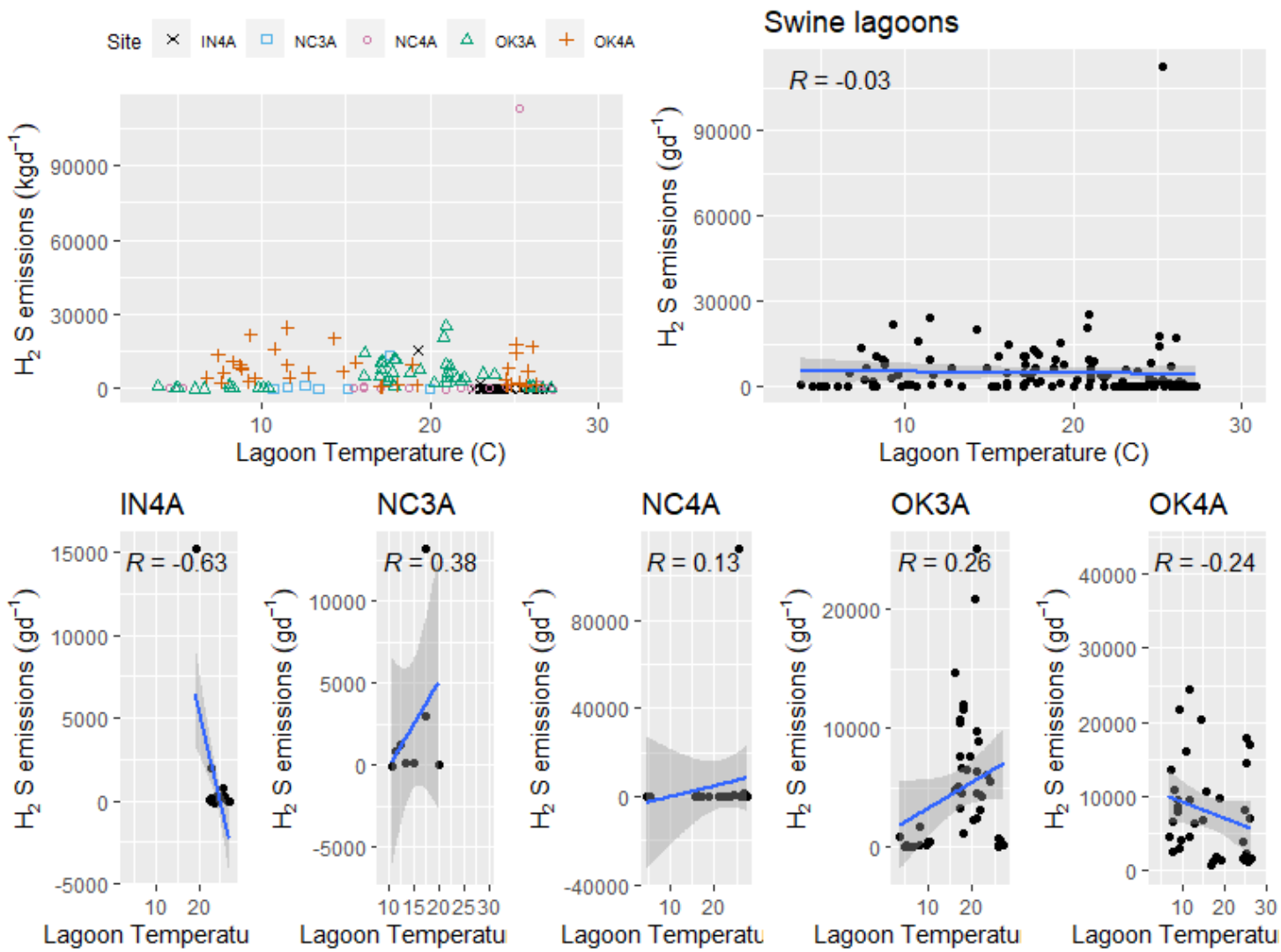


**Figure F.5-7. Scatter plot of swine lagoons $H_2S$ emissions (g $d^{-1}$) versus lagoon temperature.**

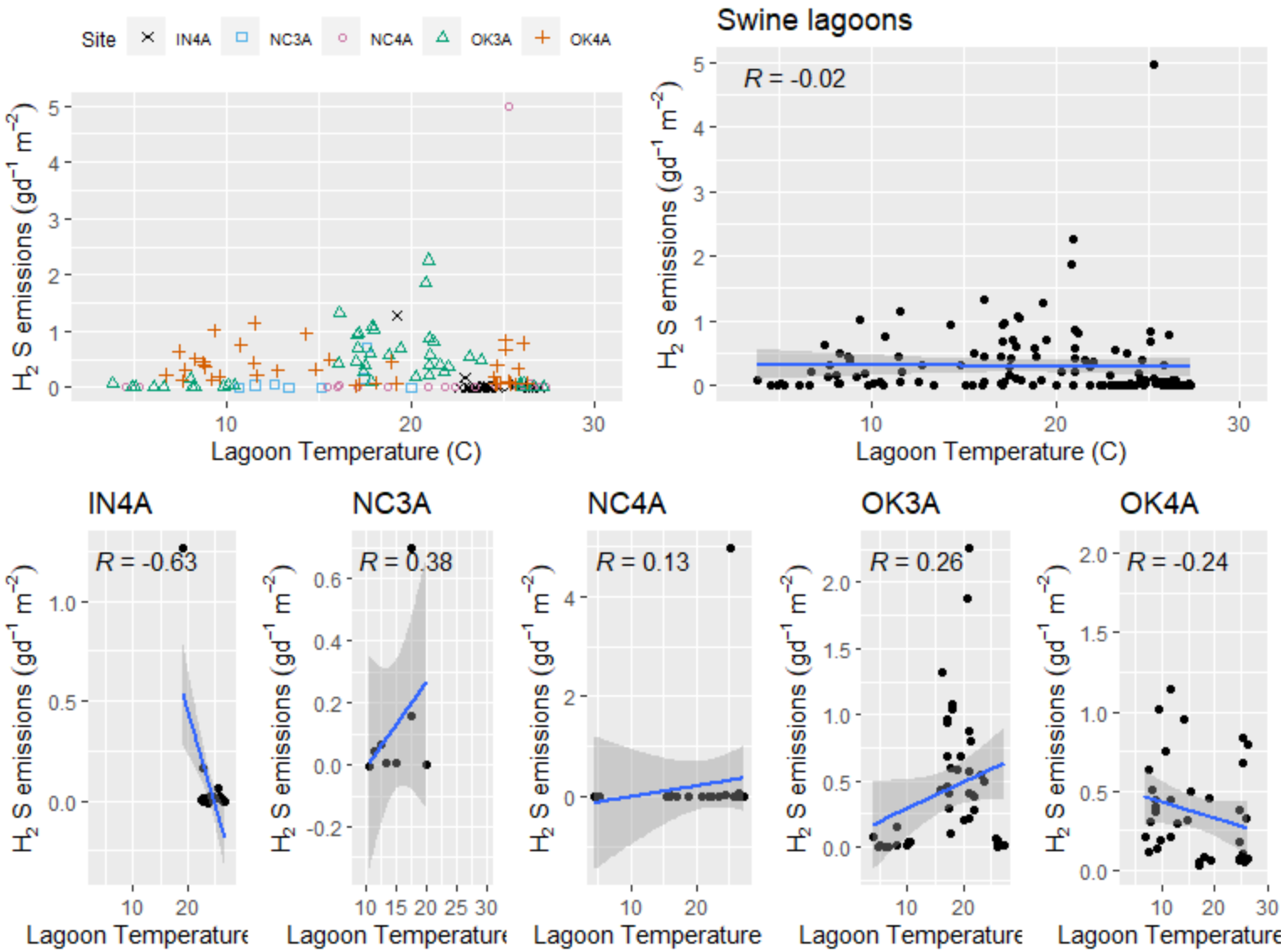


**Figure F.5-8. Scatter plot of swine lagoons $H_2S$ emissions (g $d^{-1}m^{-2}$) versus lagoon temperature.**

F.5.1.2.2 Oxidation reduction potential

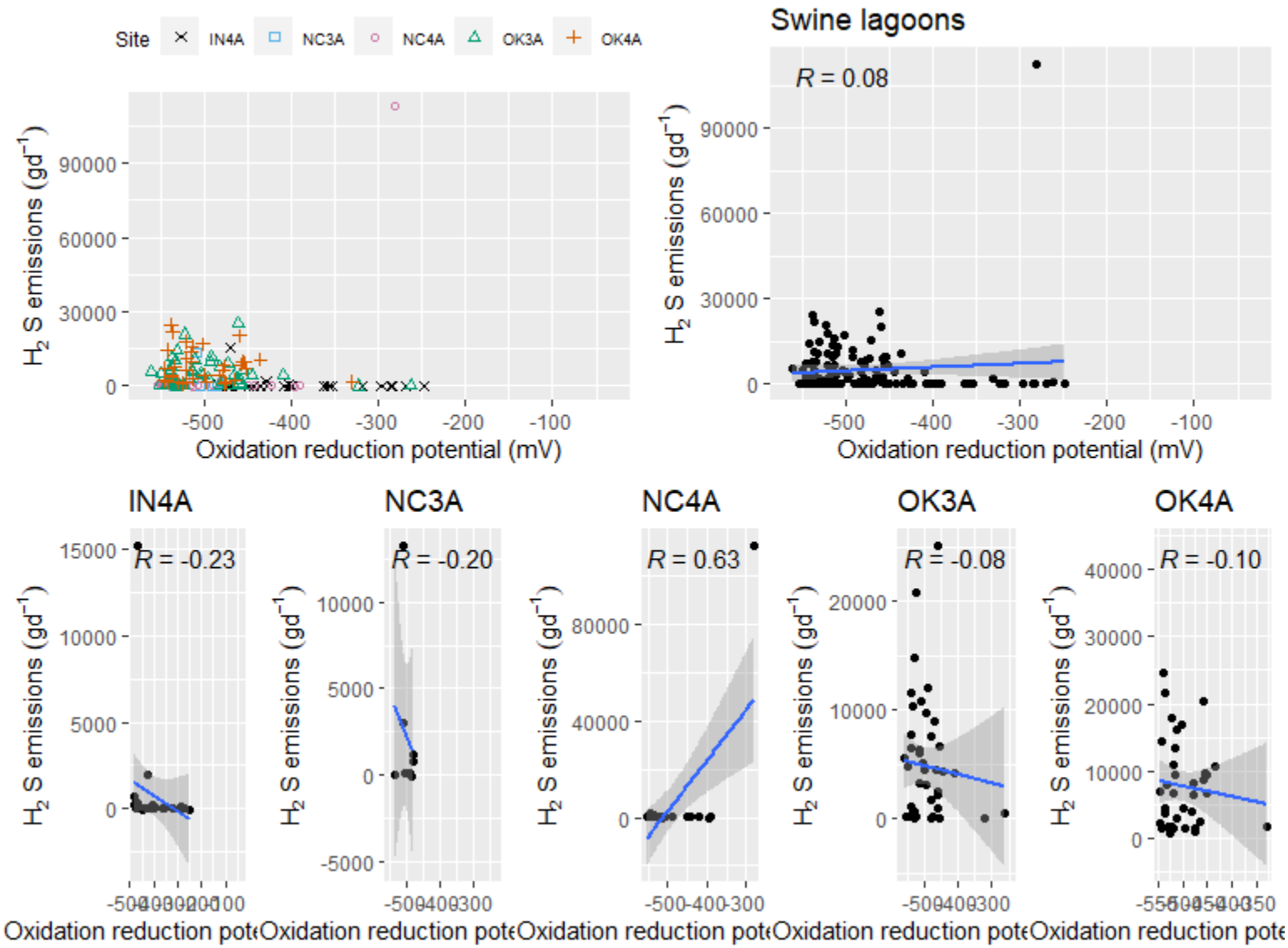


**Figure F.5-9. Scatter plot of swine lagoons $H_2S$ emissions (g $d^{-1}$) versus ORP.**

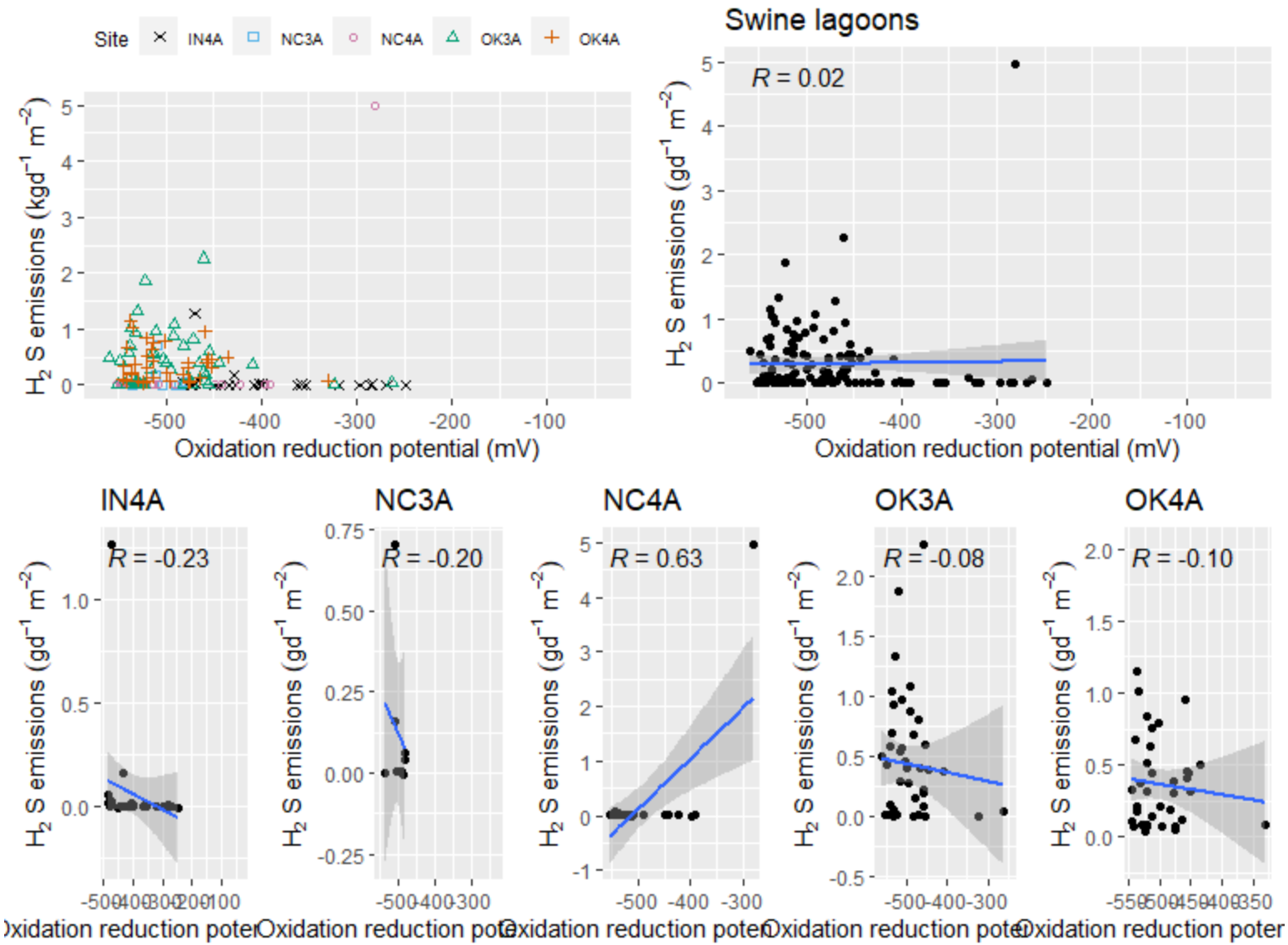


**Figure F.5-10. Scatter plot of swine lagoons $H_2S$ emissions (g $d^{-1}m^{-2}$) versus ORP.**

F.5.1.2.3 pH

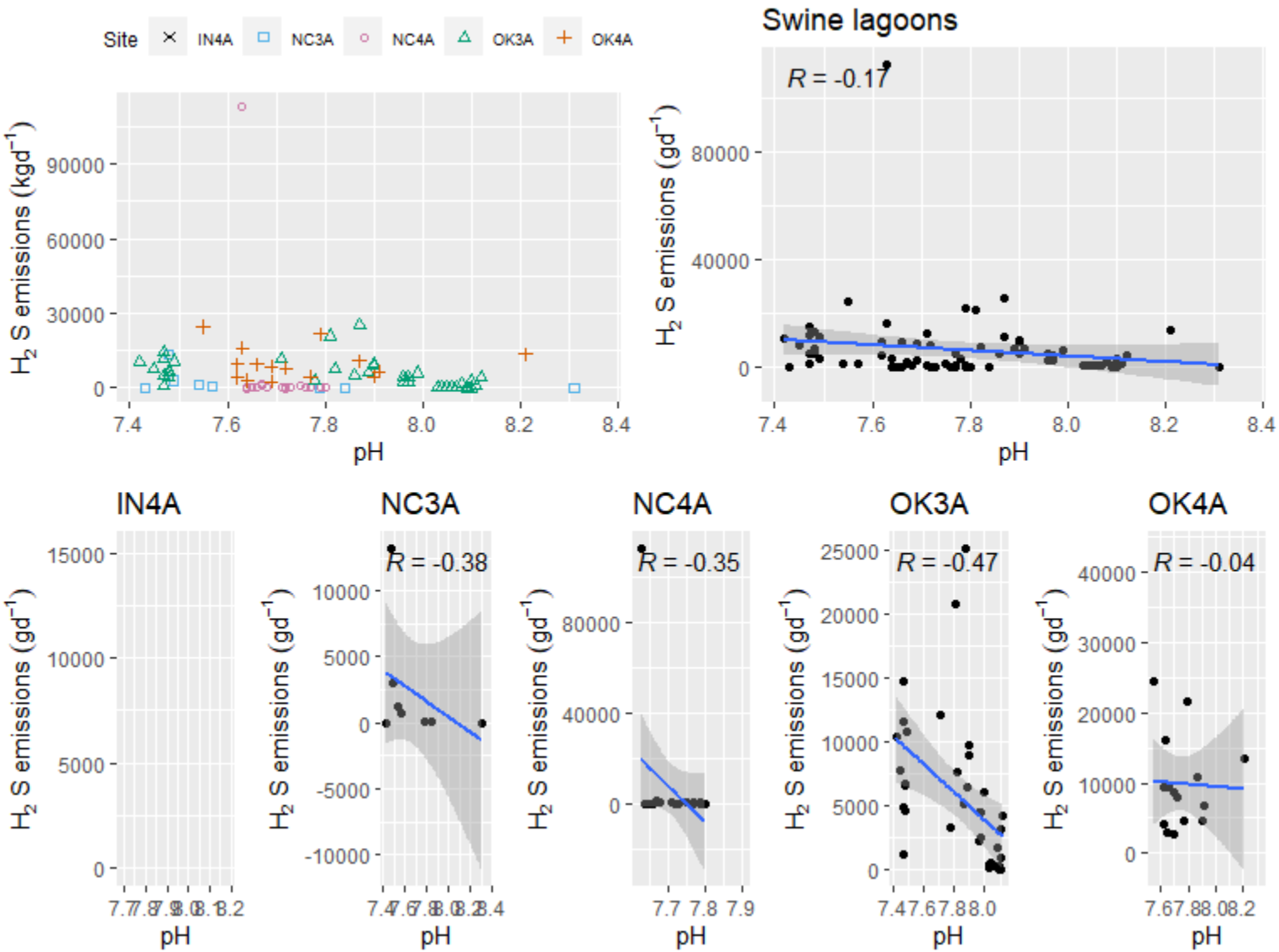


**Figure F.5-11. Scatter plot of swine lagoons $H_2S$ emissions (g $d^{-1}$) versus pH.**

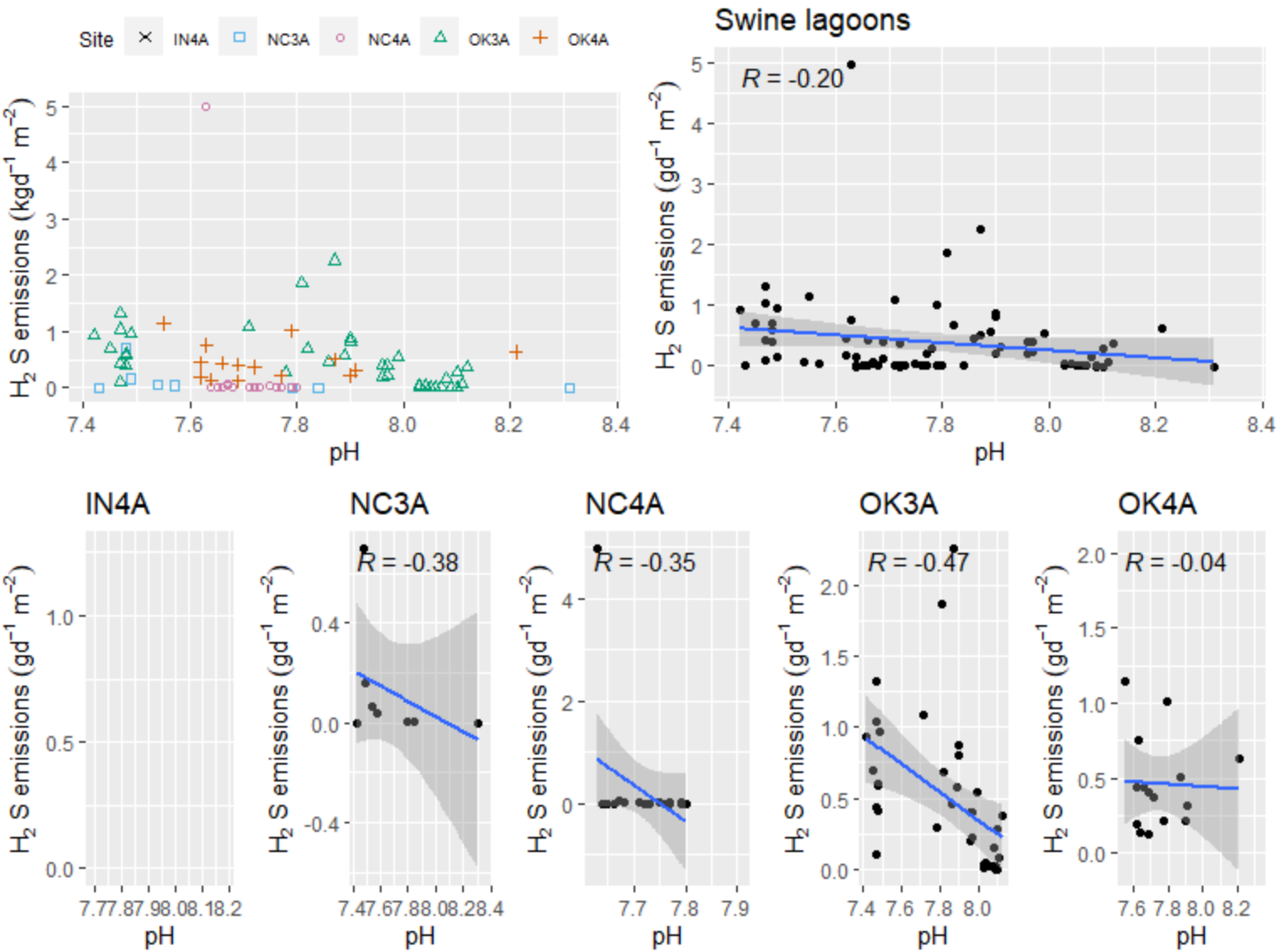


**Figure F.5-12. Scatter plot of swine lagoons $H_2S$ emissions (g $d^{-1}m^{-2}$) versus pH.**

### *F.5.2 Ambient*

**Table F.5.2. Summary of swine lagoons $R^2$ values for ambient parameters.**

| Pollutant | Parameter | R | $R^2$ | Strength | Figure |
|---|---|---|---|---|---|
| $NH_3$ ($kgd^{-1}$) | Air temperature (°C) | 0.64 | 0.41 | moderate | F.5-13 |
| $NH_3$ ($kgd^{-1}m^{-2}$) | Air temperature (°C) | 0.71 | 0.51 | moderate | F.5-14 |
| $NH_3$ ($kgd^{-1}$) | Relative Humidity (%) | -0.16 | 0.03 | slight or weak | F.5-15 |
| $NH_3$ ($kgd^{-1}m^{-2}$) | Relative Humidity (%) | -0.19 | 0.04 | slight or weak | F.5-16 |
| $NH_3$ ($kgd^{-1}$) | Barometric pressure (kPa) | -0.33 | 0.11 | slight or weak | F.5-17 |
| $NH_3$ ($kgd^{-1}m^{-2}$) | Barometric pressure (kPa) | -0.42 | 0.17 | slight or weak | F.5-18 |
| $NH_3$ ($kgd^{-1}$) | Wind speed ($ms^{-1}$) | 0.26 | 0.07 | slight or weak | F.5-19 |
| $NH_3$ ($kgd^{-1}m^{-2}$) | Wind speed ($ms^{-1}$) | 0.27 | 0.07 | slight or weak | F.5-20 |
| $H_2S$ ($gd^{-1}$) | Air temperature (°C) | 0.00 | 0.00 | slight or weak | F.5-21 |
| $H_2S$ ($gd^{-1}m^{-2}$) | Air temperature (°C) | 0.02 | 0.00 | slight or weak | F.5-22 |
| $H_2S$ ($gd^{-1}$) | Relative Humidity (%) | -0.17 | 0.03 | slight or weak | F.5-23 |
| $H_2S$ ($gd^{-1}m^{-2}$) | Relative Humidity (%) | -0.21 | 0.05 | slight or weak | F.5-24 |
| $H_2S$ ($gd^{-1}$) | Barometric pressure (kPa) | -0.19 | 0.04 | slight or weak | F.5-25 |
| $H_2S$ ($gd^{-1}m^{-2}$) | Barometric pressure (kPa) | -0.28 | 0.08 | slight or weak | F.5-26 |
| $H_2S$ ($gd^{-1}$) | Wind speed ($ms^{-1}$) | 0.24 | 0.06 | slight or weak | F.5-27 |
| $H_2S$ ($gd^{-1}m^{-2}$) | Wind speed ($ms^{-1}$) | 0.32 | 0.10 | slight or weak | F.5-28 |

### *F.5.2.1 Ammonia ($NH_3$)*

F.5.2.1.1 Ambient temperature

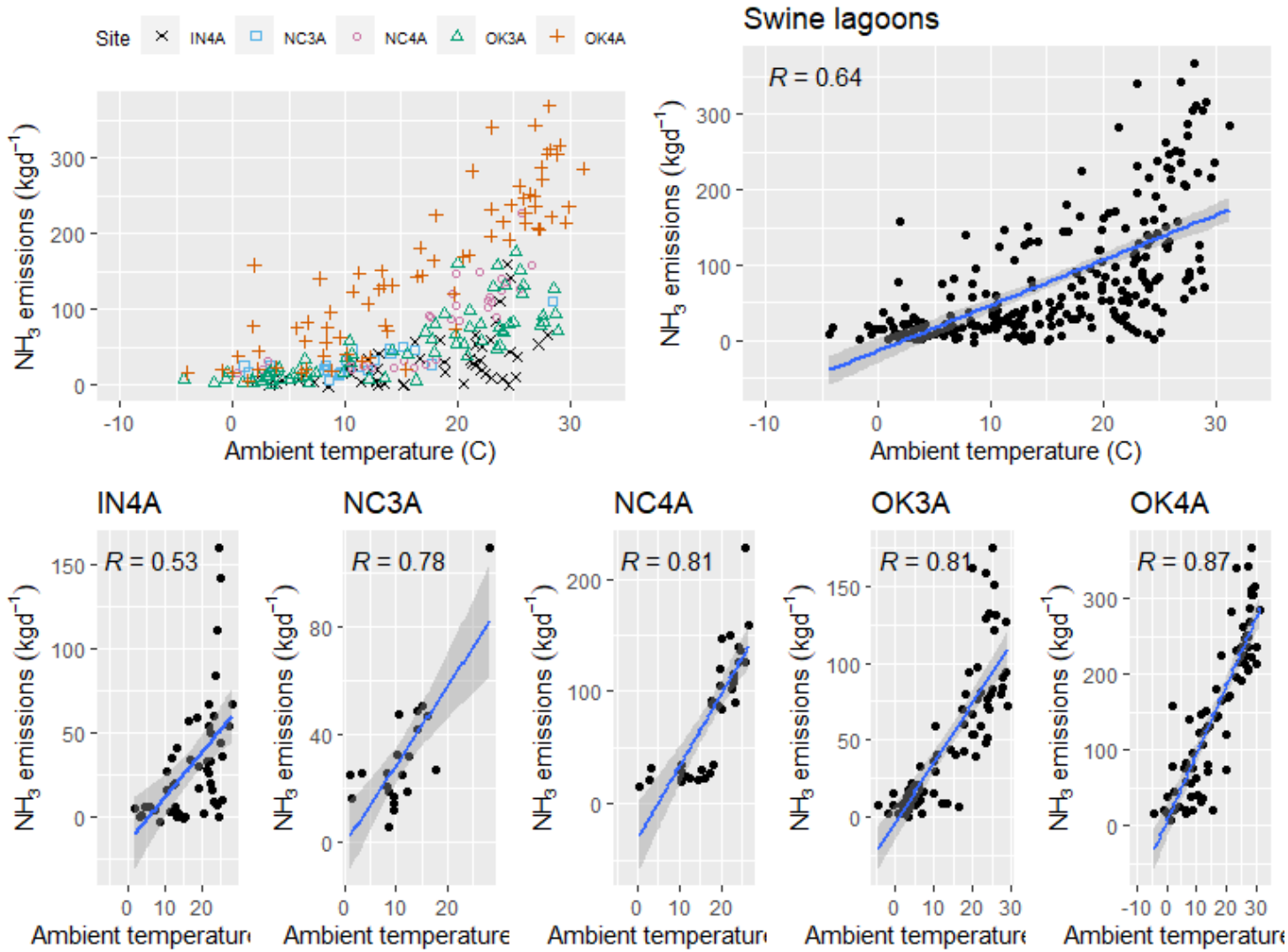


**Figure F.5-13. Scatter plot of swine lagoons $NH_3$ emissions (kg $d^{-1}$) versus ambient temperature.**

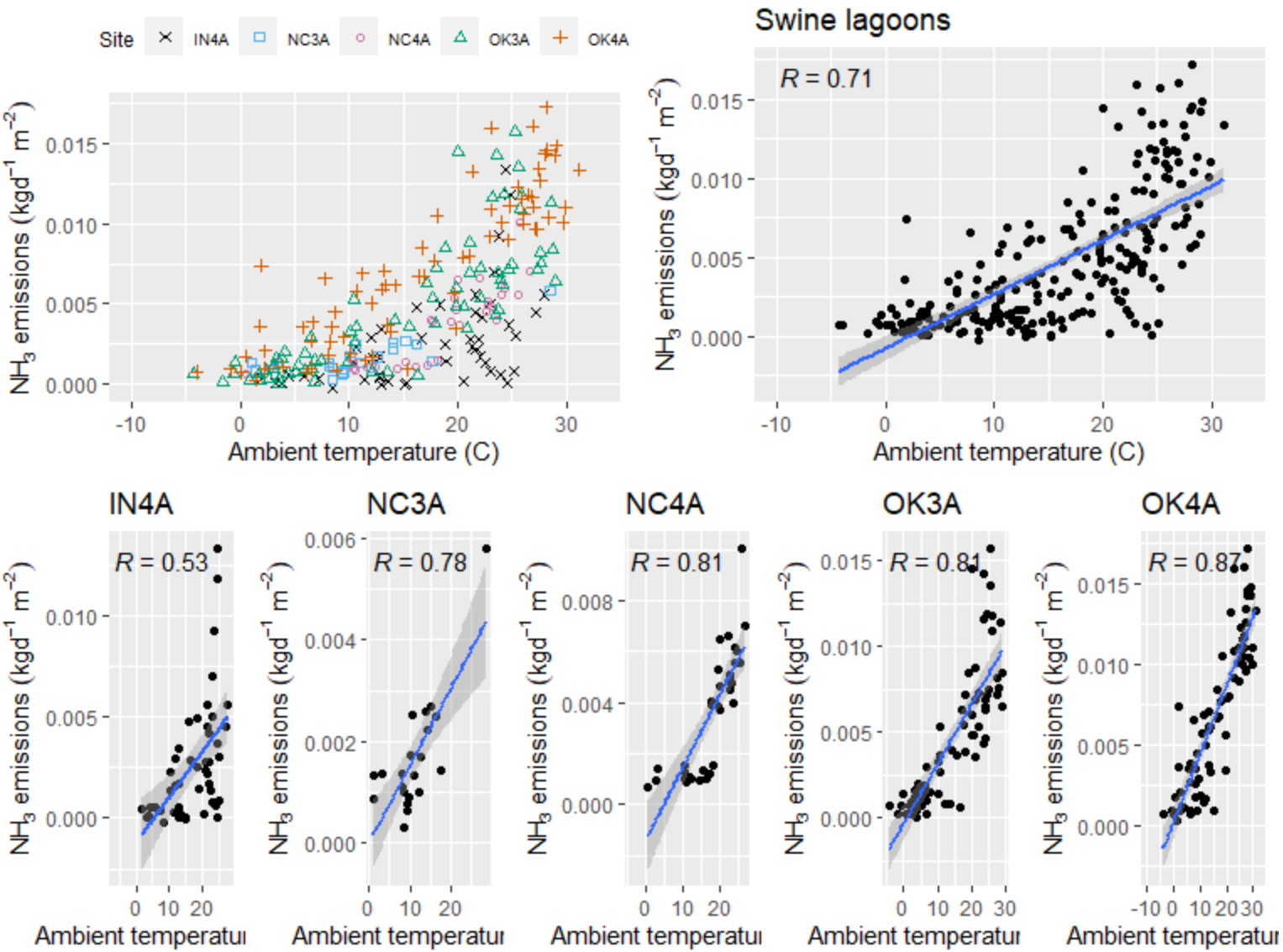


**Figure F.5-14. Scatter plot of swine lagoons $NH_3$ emissions (kg $d^{-1}m^{-2}$) versus ambient temperature.**

F.5.2.1.2 Relative humidity

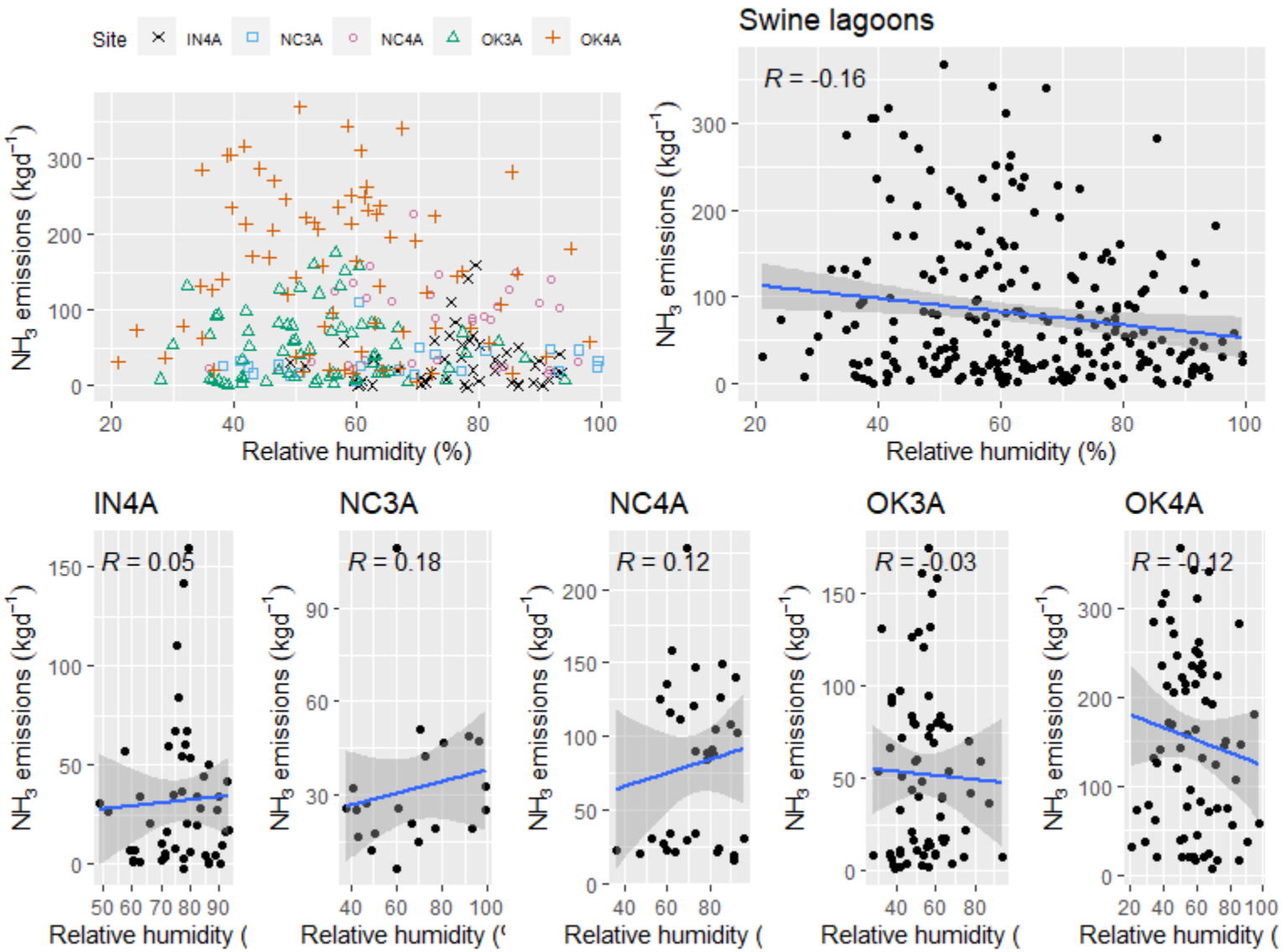


**Figure F.5-15. Scatter plot of swine lagoons $NH_3$ emissions (kg $d^{-1}$) versus relative humidity.**

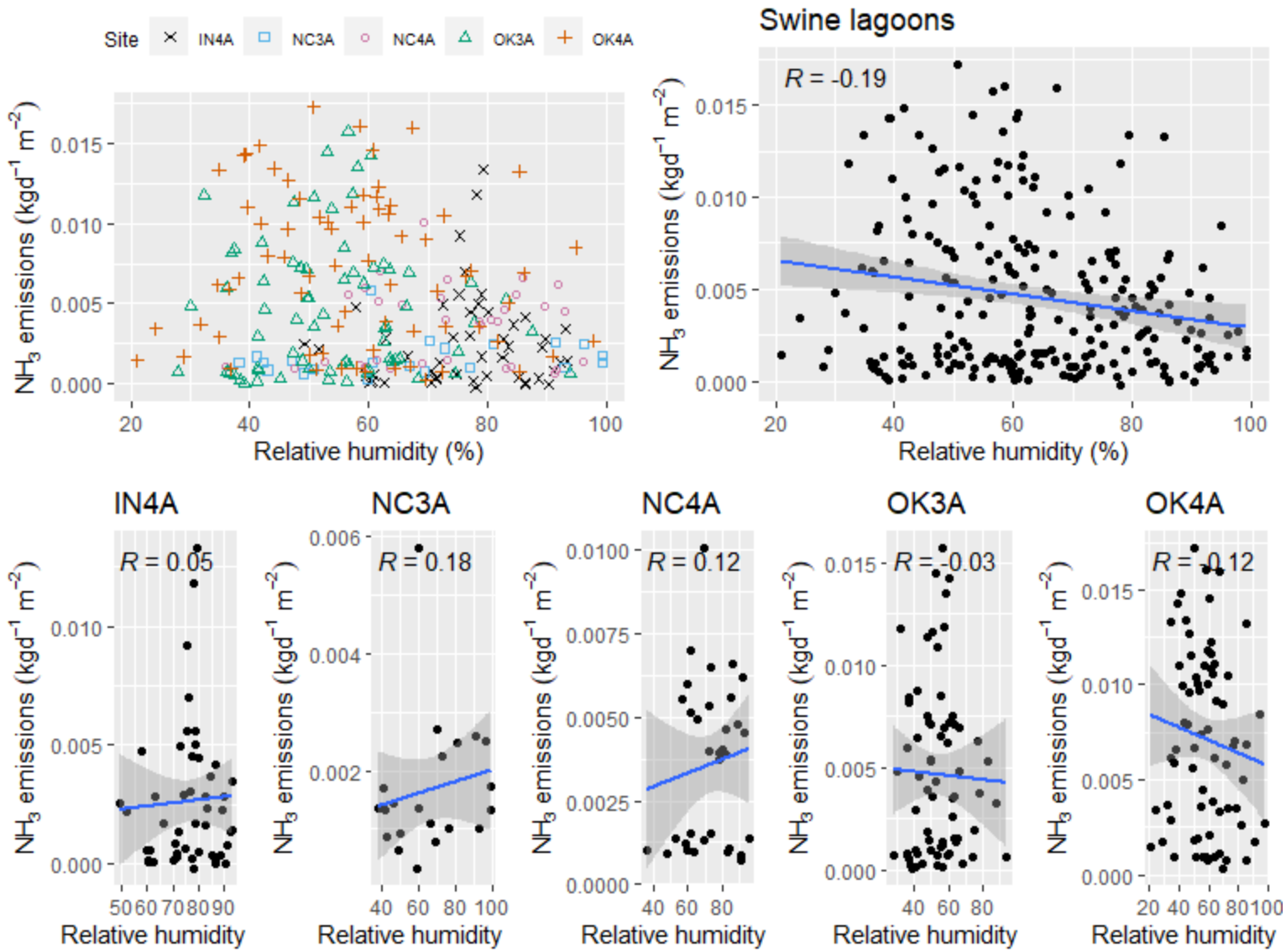


**Figure F.5-16. Scatter plot of swine lagoons $NH_3$ emissions (g $d^{-1}m^{-2}$) versus relative humidity.**

F.5.2.1.3 Barometric Pressure

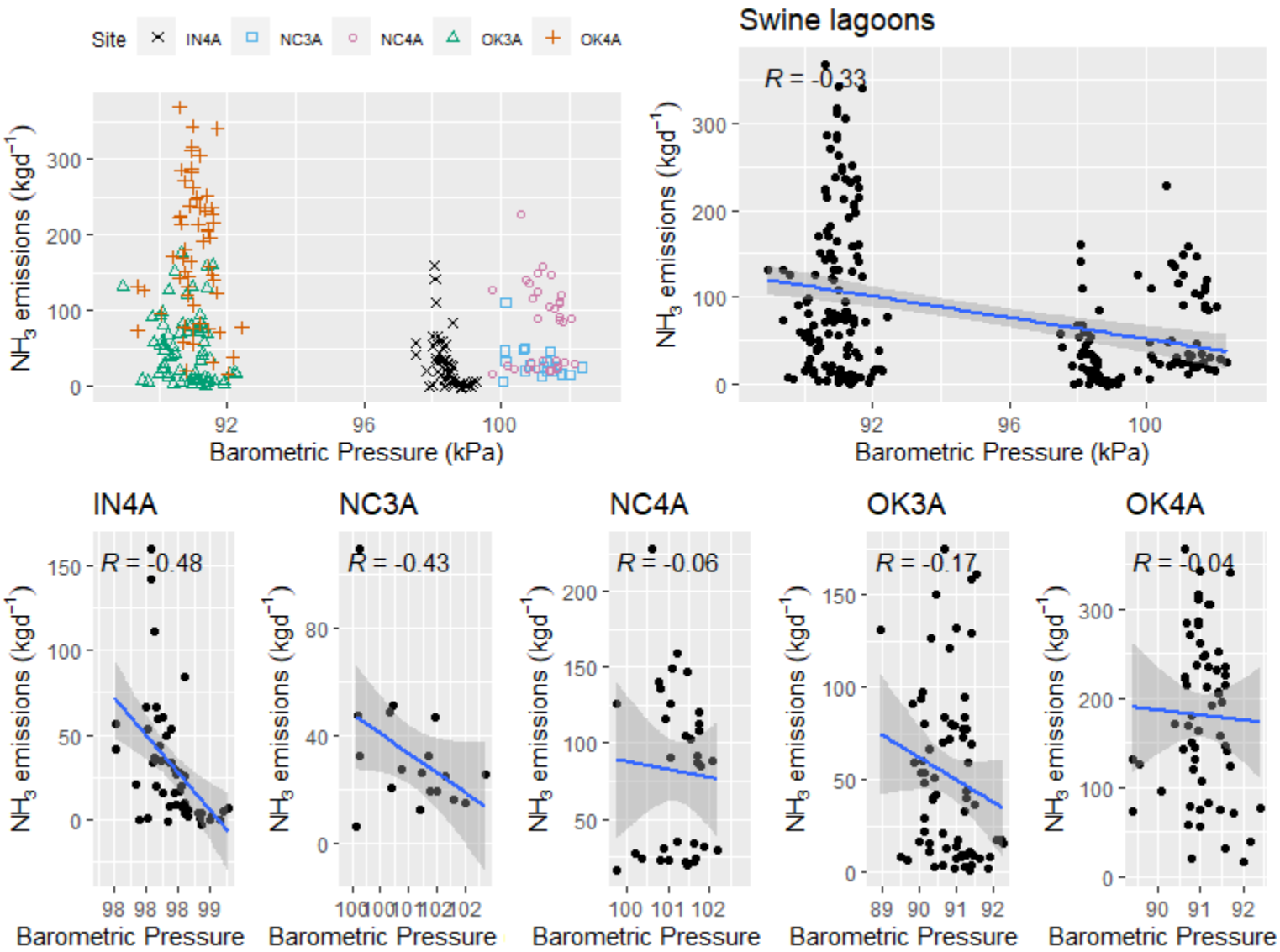


**Figure F.5-17. Scatter plot of swine lagoons $NH_3$ emissions (kg $d^{-1}$) versus barometric pressure.**

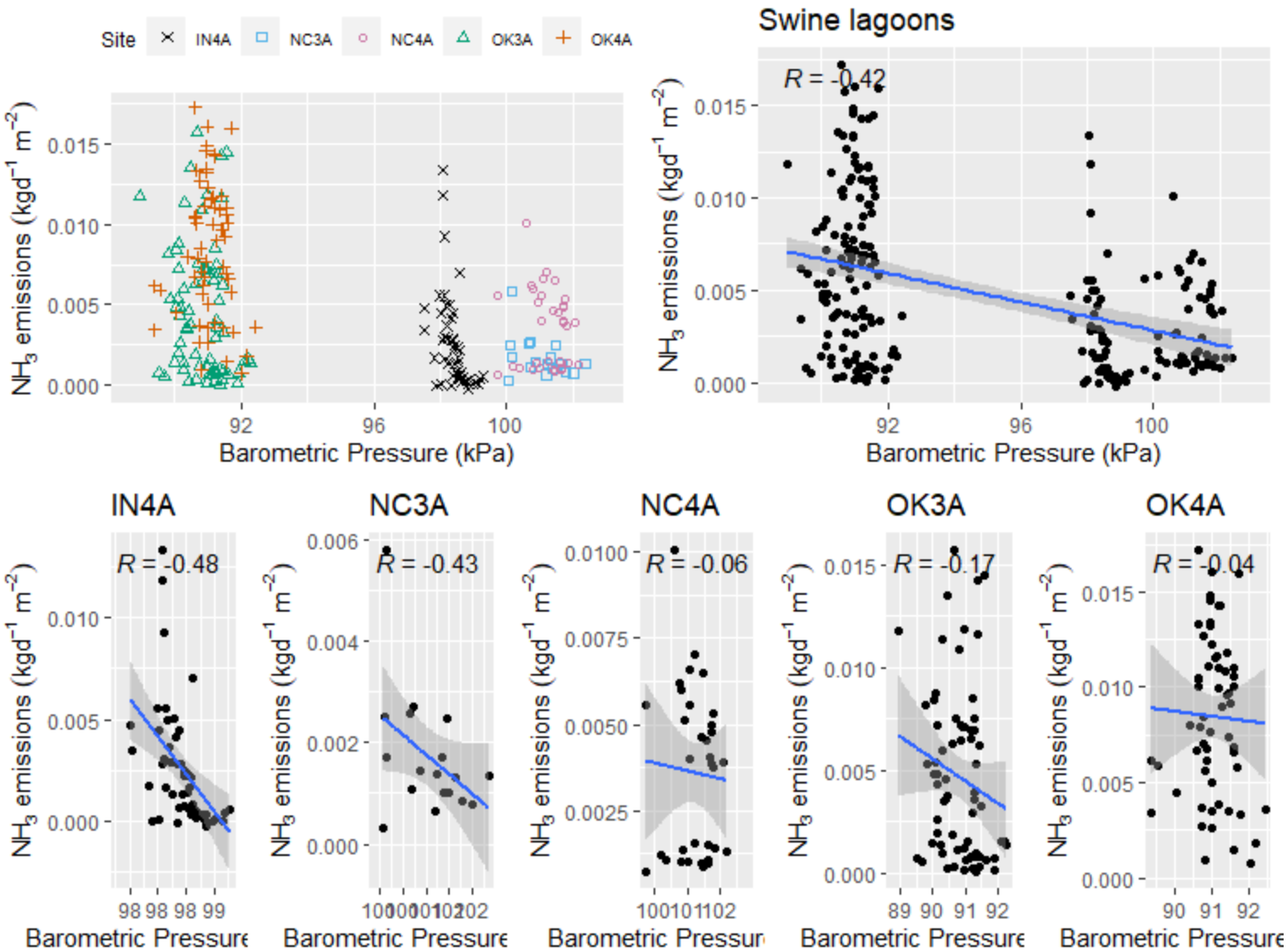


**Figure F.5-18. Scatter plot of swine lagoons $NH_3$ emissions (kg $d^{-1}m^{-2}$) versus barometric pressure.**

F.5.2.1.4 Wind speed

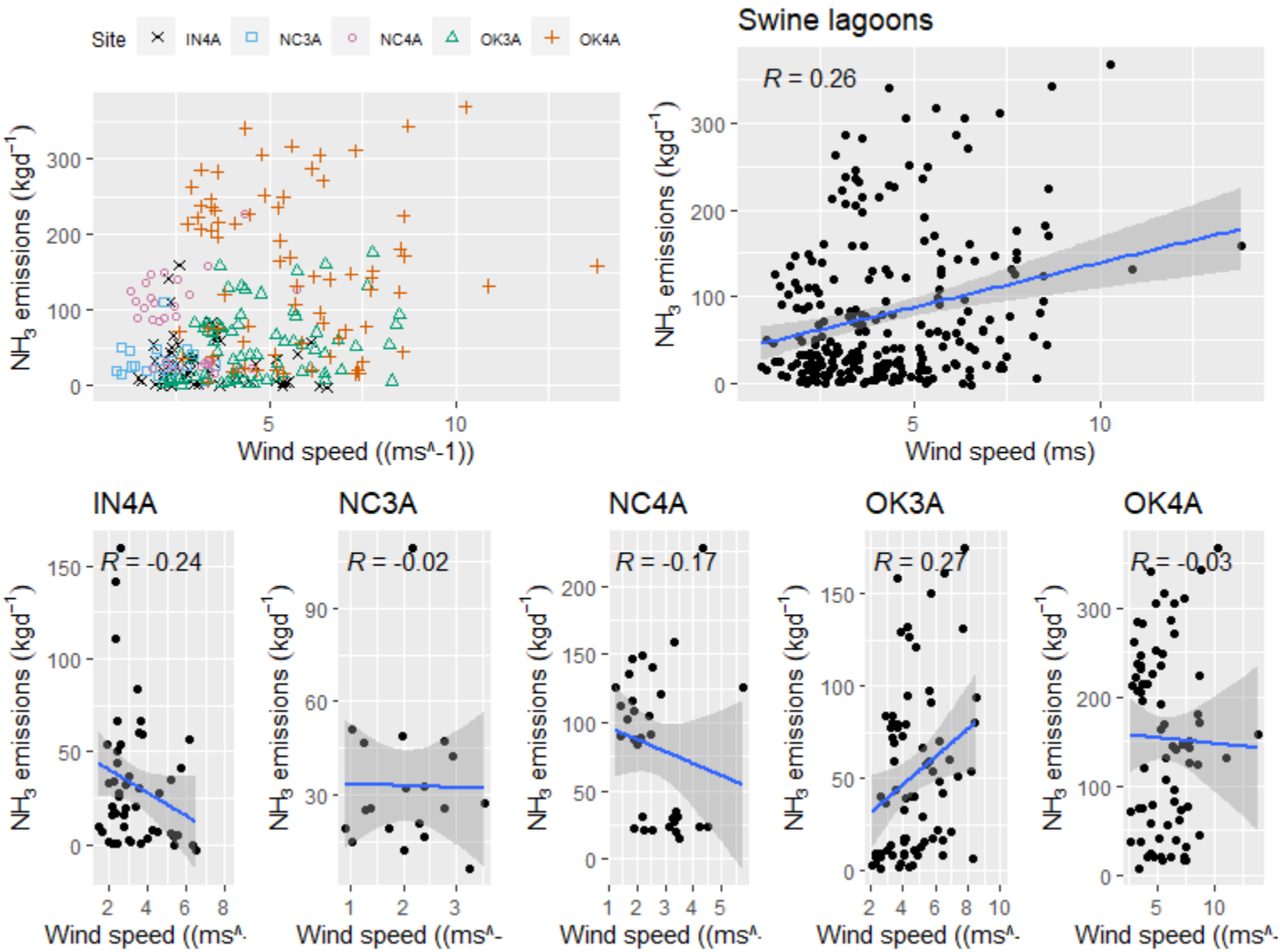


**Figure F.5-19. Scatter plot of swine lagoons $NH_3$ emissions (kg $d^{-1}$) versus Wind speed.**

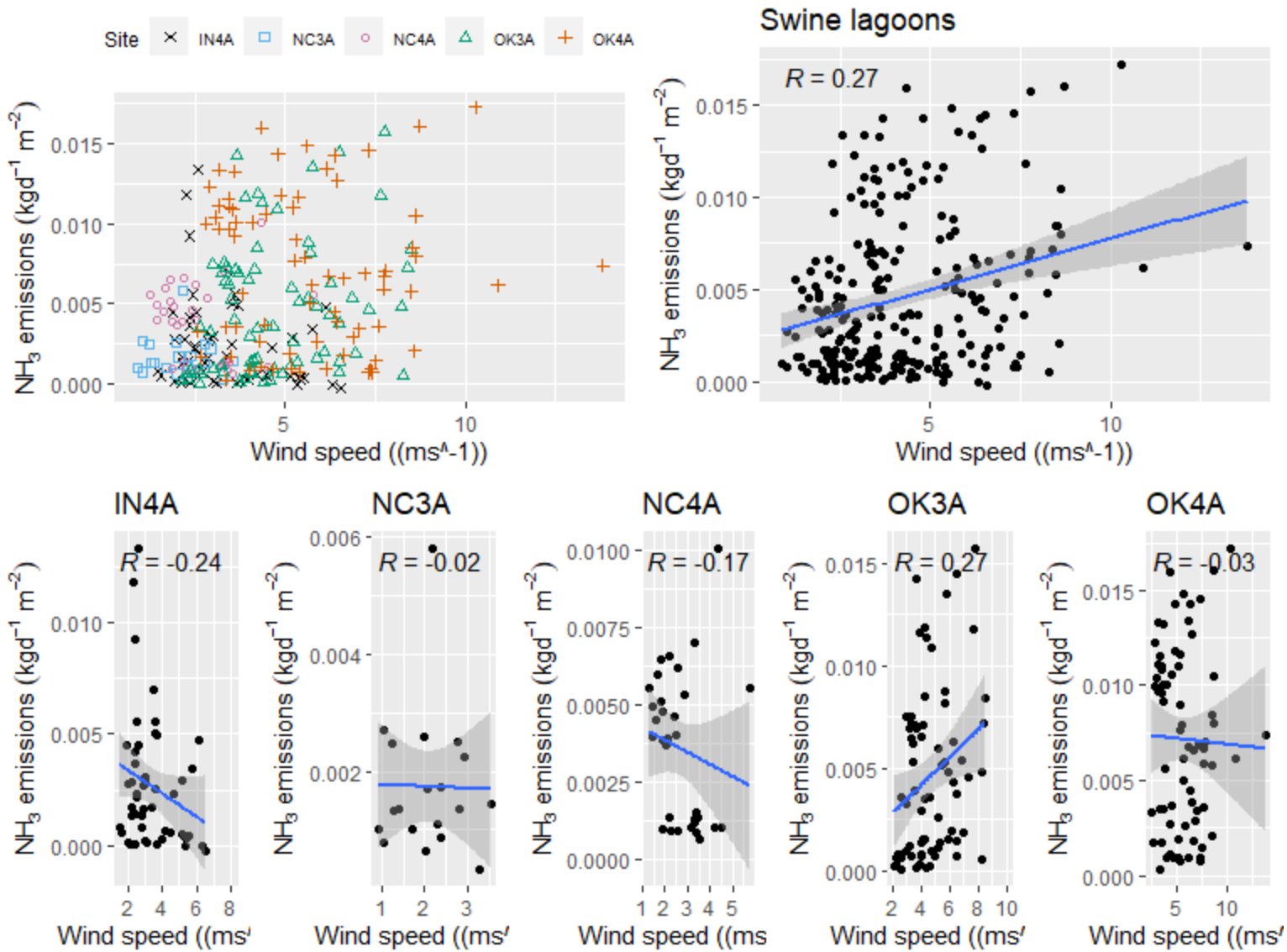


**Figure F.5-20. Scatter plot of swine lagoons $NH_3$ emissions (kg $d^{-1}m^{-2}$) versus Wind speed.**

### *F.5.2.2 Hydrogen Sulfide ($H_2S$)*

F.5.2.2.1 Ambient temperature

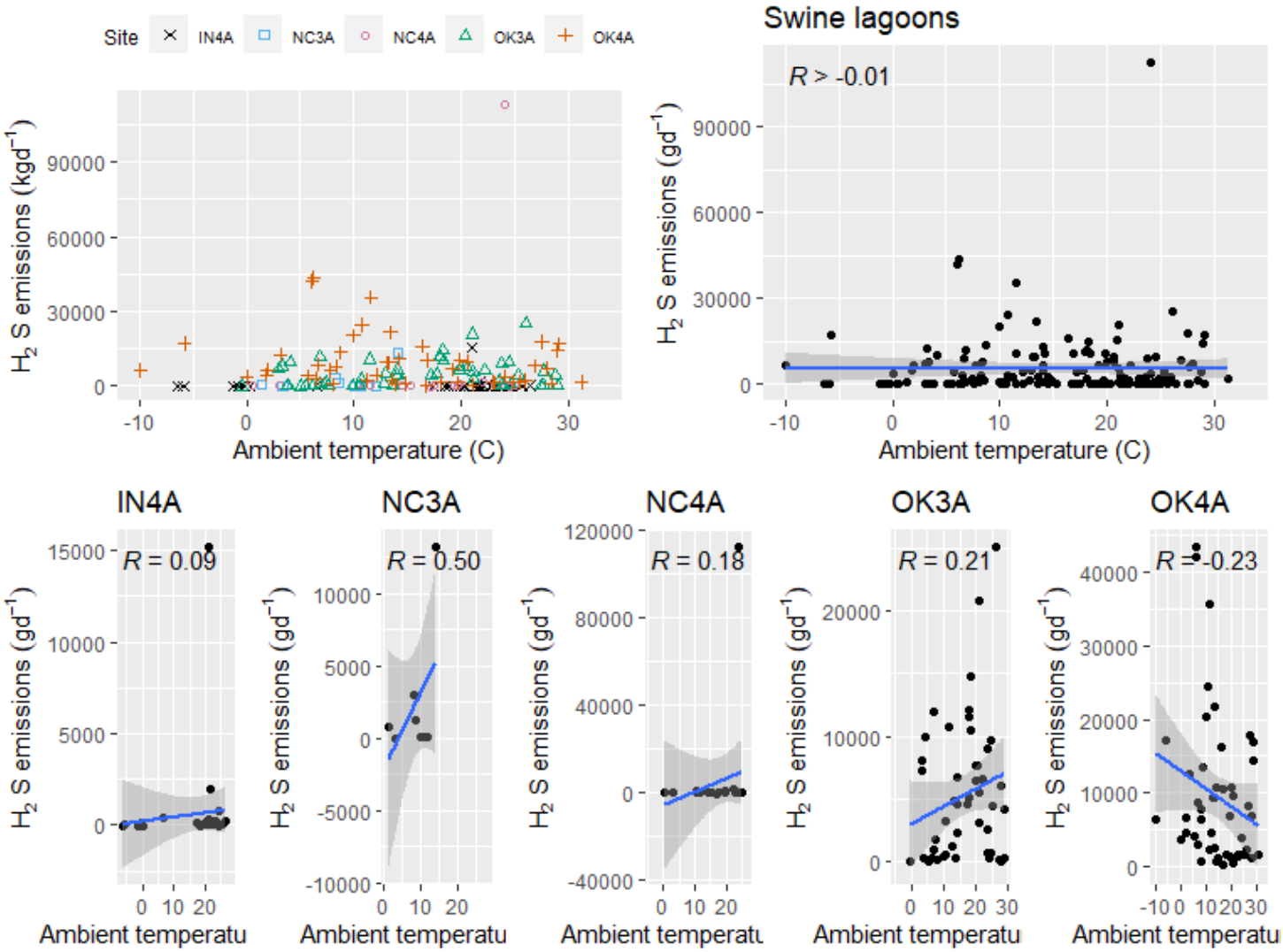


**Figure F.5-21. Scatter plot of swine lagoons $H_2S$ emissions (g $d^{-1}$) versus ambient temperature.**

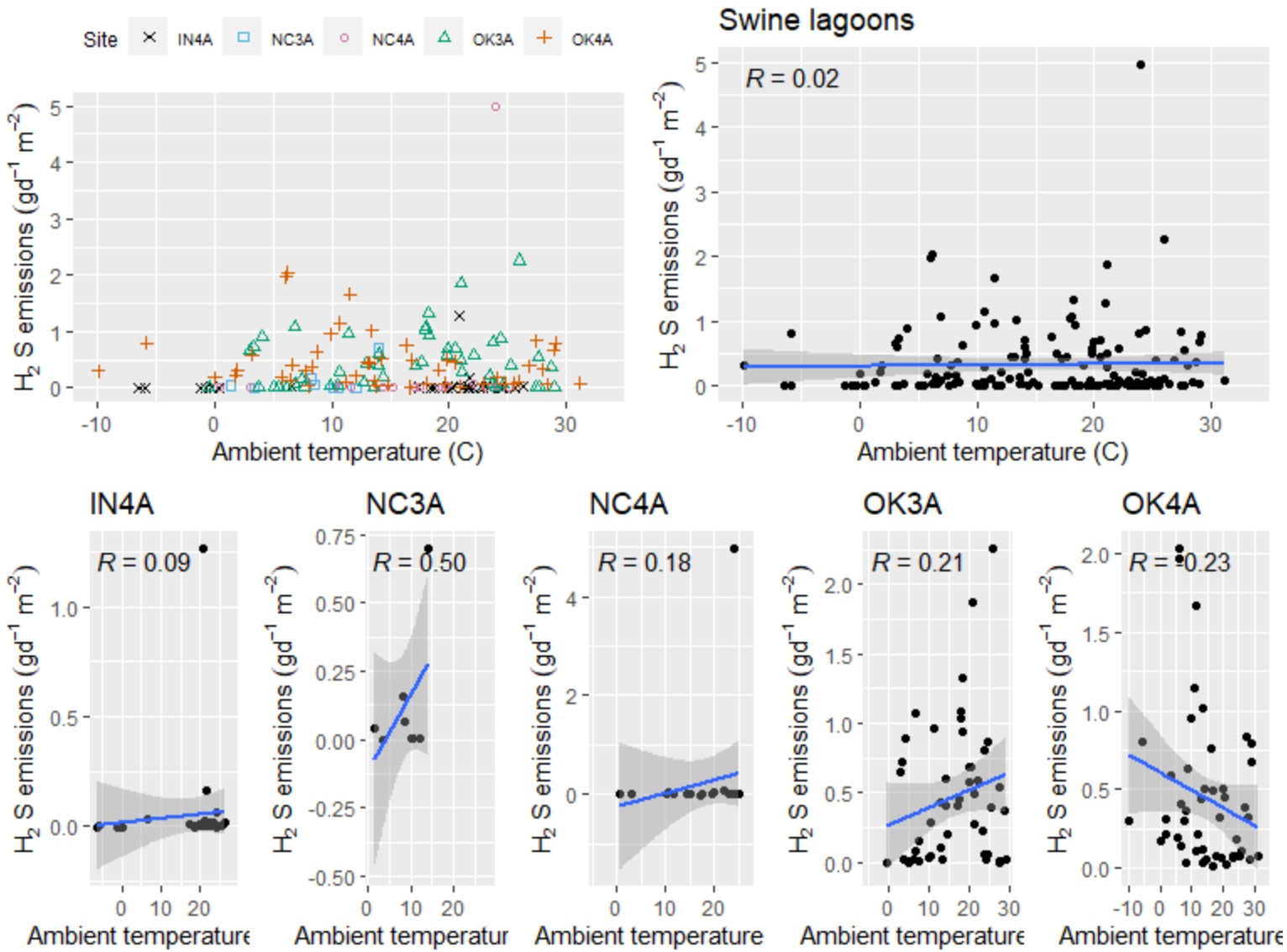


**Figure F.5-22. Scatter plot of swine lagoons $H_2S$ emissions (g $d^{-1}m^{-2}$) versus ambient temperature.**

F.5.2.2.2 Relative humidity

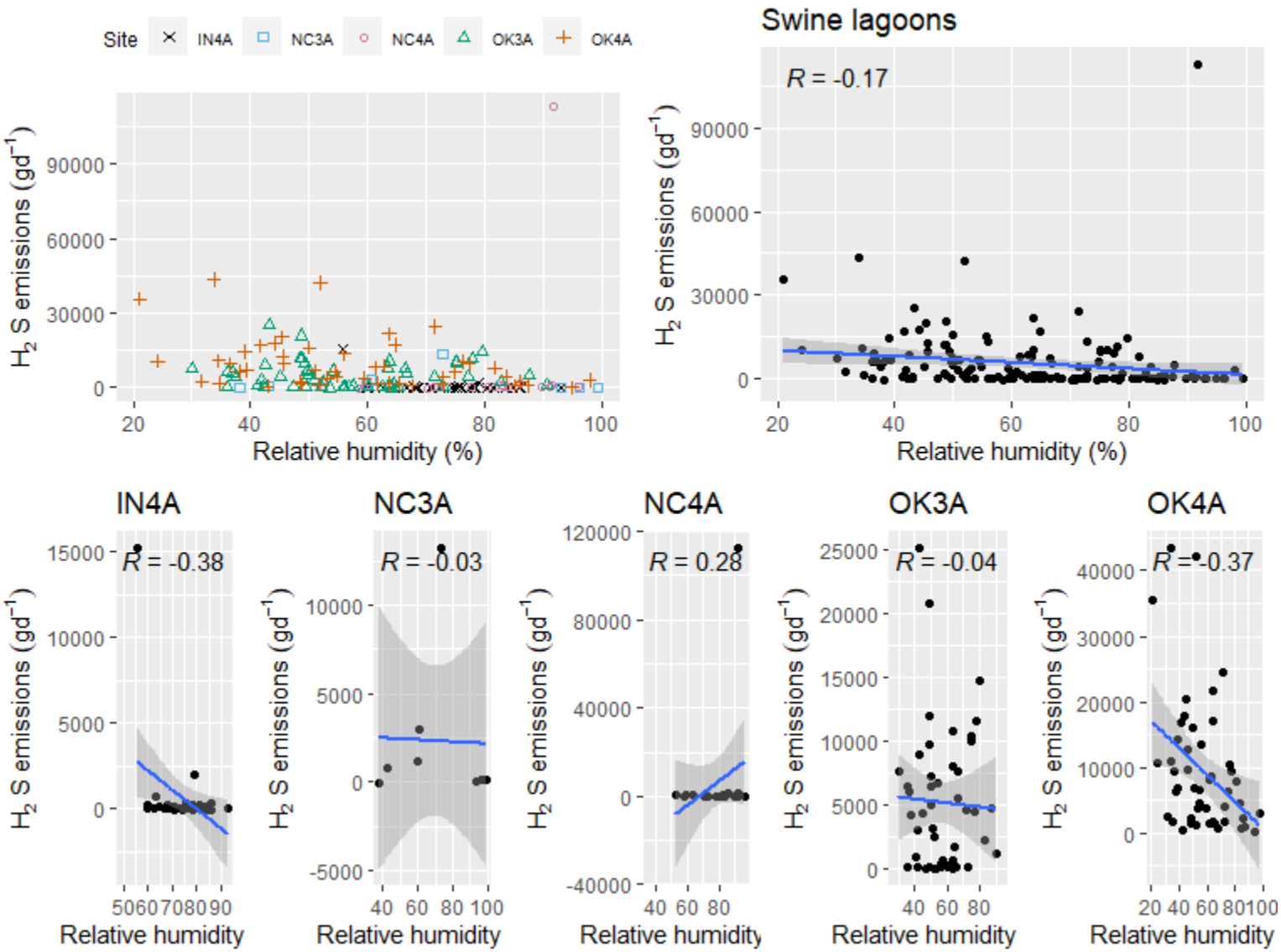


**Figure F.5-23. Scatter plot of swine lagoons $H_2S$ emissions (g $d^{-1}$) versus relative humidity.**

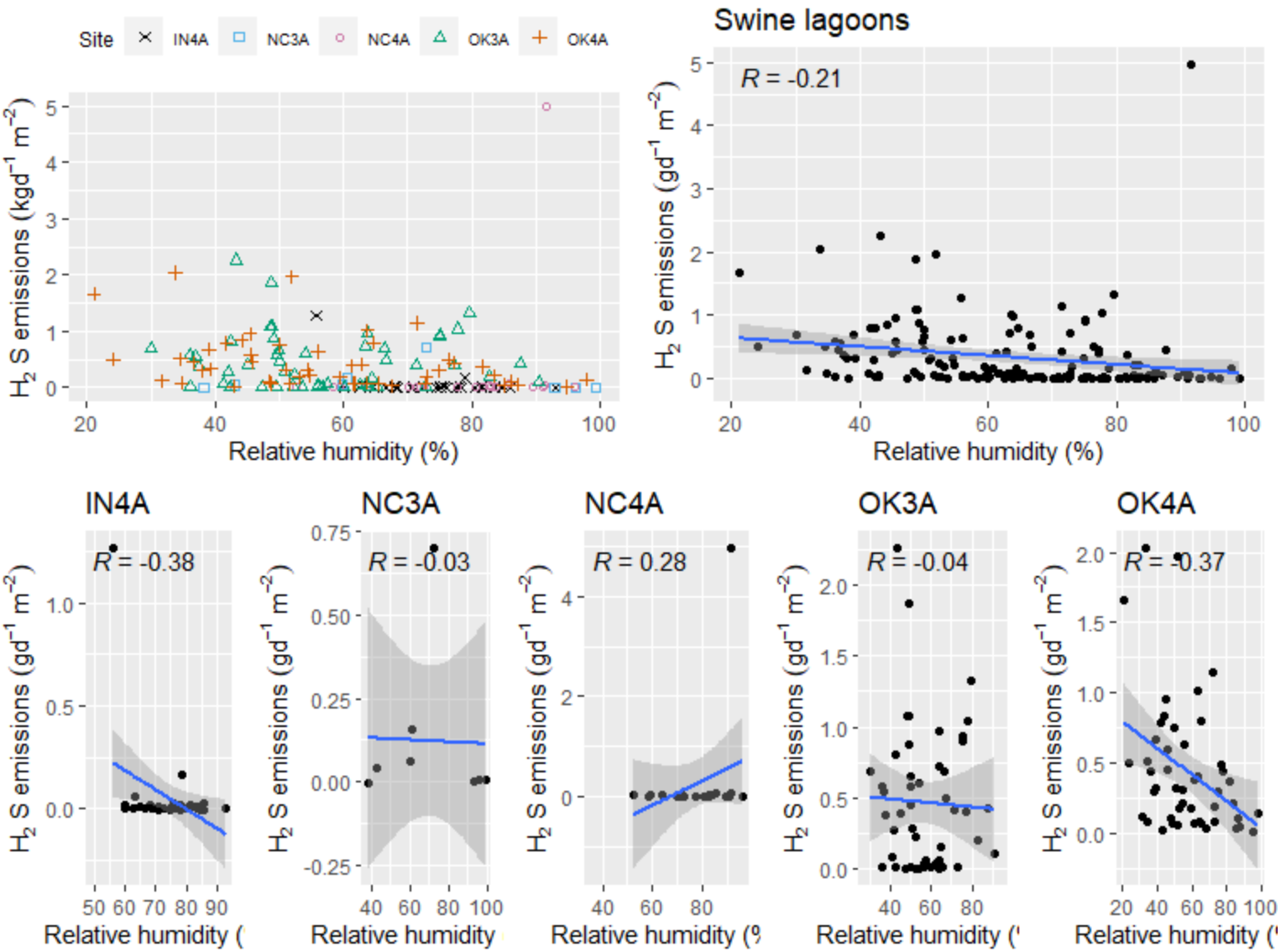


**Figure F.5-24. Scatter plot of swine lagoons $H_2S$ emissions (g $d^{-1}m^{-2}$) versus relative humidity.**

F.5.2.2.3 Barometric Pressure

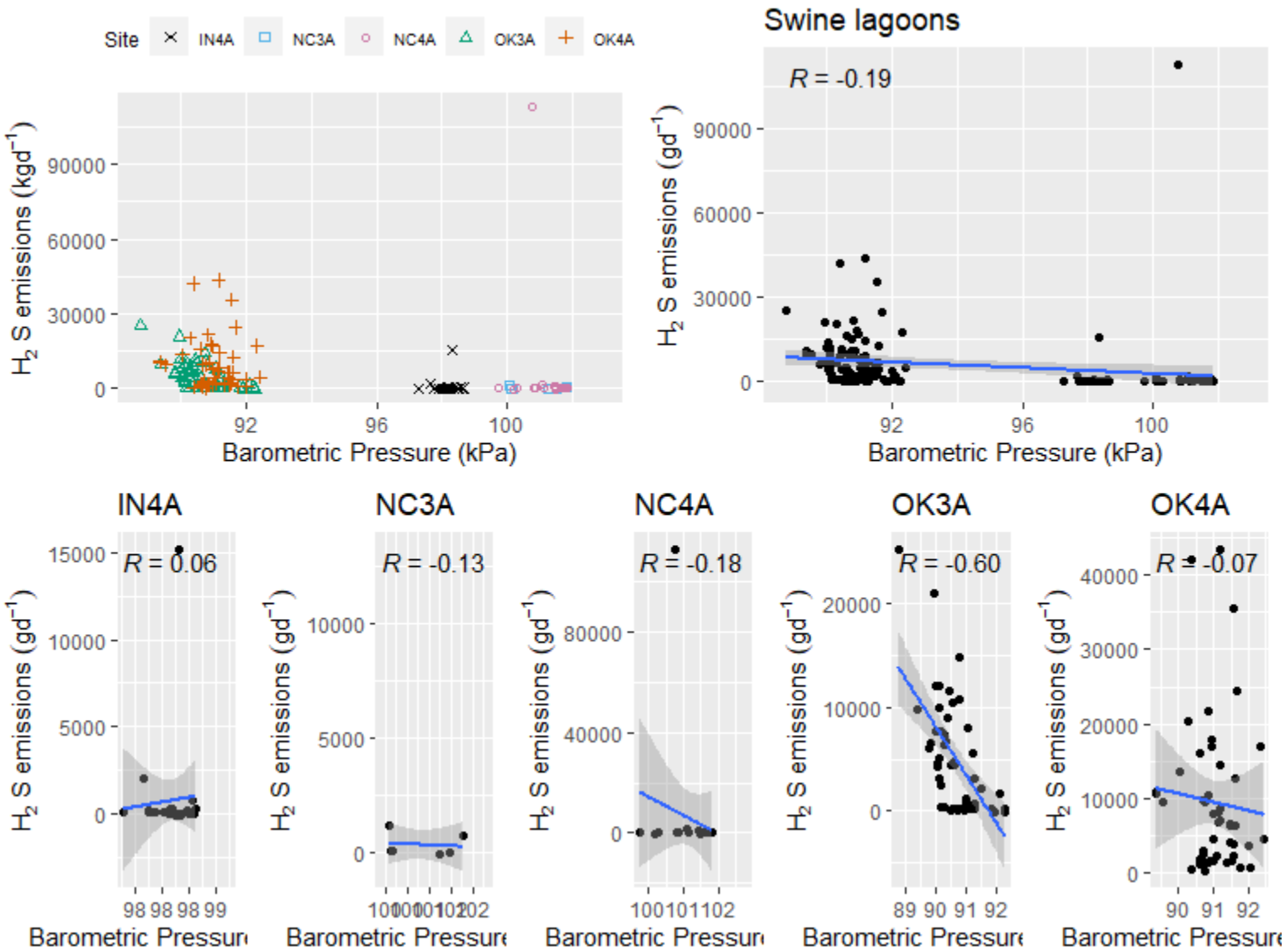


**Figure F.5-25. Scatter plot of swine lagoons $H_2S$ emissions (g $d^{-1}$) versus Barometric pressure (kPa).**

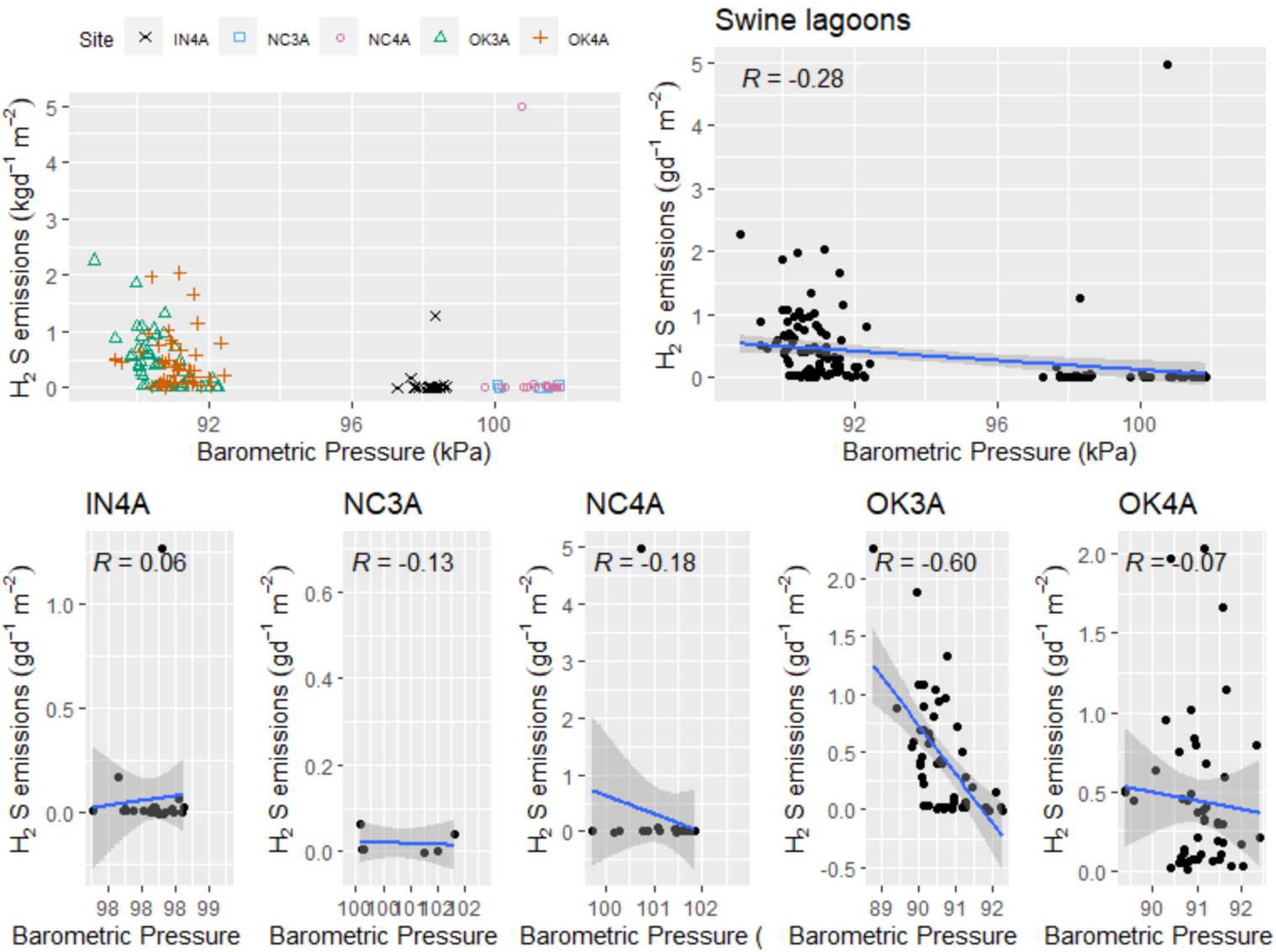


**Figure F.5-26. Scatter plot of swine lagoons $H_2S$ emissions (g $d^{-1}m^{-2}$) versus barometric pressure (kPa)**

F.5.2.2.4 Wind speed

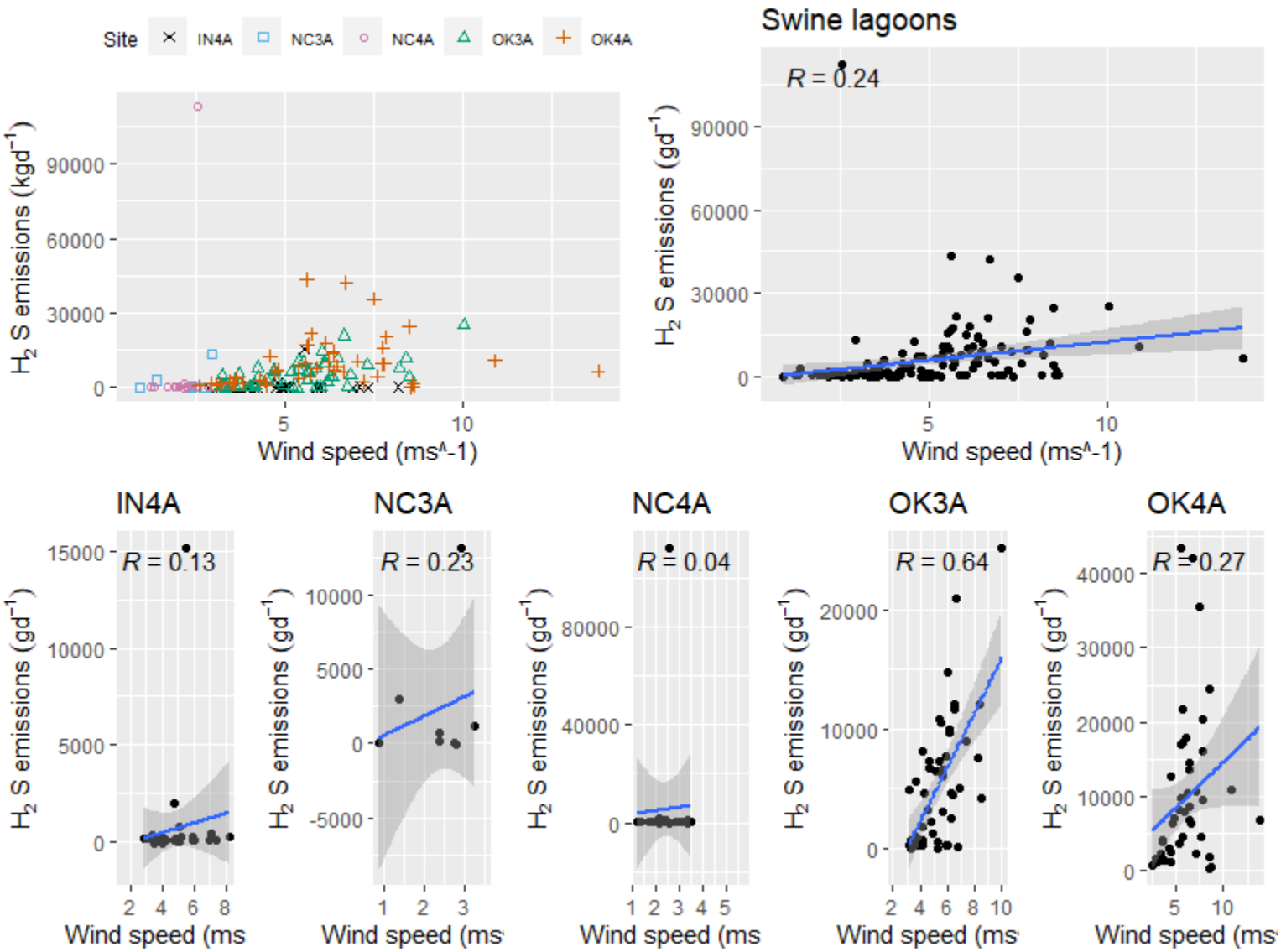


**Figure F.5-27. Scatter plot of swine lagoons $H_2S$ emissions (g $d^{-1}$) versus Wind speed (ms-1).**

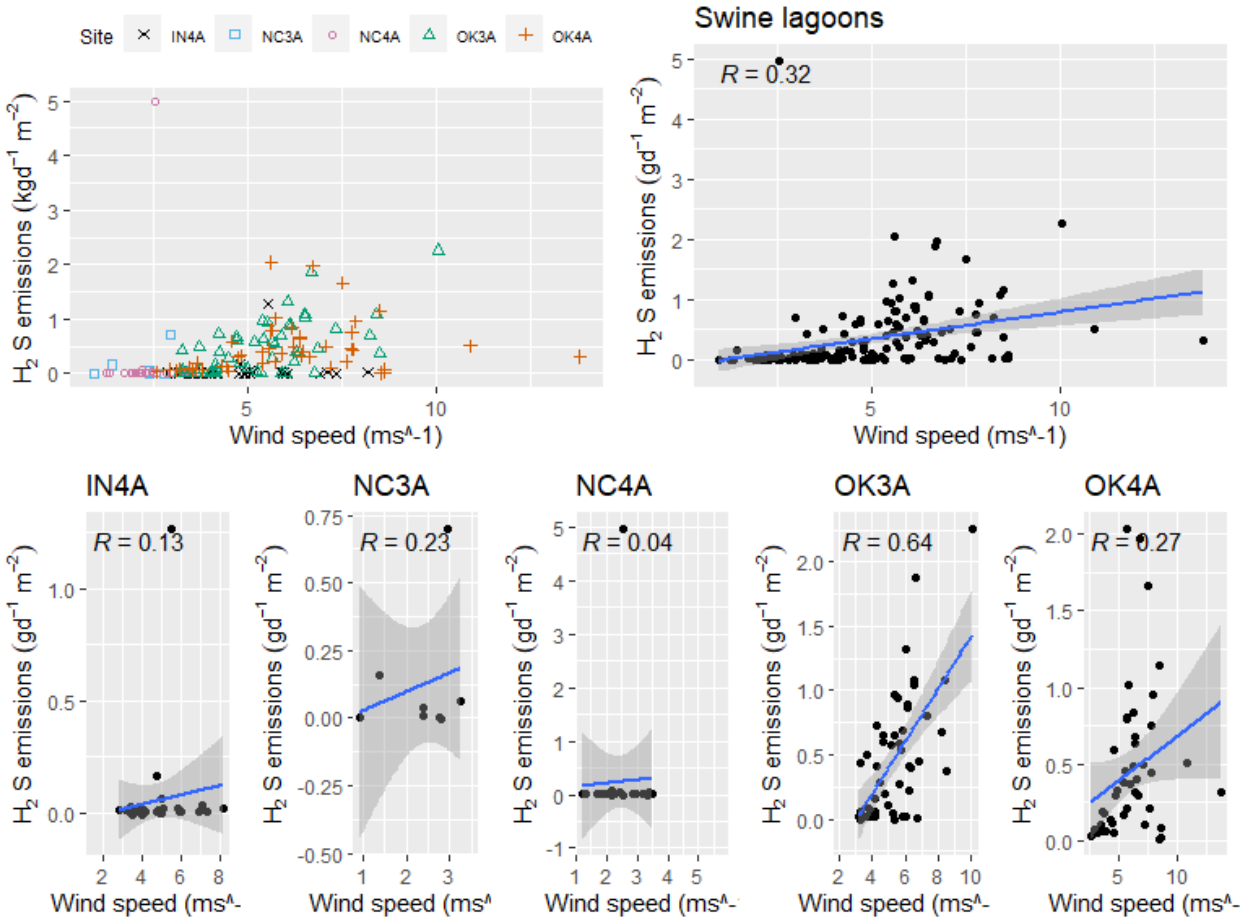


**Figure F.5-28. Scatter plot of swine lagoons $H_2S$ emissions (g $d^{-1}m^{-2}$) versus Wind speed (ms^-1)**

## F.6 Basins

### *F.6.1 Ambient*

**Table F.6.1. Summary of swine basin $R^2$ values for ambient parameters.**

| Pollutant | Parameter | R | $R^2$ | Strength | Figure |
|---|---|---|---|---|---|
| $NH_3$ ($kgd^{-1}$) | Air temperature (°C) | 0.78 | 0.61 | moderately strong | F.6-1 |
| $NH_3$ ($kgd^{-1}m^{-2}$) | Air temperature (°C) | 0.78 | 0.61 | moderately strong | F.6-2 |
| $NH_3$ ($kgd^{-1}$) | Relative Humidity (%) | 0.06 | 0.00 | slight or weak | F.6-3 |
| $NH_3$ ($kgd^{-1}m^{-2}$) | Relative Humidity (%) | 0.06 | 0.00 | slight or weak | F.6-4 |
| $NH_3$ ($kgd^{-1}$) | Barometric pressure (kPa) | -0.28 | 0.08 | slight or weak | F.6-5 |
| $NH_3$ ($kgd^{-1}m^{-2}$) | Barometric pressure (kPa) | -0.28 | 0.08 | slight or weak | F.6-6 |
| $NH_3$ ($kgd^{-1}$) | Wind speed ($ms^{-1}$) | -0.43 | 0.19 | slight or weak | F.6-7 |
| $NH_3$ ($kgd^{-1}m^{-2}$) | Wind speed ($ms^{-1}$) | -0.43 | 0.19 | slight or weak | F.6-8 |
| $H_2S$ ($gd^{-1}$) | Air temperature (°C) | 0.42 | 0.18 | slight or weak | F.6-9 |
| $H_2S$ ($gd^{-1}m^{-2}$) | Air temperature (°C) | 0.42 | 0.18 | slight or weak | F.6-10 |
| $H_2S$ ($gd^{-1}$) | Relative Humidity (%) | -0.13 | 0.02 | slight or weak | F.6-11 |
| $H_2S$ ($gd^{-1}m^{-2}$) | Relative Humidity (%) | -0.13 | 0.02 | slight or weak | F.6-12 |
| $H_2S$ ($gd^{-1}$) | Barometric pressure (kPa) | -0.33 | 0.11 | slight or weak | F.6-13 |
| $H_2S$ ($gd^{-1}m^{-2}$) | Barometric pressure (kPa) | -0.33 | 0.11 | slight or weak | F.6-14 |
| $H_2S$ ($gd^{-1}$) | Wind speed ($ms^{-1}$) | 0.07 | 0.01 | slight or weak | F.6-15 |
| $H_2S$ ($gd^{-1}m^{-2}$) | Wind speed ($ms^{-1}$) | 0.07 | 0.01 | slight or weak | F.6-16 |

### *F.6.1.1 Ammonia ($NH_3$)*

F.6.1.1.1 Ambient temperature

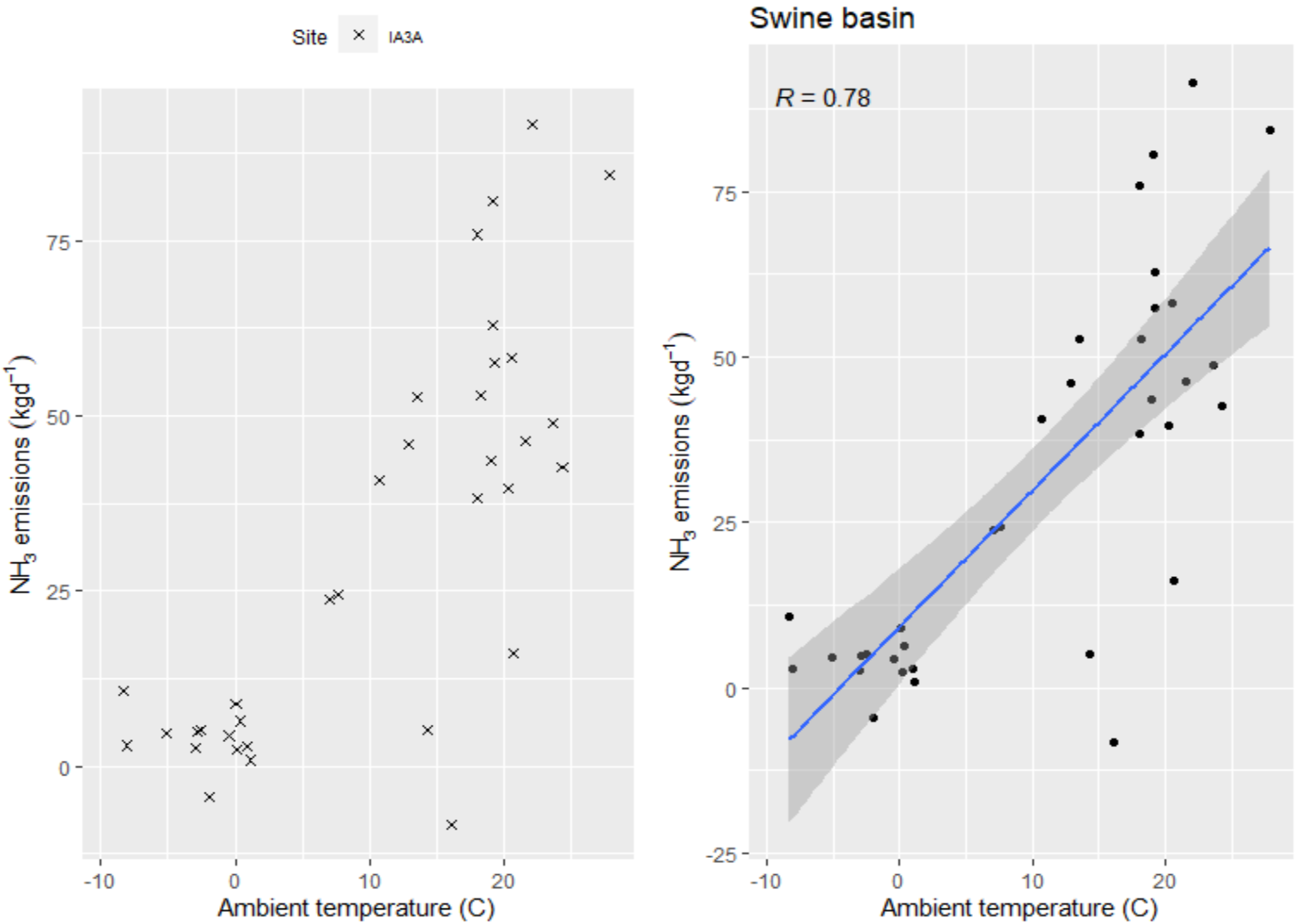


**Figure F.6-1. Scatter plot of swine basin $NH_3$ emissions (kg $d^{-1}$) versus ambient temperature.**

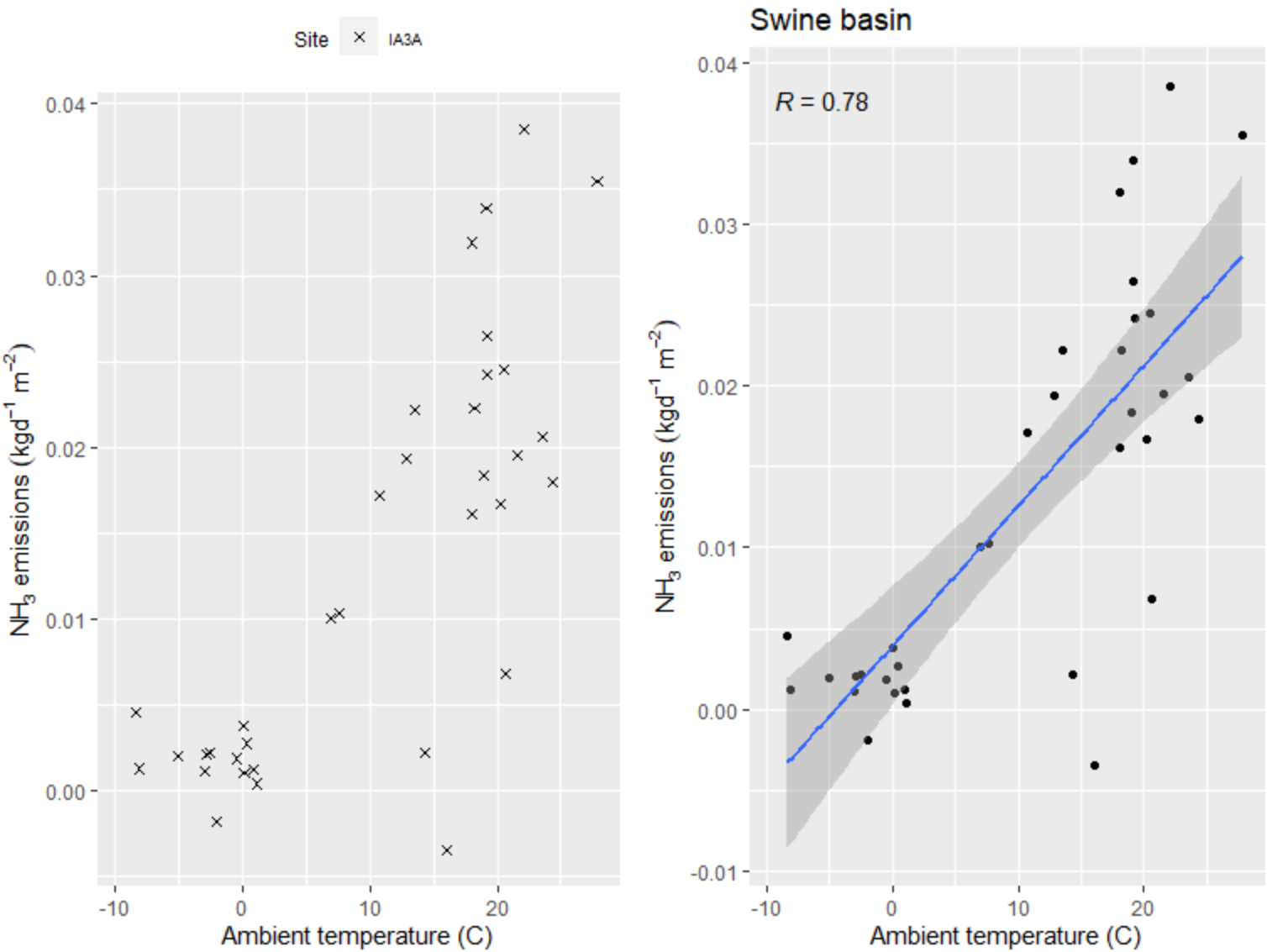


**Figure F.6-2. Scatter plot of swine basin $NH_3$ emissions (kg $d^{-1}m^{-2}$) versus ambient temperature.**

F.6.1.1.2 Relative humidity

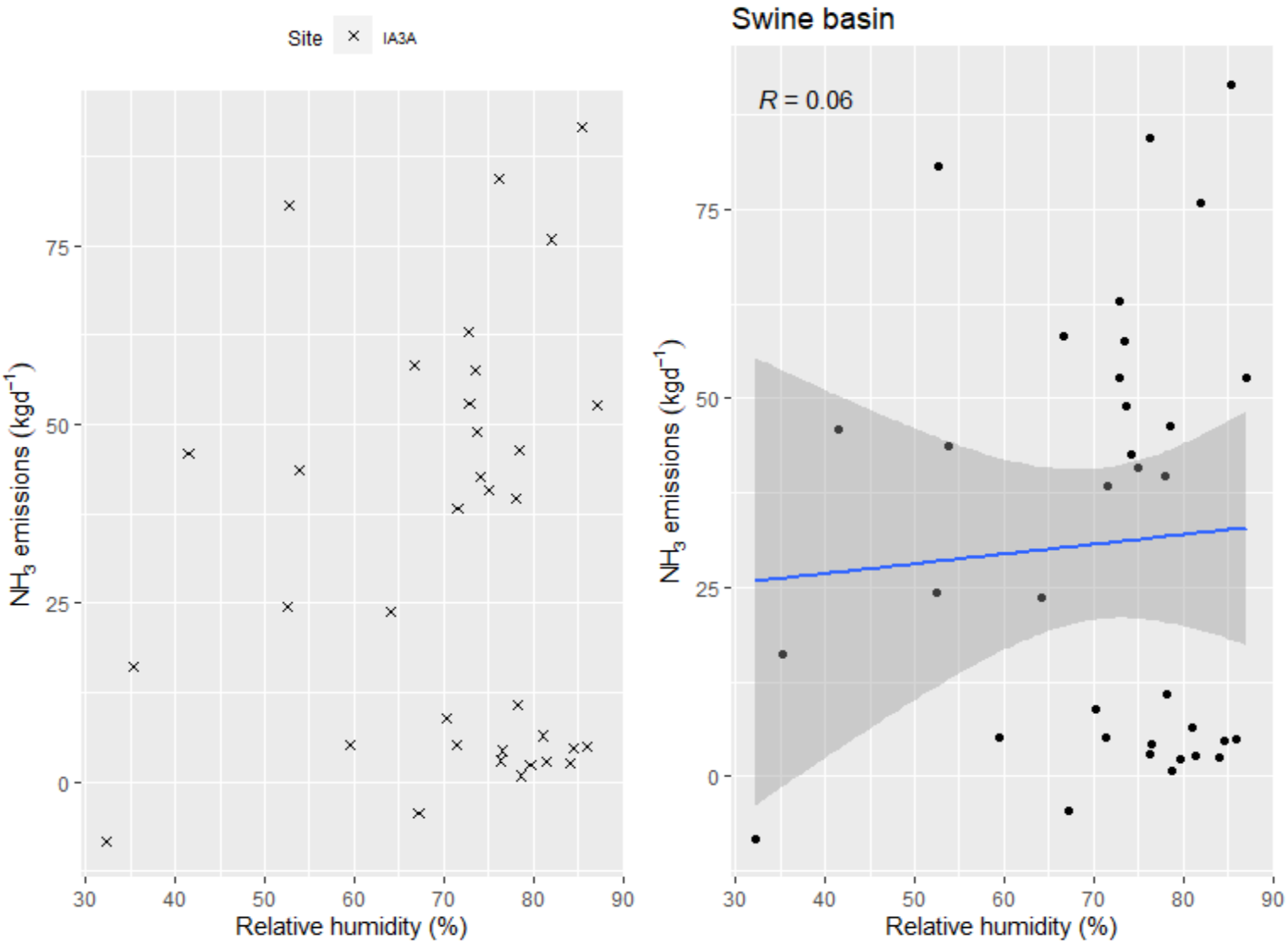


**Figure F.6-3. Scatter plot of swine basin $NH_3$ emissions (kg $d^{-1}$) versus relative humidity.**

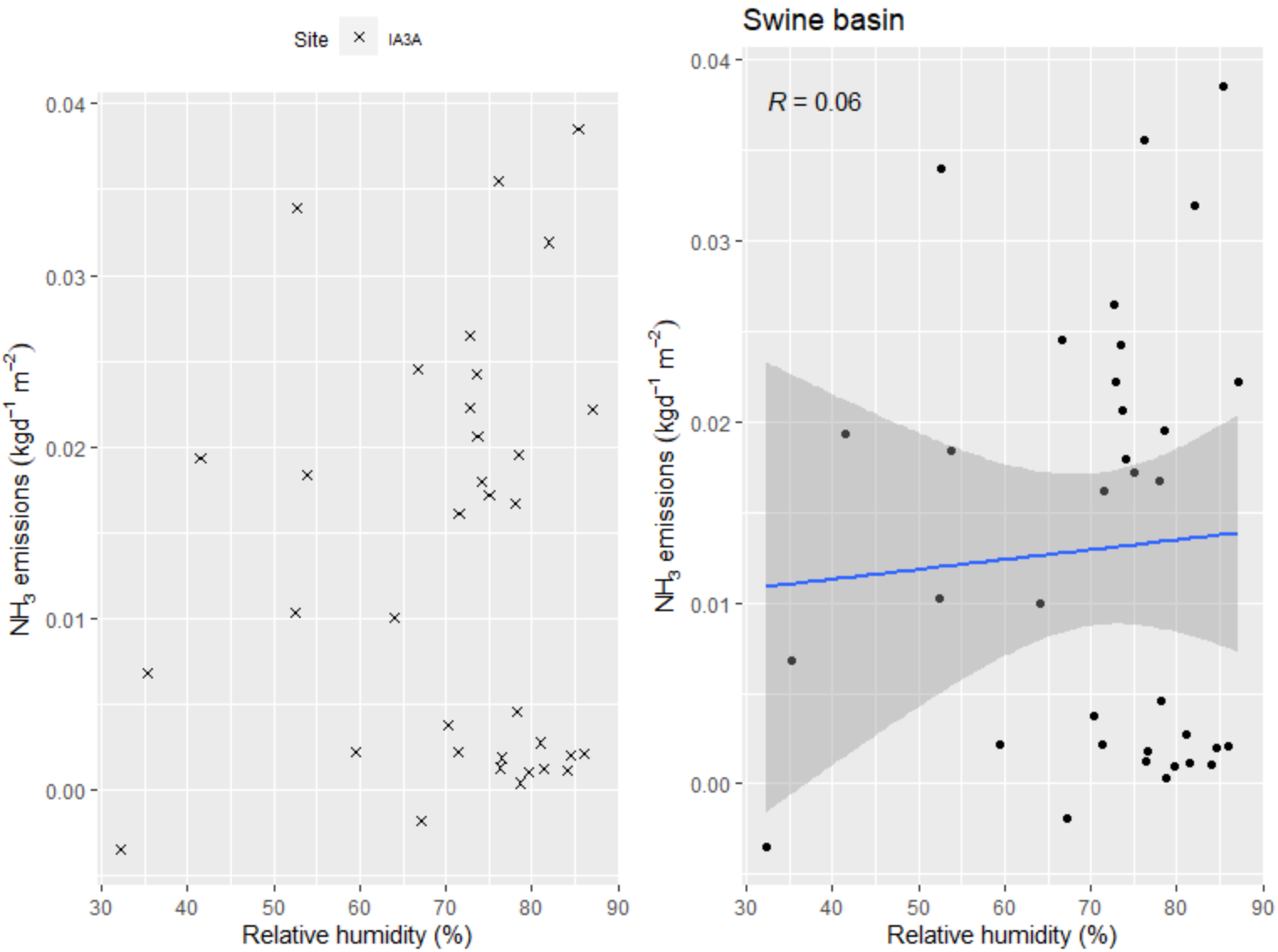


**Figure F.6-4. Scatter plot of swine basin $NH_3$ emissions (g $d^{-1}m^{-2}$) versus relative humidity.**

F.6.1.1.3 Barometric Pressure

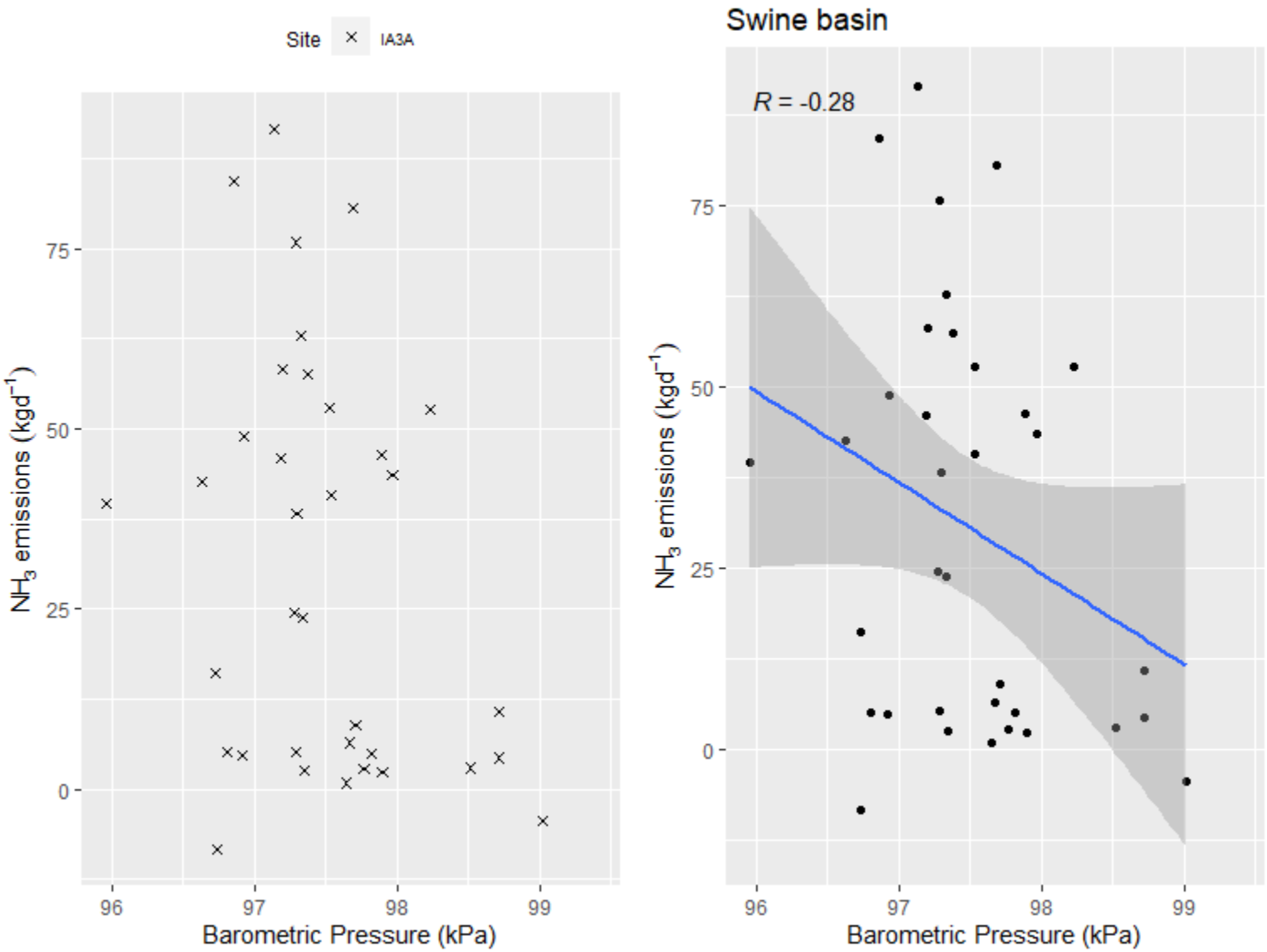


**Figure F.6-5. Scatter plot of swine basin $NH_3$ emissions (kg $d^{-1}$) versus barometric pressure.**

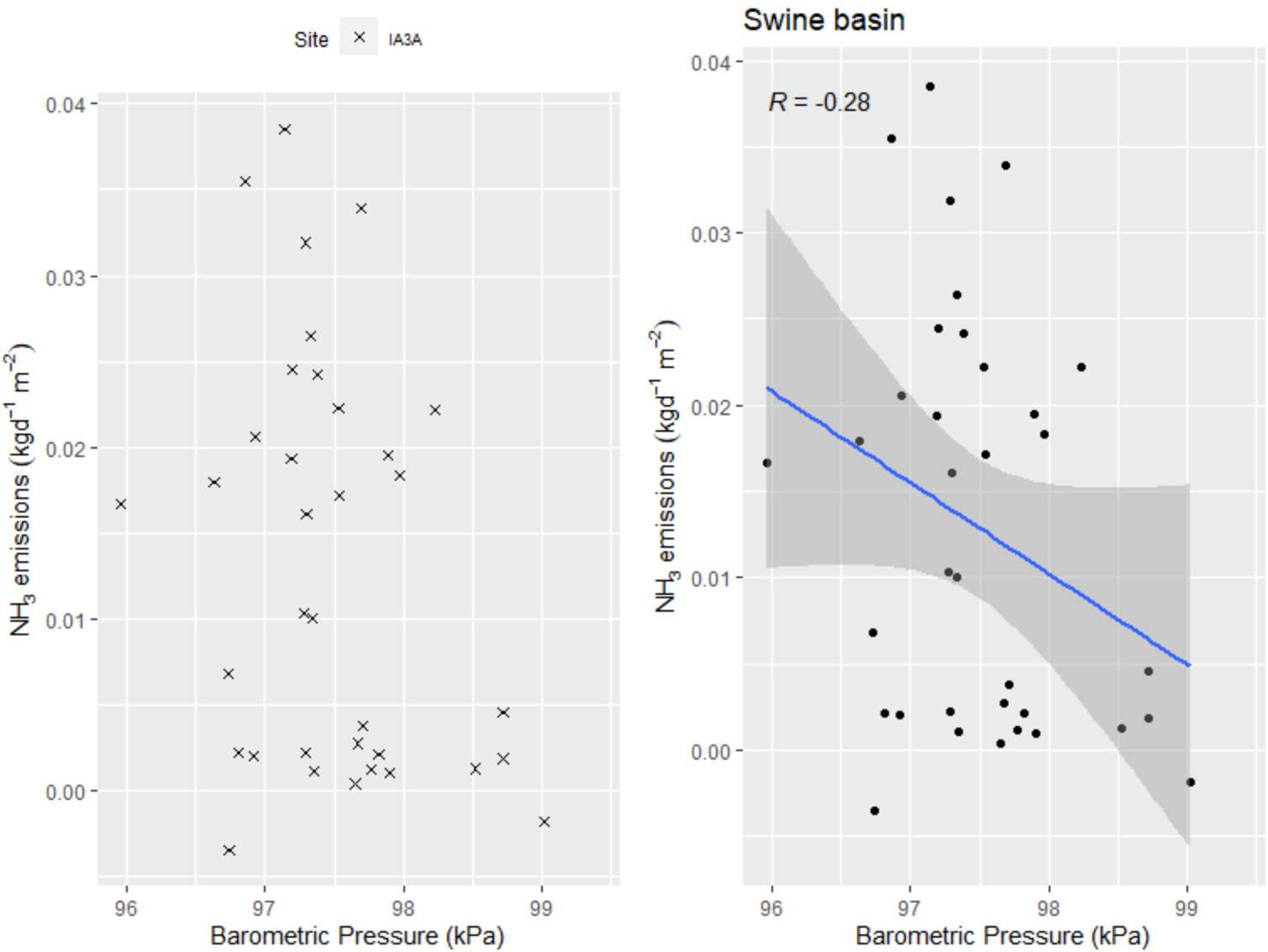


**Figure F.6-6. Scatter plot of swine basin $NH_3$ emissions (kg $d^{-1}m^{-2}$) versus barometric pressure.**

F.6.1.1.4 Wind speed

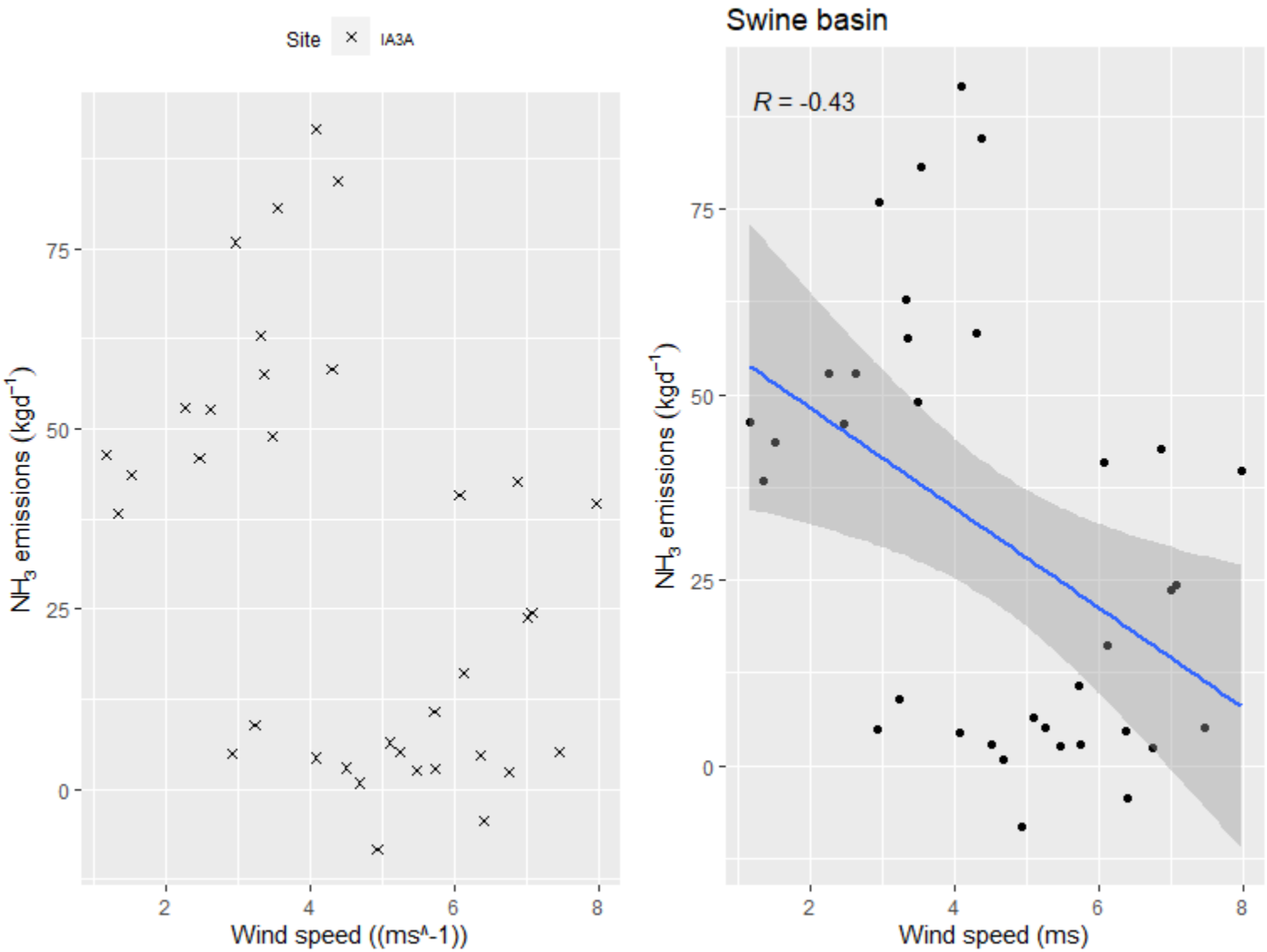


**Figure F.6-7. Scatter plot of swine basin $NH_3$ emissions (kg $d^{-1}$) versus Wind speed.**

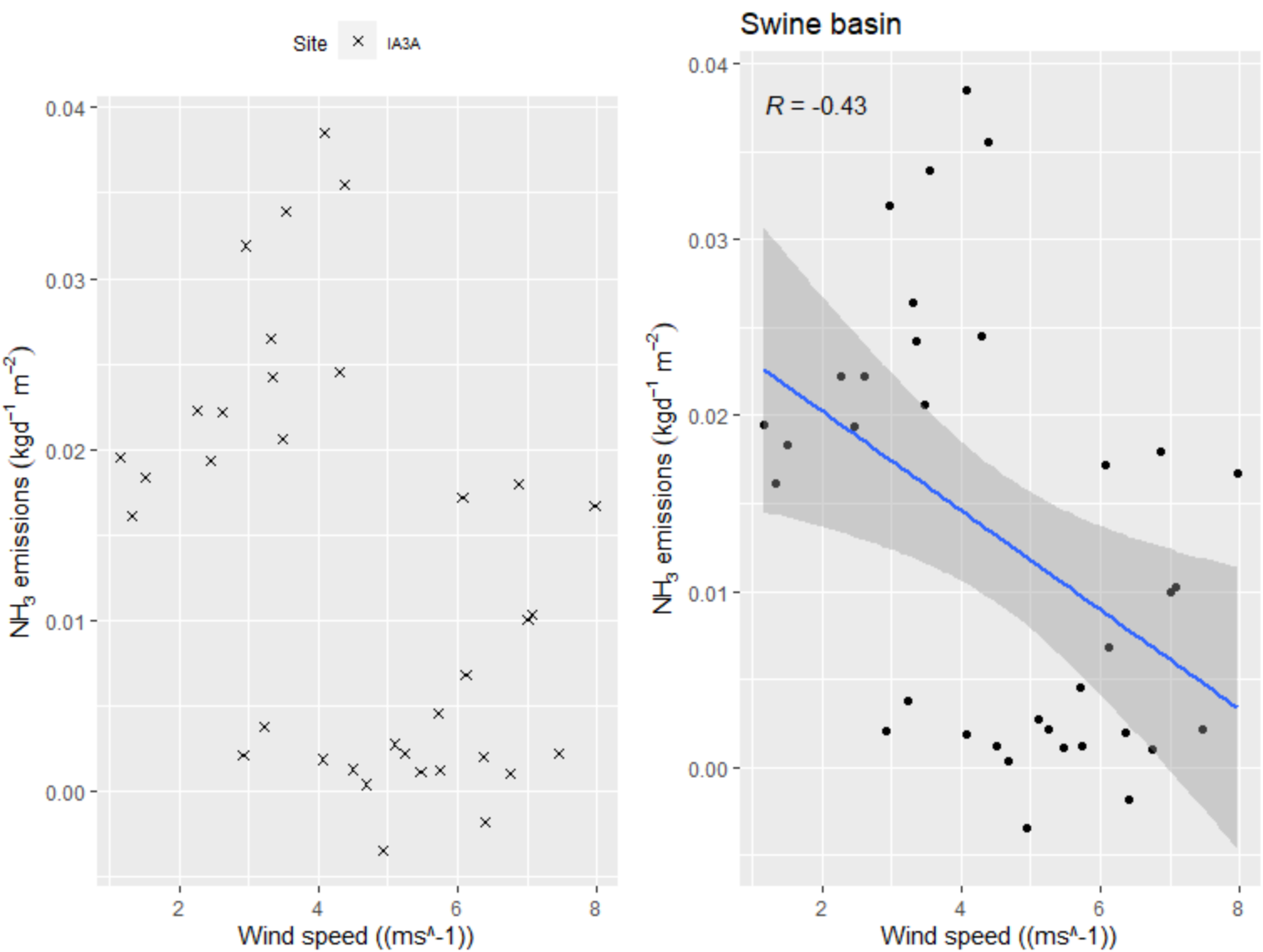


**Figure F.6-8. Scatter plot of swine basin $NH_3$ emissions (kg $d^{-1}m^{-2}$) versus Wind speed.**

### *F.6.1.2 Hydrogen Sulfide ($H_2S$)*

F.6.1.2.1 Ambient temperature

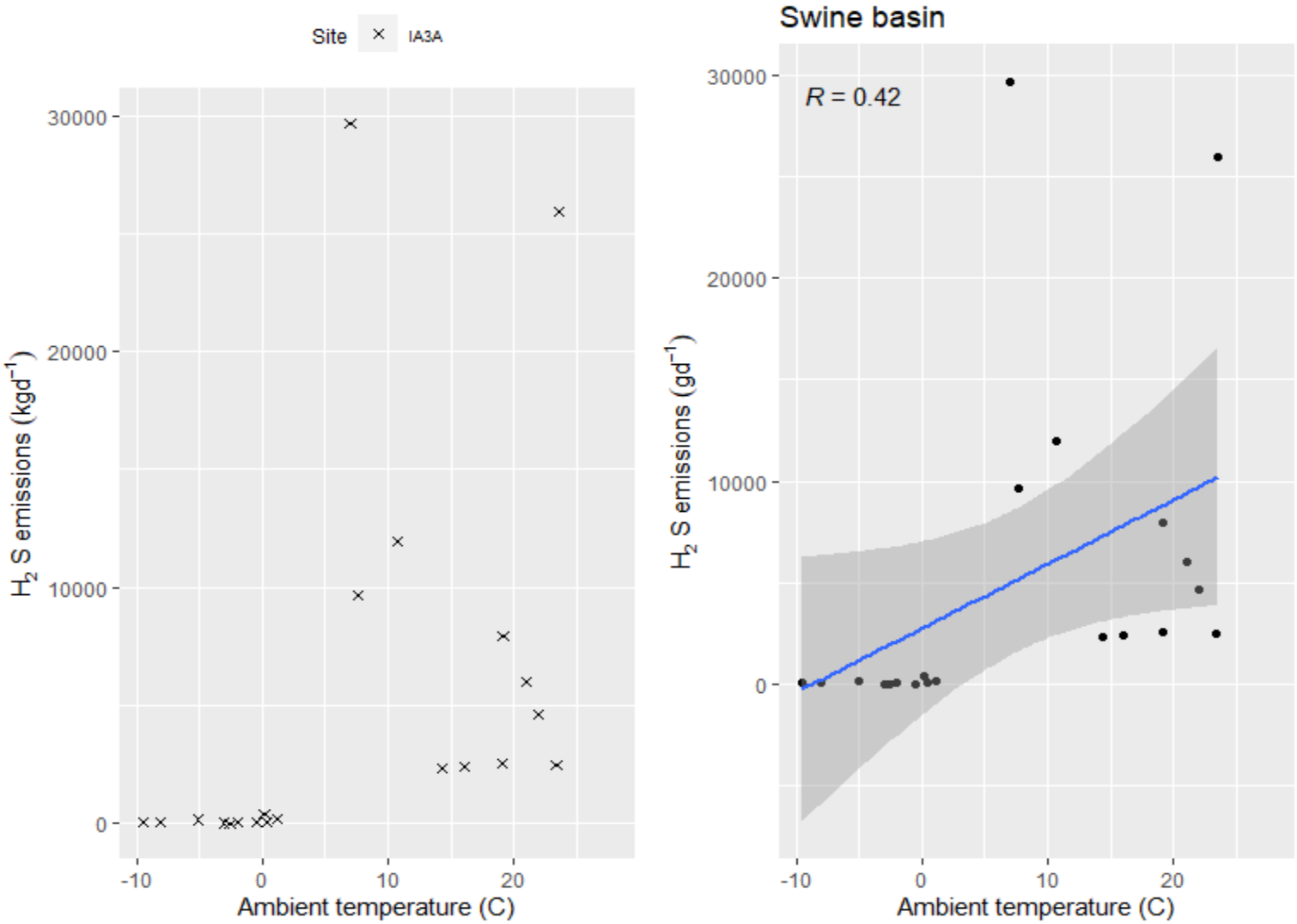


**Figure F.6-9. Scatter plot of swine basin $H_2S$ emissions (g $d^{-1}$) versus ambient temperature.**

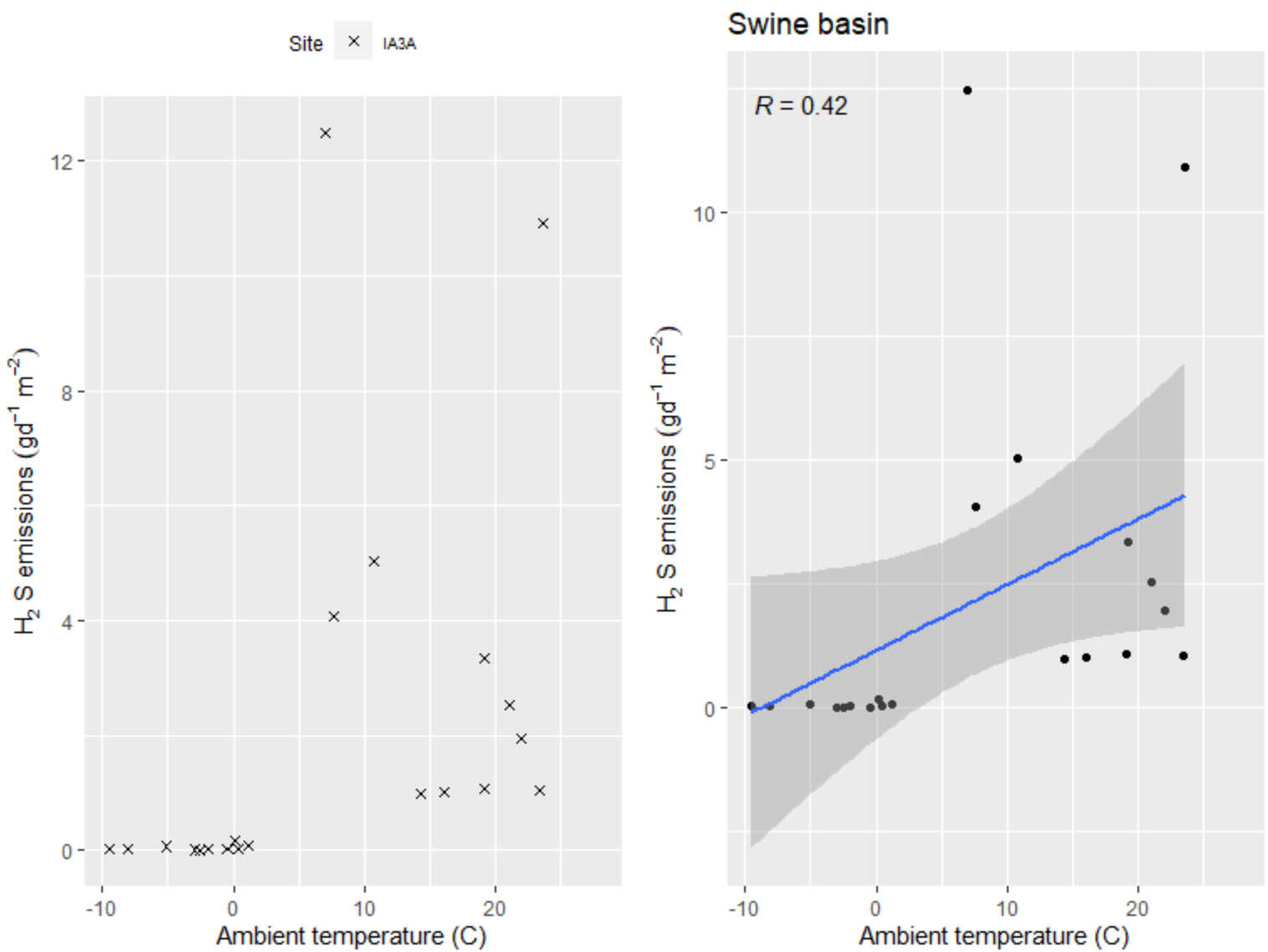


**Figure F.6-10. Scatter plot of swine basin $H_2S$ emissions (g $d^{-1}m^{-1}$) versus ambient temperature.**

F.6.1.2.2 Relative humidity

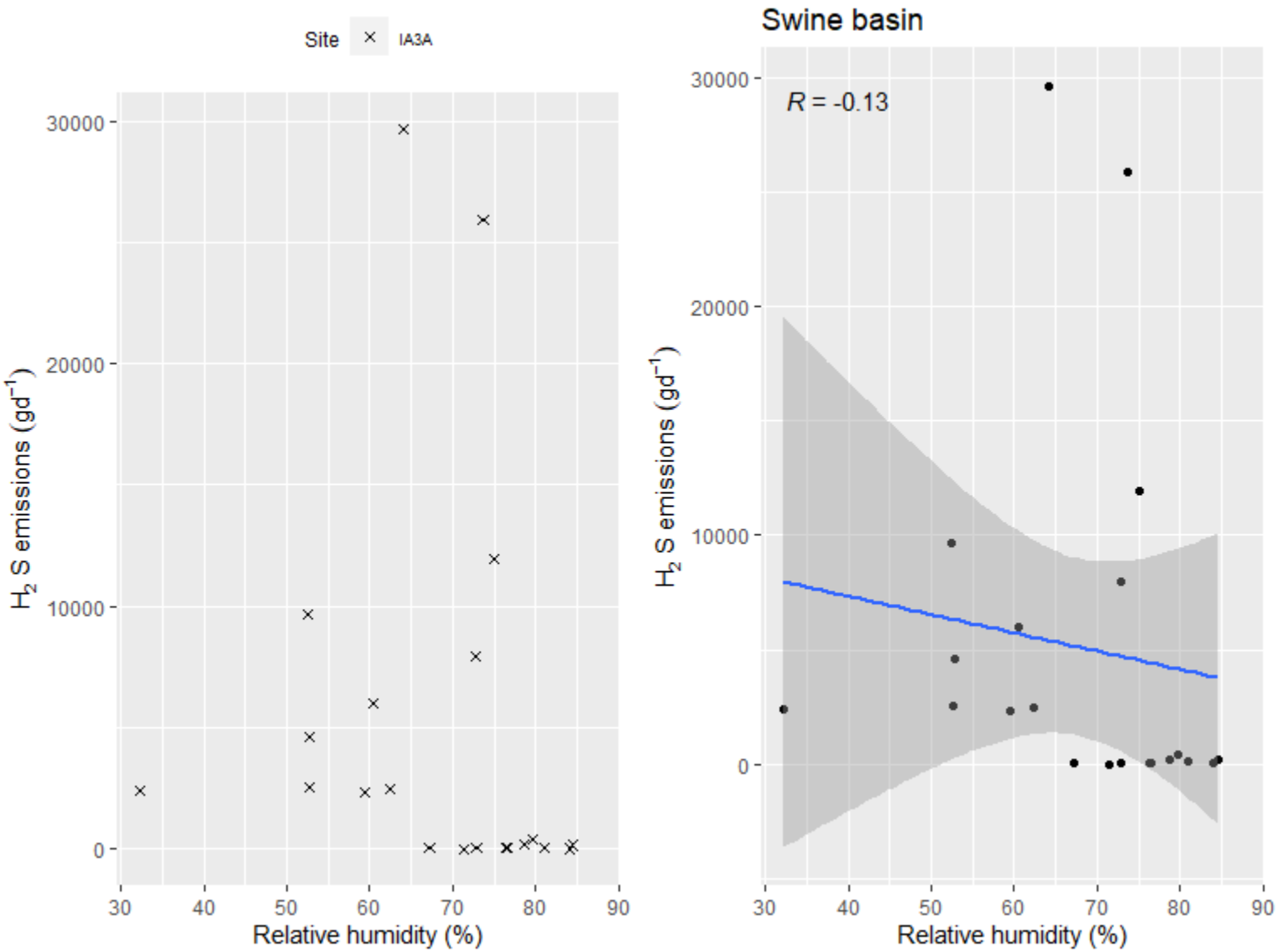


**Figure F.6-11. Scatter plot of swine basin $H_2S$ emissions (g $d^{-1}$) versus relative humidity.**

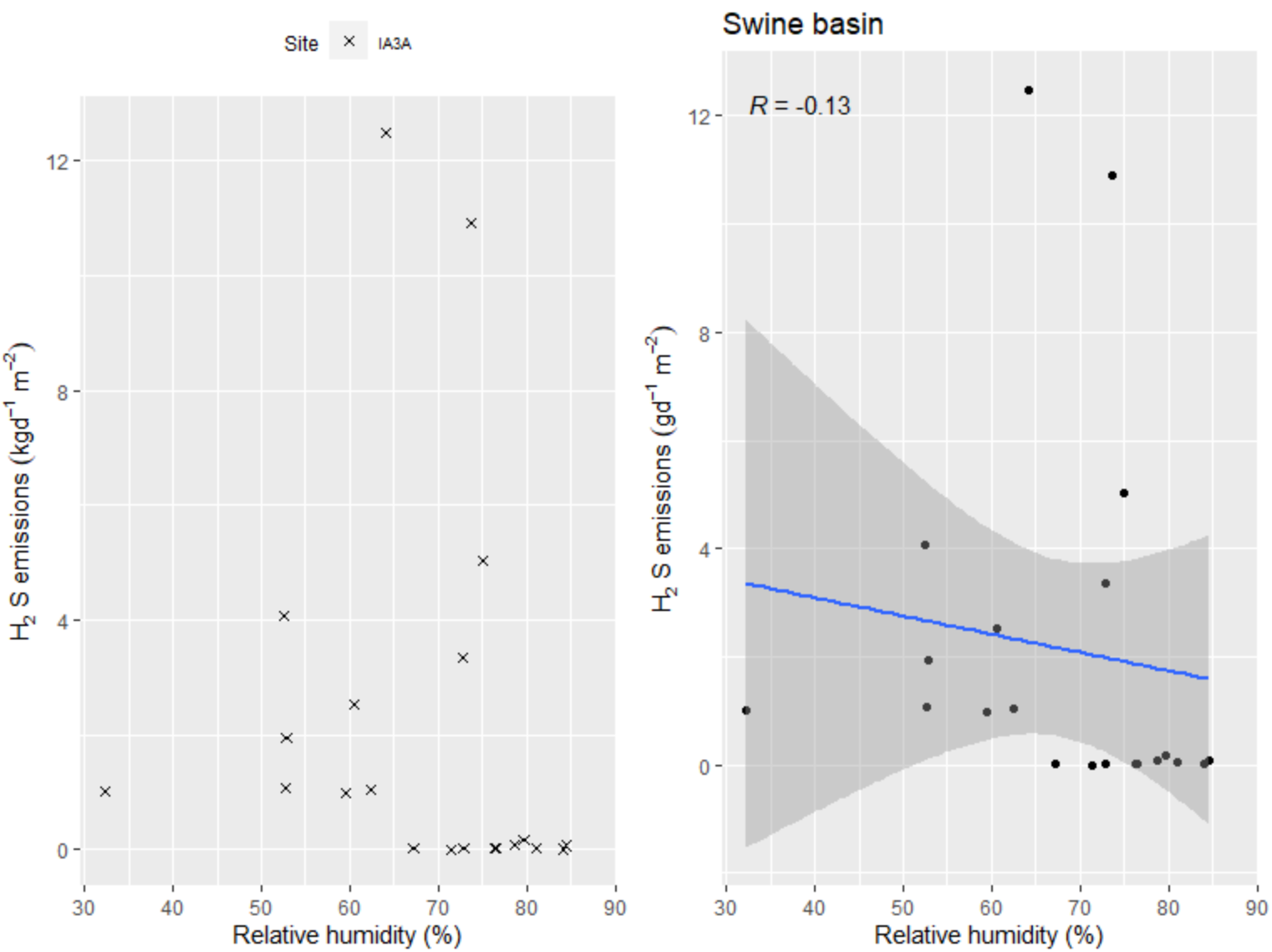


**Figure F.6-12. Scatter plot of swine basin $H_2S$ emissions (g $d^{-1}m^{-2}$) versus relative humidity.**

F.6.1.2.3 Barometric Pressure

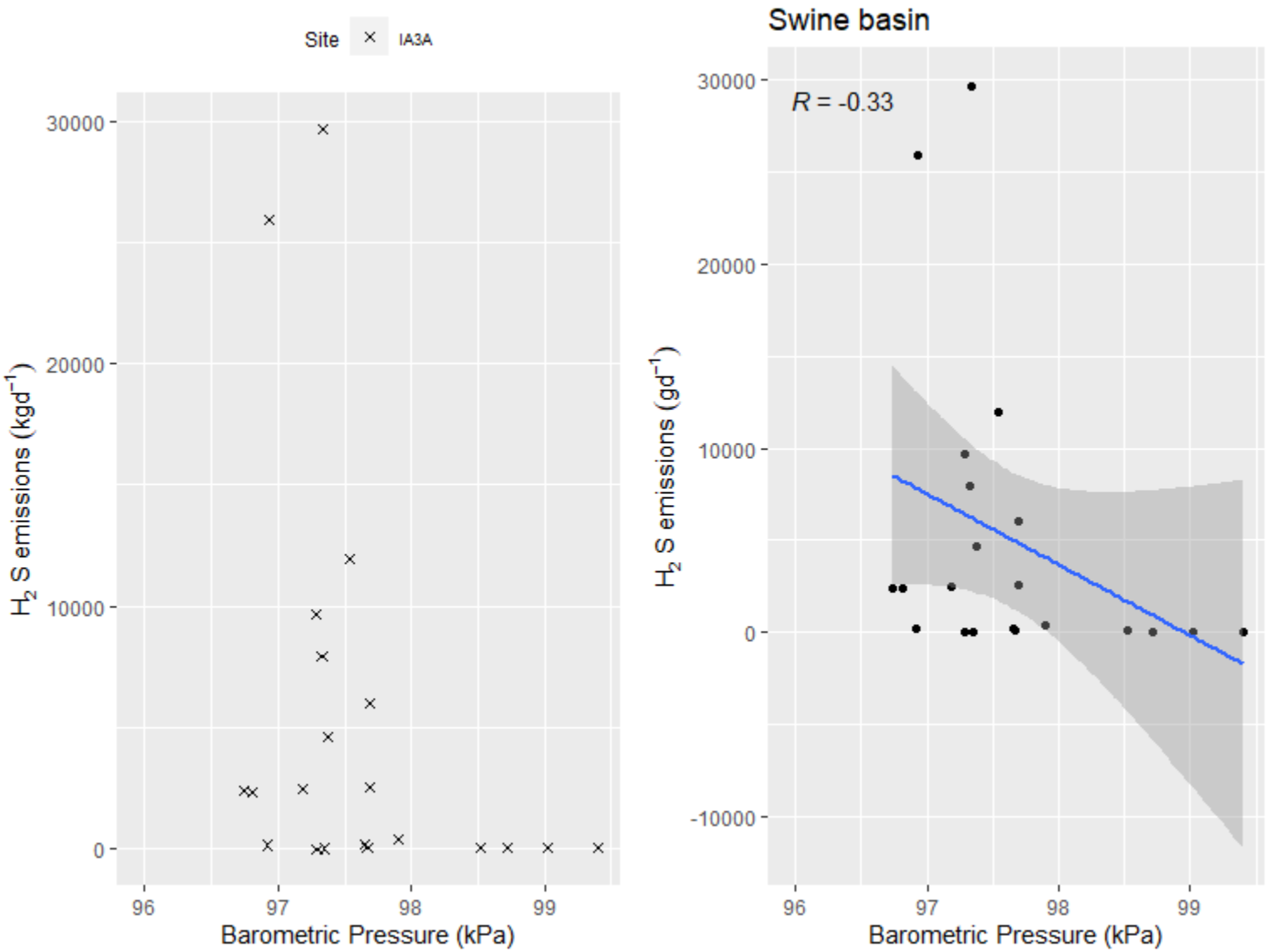


**Figure F.6-13. Scatter plot of swine basin $H_2S$ emissions (g $d^{-1}$) versus Barometric Pressure (kPa).**

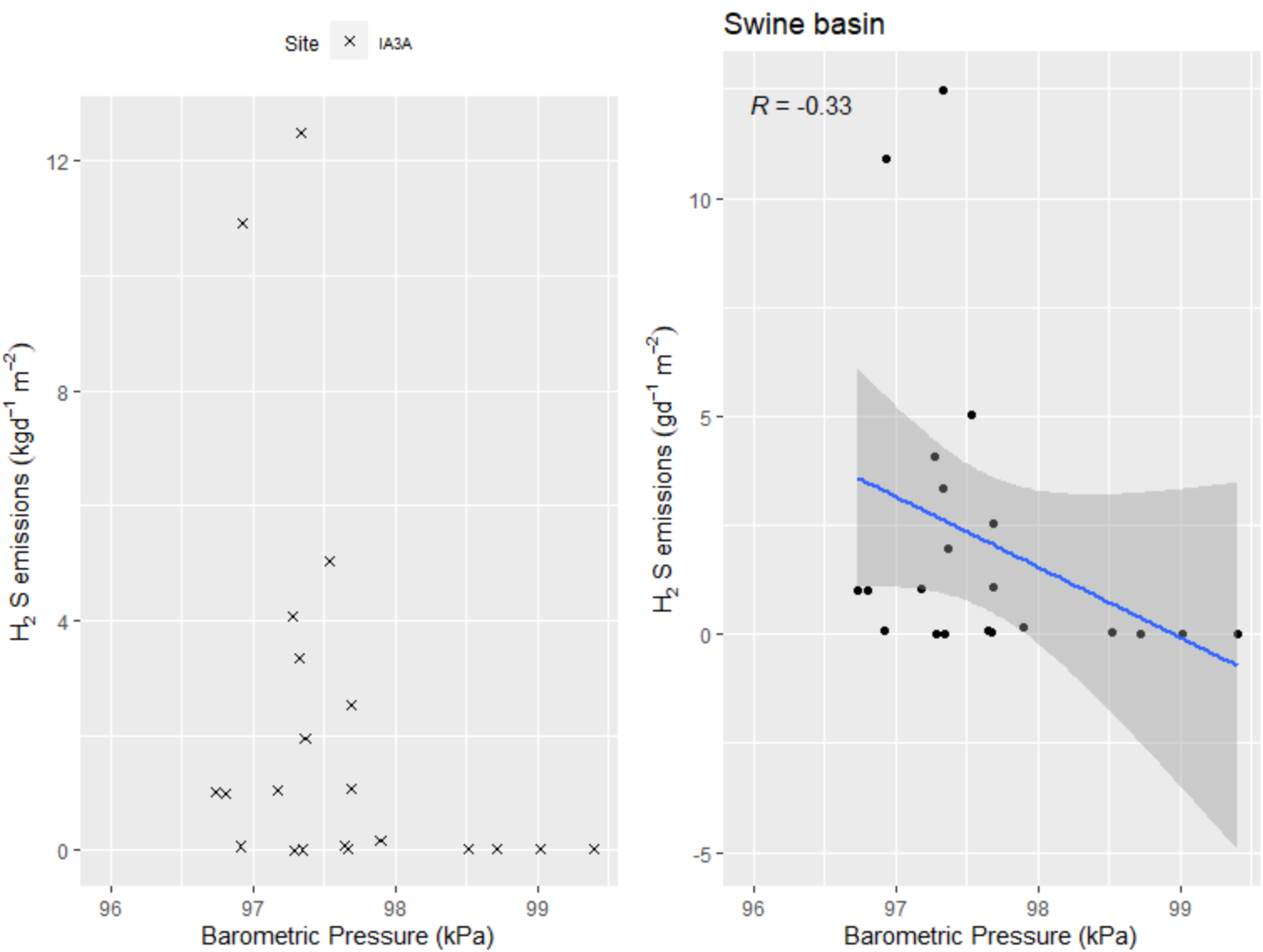


**Figure F.6-14. Scatter plot of swine basin $H_2S$ emissions (g $d^{-1}m^{-2}$) versus barometric pressure (kPa)**

F.6.1.2.4 Wind speed

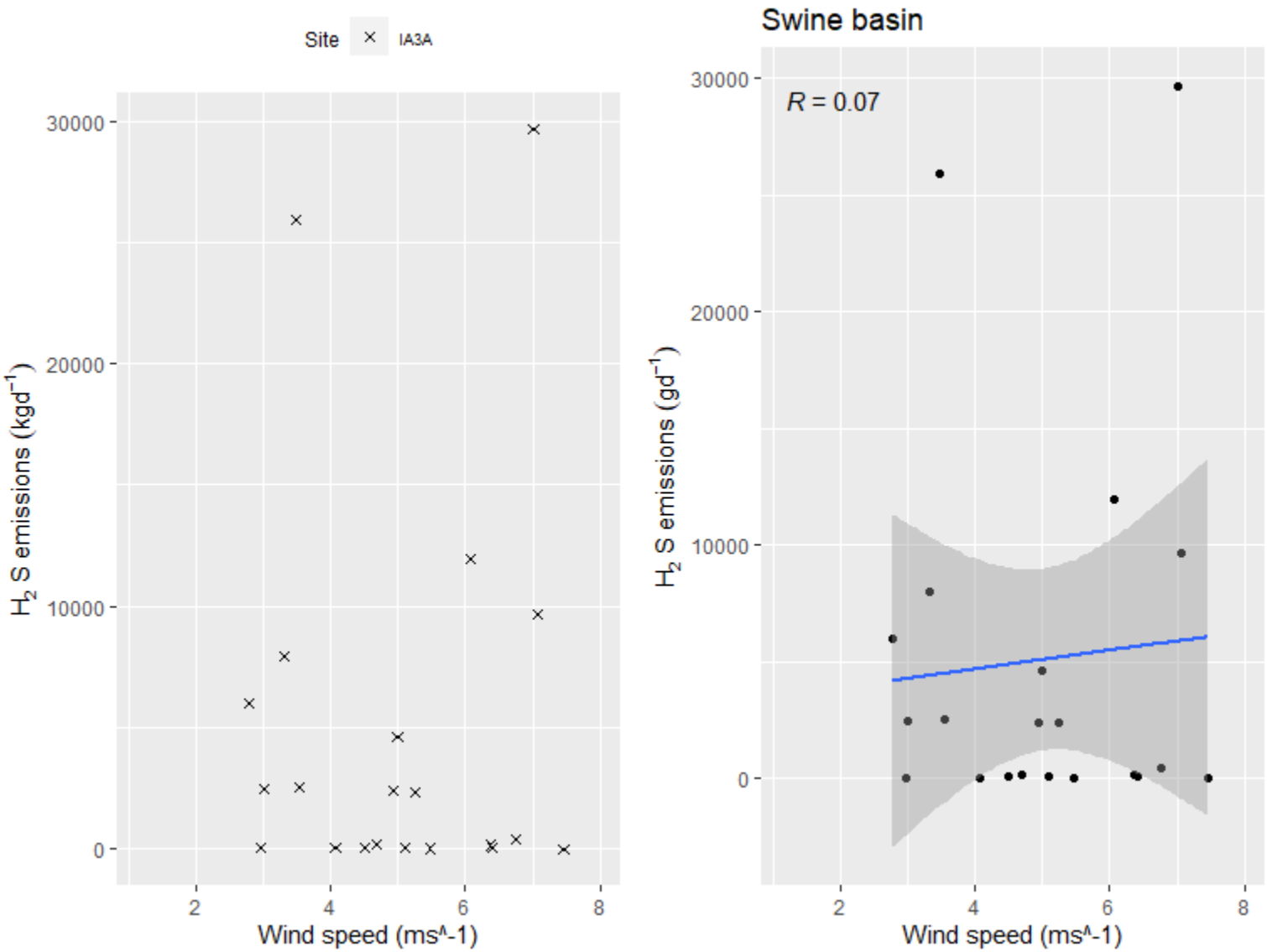


**Figure F.6-15. Scatter plot of swine basin $H_2S$ emissions (g $d^{-1}$) versus wind speed ($ms^{-1}$).**

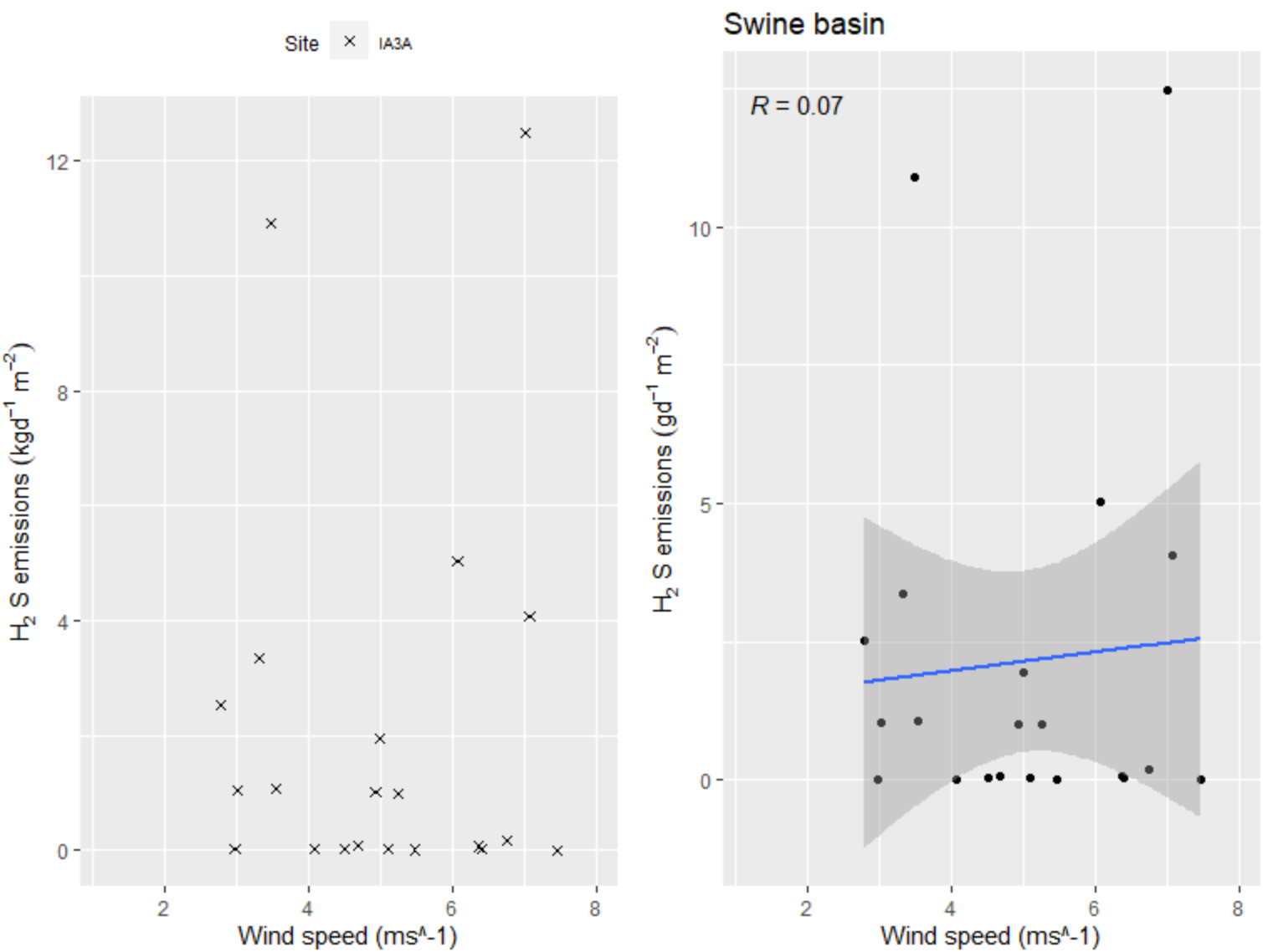


**Figure F.6-16. Scatter plot of swine basin $H_2S$ emissions (g $d^{-1}m^{-2}$) versus wind speed ($ms^{-1}$).**

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## G.1 Farrowing Rooms

### G.1.1 Ammonia ($NH_3$)

**Table G-1. Parameter and estimates $NH_3$ emission models for swine farrowing room.**

| Model | Parameter | Estimate | Standard Error | p-value |
|---|---|---|---|---|
| 1 | Intercept | 0.619374 | 0.04527 | <.0001 |
| | Cycle day | 0.002028 | 0.00084 | 0.017 |
| | Ambient temperature | 0.00017 | 0.00035 | 0.6266 |
| | Exhaust temperature | 0.003027 | 0.00175 | 0.084 |
| | Live animal weight | 0.00805 | 0.00187 | <.0001 |
| 2 | Intercept | 0.634065 | 0.04378 | <.0001 |
| | Cycle day | 0.002188 | 0.00069 | 0.0018 |
| | Ambient temperature | 0.00006 | 0.00035 | 0.8659 |
| | Exhaust temperature | 0.003527 | 0.00173 | 0.0422 |
| | Inventory | 0.03089 | 0.04146 | 0.4566 |
| 3 | Intercept | 0.607334 | 0.02146 | <.0001 |
| | Cycle day | 0.001882 | 0.00056 | 0.0011 |
| | Exhaust temperature | 0.003658 | 0.00073 | <.0001 |
| | Live animal weight | 0.007369 | 0.00169 | <.0001 |
| 4 | Intercept | 0.68875 | 0.01775 | <.0001 |
| | Cycle day | 0.001961 | 0.0008 | 0.0157 |
| | Ambient temperature | 0.000581 | 0.00029 | 0.0449 |
| | Live animal weight | 0.008405 | 0.00154 | <.0001 |
| 5 | Intercept | 0.627724 | 0.02043 | <.0001 |
| | Cycle day | 0.002053 | 0.0005 | <.0001 |
| | Exhaust temperature | 0.003771 | 0.00069 | <.0001 |
| | Inventory | 0.028189 | 0.03115 | 0.3658 |
| 6 | Intercept | 0.713155 | 0.01572 | <.0001 |
| | Cycle day | 0.002087 | 0.0007 | 0.0035 |
| | Ambient temperature | 0.00054 | 0.00029 | 0.0596 |
| | Inventory | 0.049431 | 0.03829 | 0.1972 |

**Table G-2. Fit and evaluation statistics for swine farrowing room $NH_3$ models tested.**

| Model | 2LogL | AIC | AICc | BIC | Corr. | LNME[a] (%) | NME[b] (%) | ME[b] (kg day$^{-1}$) | MB[b] (kg day$^{-1}$) | NMB[b] (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | -5975 | -5953 | -5953 | -5926 | 0.429 | 9.3 | 57.16 | 0.17 | 0.00 | -0.30 |
| 2 | -5948 | -5926 | -5926 | -5899 | 0.227 | 10.2 | 59.90 | 0.18 | 0.00 | -0.08 |
| 3 | -6698 | -6678 | -6678 | -6653 | 0.412 | 9.2 | 60.06 | 0.17 | 0.00 | -0.29 |
| 4 | -6010 | -5990 | -5990 | -5965 | 0.503 | 9.1 | 55.93 | 0.17 | 0.00 | -0.39 |
| 5 | -6673 | -6653 | -6653 | -6628 | 0.215 | 10.0 | 62.69 | 0.18 | 0.00 | -0.07 |
| 6 | -5973 | -5953 | -5953 | -5928 | 0.347 | 9.9 | 58.31 | 0.18 | 0.00 | -0.20 |

[a] Based on transformed data (i.e., $\ln(NH_3)$).
[b] Based on back-transformed data.

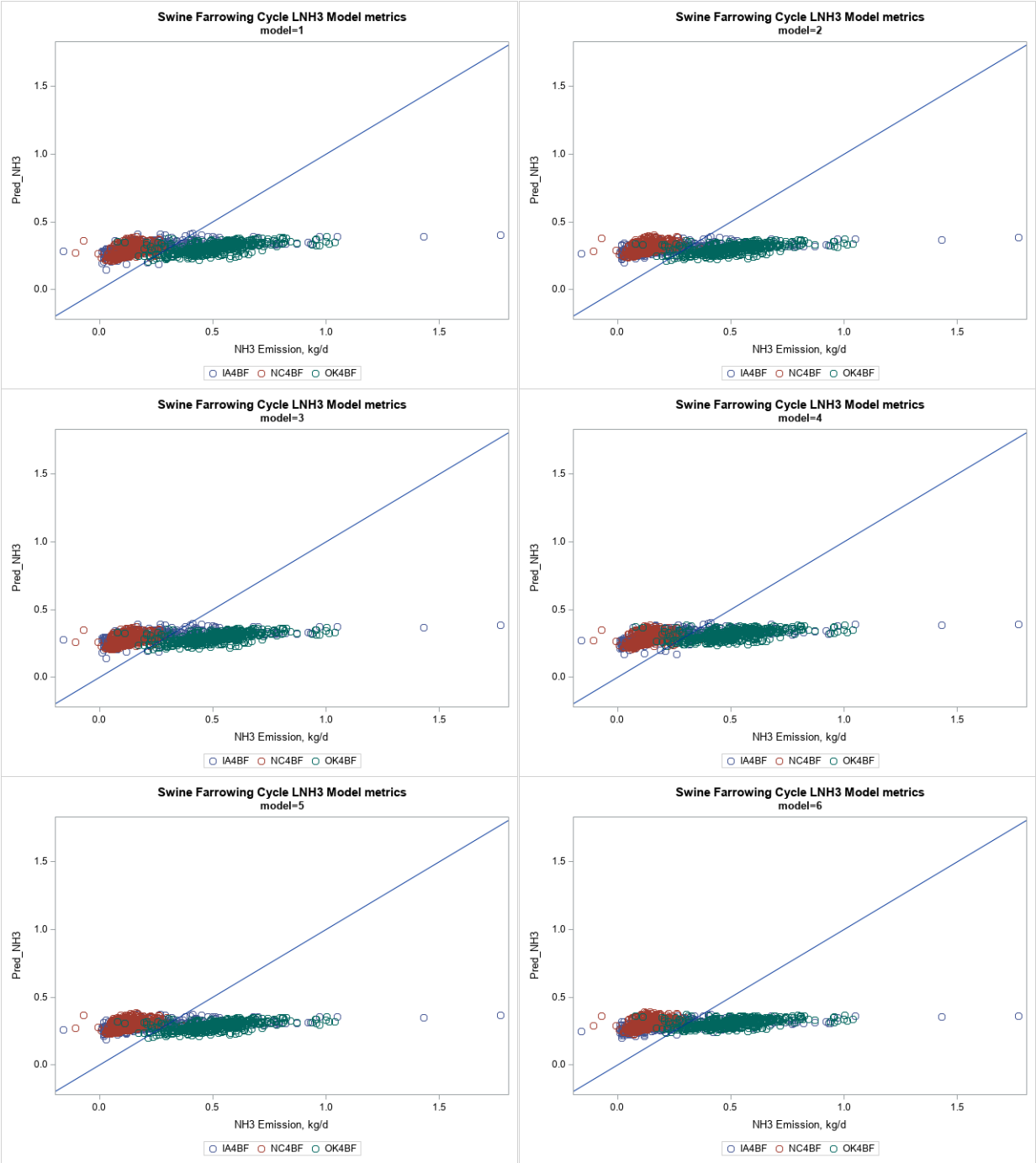


**Figure G-1. Farrowing room $NH_3$ model results model one-to-one plots.**

### G.1.2 Hydrogen Sulfide ($H_2S$)

**Table G-3. Parameter and estimates $H_2S$ emission models for Swine Farrowing room.**

| Model | Parameter | Estimate | Standard Error | p-value |
|---|---|---|---|---|
| 1 | Intercept | 1.696616 | 0.4 | <.0001 |
| | Cycle day | 0.128162 | 0.00595 | <.0001 |
| | Ambient temperature | 0.002557 | 0.0033 | 0.4392 |
| | Exhaust temperature | 0.009579 | 0.01667 | 0.5657 |
| | Live animal weight | 0.091992 | 0.01932 | <.0001 |
| 2 | Intercept | 1.998359 | 0.40565 | <.0001 |
| | Cycle day | 0.12883 | 0.00574 | <.0001 |
| | Ambient temperature | 0.001747 | 0.0033 | 0.5971 |
| | Exhaust temperature | 0.016646 | 0.01666 | 0.3179 |
| | Inventory | 0.181305 | 0.39501 | 0.6463 |
| 3 | Intercept | 1.599675 | 0.33031 | <.0001 |
| | Cycle day | 0.128651 | 0.00561 | <.0001 |
| | Exhaust temperature | 0.018381 | 0.01242 | 0.1393 |
| | Live animal weight | 0.080834 | 0.0186 | <.0001 |
| 4 | Intercept | 2.030664 | 0.13947 | <.0001 |
| | Cycle day | 0.128944 | 0.0059 | <.0001 |
| | Ambient temperature | 0.003998 | 0.00256 | 0.1184 |
| | Live animal weight | 0.0684 | 0.01688 | <.0001 |
| 5 | Intercept | 1.923371 | 0.33545 | <.0001 |
| | Cycle day | 0.129496 | 0.00554 | <.0001 |
| | Exhaust temperature | 0.021562 | 0.01243 | 0.0831 |
| | Inventory | 0.123177 | 0.38741 | 0.7506 |
| 6 | Intercept | 2.393581 | 0.13808 | <.0001 |
| | Cycle day | 0.128682 | 0.00575 | <.0001 |
| | Ambient temperature | 0.003897 | 0.00255 | 0.1264 |
| | Inventory | 0.089971 | 0.3678 | 0.8068 |
| 7 | Intercept | 2.142329 | 0.12728 | <.0001 |
| | Cycle day | 0.129797 | 0.00562 | <.0001 |
| | Live animal weight | 0.061406 | 0.01641 | 0.0002 |

**Table G-4. Fit and evaluation statistics for dairy mechanically ventilated barn $H_2S$ models tested.**

| Model | 2LogL | AIC | AICc | BIC | Corr. | LNME[a] (%) | NME[b] (%) | ME[b] (g day$^{-1}$) | MB[b] (g day$^{-1}$) | NMB[b] (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1346 | 1368 | 1369 | 1396 | 0.592 | 20.1 | 70.09 | 72.62 | 19.72 | 19.04 |
| 2 | 1372 | 1394 | 1394 | 1421 | 0.613 | 19.7 | 69.99 | 72.64 | 19.19 | 18.49 |
| 3 | 1473 | 1493 | 1494 | 1519 | 0.602 | 19.6 | 68.94 | 72.32 | 18.90 | 18.02 |
| 4 | 1386 | 1406 | 1406 | 1430 | 0.600 | 20.0 | 69.93 | 72.38 | 19.49 | 18.83 |
| 5 | 1496 | 1516 | 1516 | 1541 | 0.622 | 19.3 | 69.28 | 72.78 | 18.95 | 18.04 |
| 6 | 1406 | 1426 | 1426 | 1451 | 0.612 | 19.7 | 70.89 | 73.50 | 20.17 | 19.46 |
| 7 | 1516 | 1534 | 1534 | 1556 | 0.598 | 19.7 | 70.28 | 73.79 | 20.32 | 19.36 |

[a] Based on transformed data (i.e., $\ln(H_2S)$).

[b] Based on back-transformed data.

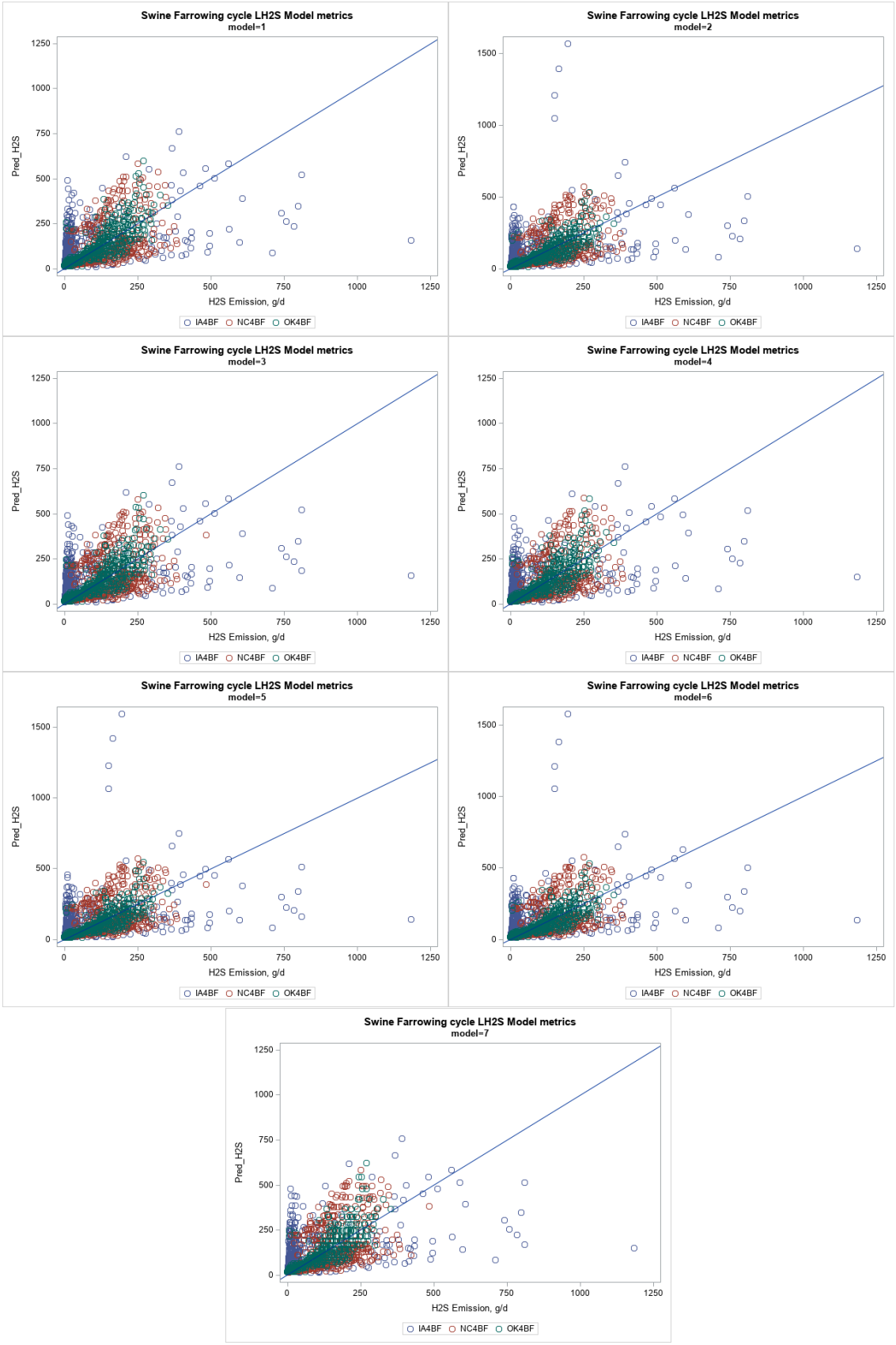


**Figure G-2. Farrowing room $H_2S$ model results model one-to-one plots.**

### G.1.3 $PM_{10}$

**Table G-5. Parameter and estimates $PM_{10}$ emission models for swine farrowing room.**

| Model | Parameter | Estimate | Standard Error | p-value |
|---|---|---|---|---|
| 1 | Intercept | 2.31939 | 0.08016 | <.0001 |
| | Cycle day | 0.05454 | 0.00362 | <.0001 |
| | Live animal weight | 0.09776 | 0.01175 | <.0001 |
| 2 | Intercept | 2.489915 | 0.09914 | <.0001 |
| | Cycle day | 0.055625 | 0.00366 | <.0001 |
| | Live animal weight | 0.106263 | 0.01302 | <.0001 |
| | Ambient relative humidity | -0.003436 | 0.00066 | <.0001 |
| 3 | Intercept | 2.631802 | 0.10743 | <.0001 |
| | Cycle day | 0.059459 | 0.0037 | <.0001 |
| | Ambient temperature | -0.007561 | 0.00192 | <.0001 |
| | Live animal weight | 0.106851 | 0.01316 | <.0001 |
| | Ambient relative humidity | -0.004065 | 0.0007 | <.0001 |
| 4 | Intercept | 3.062805 | 0.11999 | <.0001 |
| | Cycle day | 0.059061 | 0.00367 | <.0001 |
| | Ambient temperature | -0.001318 | 0.00189 | 0.4868 |
| | Live animal weight | 0.100043 | 0.01303 | <.0001 |
| | Exhaust relative humidity | -0.012872 | 0.00135 | <.0001 |
| 5 | Intercept | 3.103209 | 0.11574 | <.0001 |
| | Cycle day | 0.059367 | 0.00367 | <.0001 |
| | Live animal weight | 0.088094 | 0.01244 | <.0001 |
| | Exhaust relative humidity | -0.012851 | 0.00126 | <.0001 |
| 6 | Intercept | 2.584906 | 0.10593 | <.0001 |
| | Cycle day | 0.061876 | 0.00389 | <.0001 |
| | Ambient temperature | -0.006972 | 0.00193 | 0.0003 |
| | Inventory | 2.347235 | 0.2836 | <.0001 |
| | Ambient relative humidity | -0.00415 | 0.0007 | <.0001 |
| 7 | Intercept | 3.005011 | 0.12027 | <.0001 |
| | Cycle day | 0.061125 | 0.00384 | <.0001 |
| | Ambient temperature | -0.000608 | 0.0019 | 0.7489 |
| | Inventory | 2.291581 | 0.28682 | <.0001 |
| | Exhaust relative humidity | -0.013204 | 0.00135 | <.0001 |
| 8 | Intercept | 3.52795 | 0.26291 | <.0001 |
| | Cycle day | 0.058797 | 0.00368 | <.0001 |
| | Exhaust temperature | -0.041994 | 0.00953 | <.0001 |
| | Live animal weight | 0.102848 | 0.01333 | <.0001 |
| | Ambient relative humidity | -0.003609 | 0.00065 | <.0001 |
| 9 | Intercept | 3.672323 | 0.24689 | <.0001 |
| | Cycle day | 0.060507 | 0.00363 | <.0001 |
| | Exhaust temperature | -0.024575 | 0.00924 | 0.008 |
| | Live animal weight | 0.08629 | 0.01269 | <.0001 |
| | Exhaust relative humidity | -0.012299 | 0.00126 | <.0001 |
| 10 | Intercept | 3.459979 | 0.26643 | <.0001 |
| | Cycle day | 0.061093 | 0.00386 | <.0001 |

| Model | Parameter | Estimate | Standard Error | p-value |
|---|---|---|---|---|
| | Exhaust temperature | -0.04036 | 0.00962 | <.0001 |
| | Inventory | 2.252306 | 0.2923 | <.0001 |
| | Ambient relative humidity | -0.003676 | 0.00065 | <.0001 |
| 11 | Intercept | 3.534881 | 0.24964 | <.0001 |
| | Cycle day | 0.062781 | 0.00376 | <.0001 |
| | Exhaust temperature | -0.022618 | 0.00927 | 0.0148 |
| | Inventory | 2.144946 | 0.28392 | <.0001 |
| | Exhaust relative humidity | -0.012531 | 0.00126 | <.0001 |

**Table G-6. Fit and evaluation statistics for swine farrowing room $PM_{10}$ models tested.**

| Model | 2LogL | AIC | AICc | BIC | Corr. | LNME[a] (%) | NME[b] (%) | ME[b] (g day$^{-1}$) | MB[b] (g day$^{-1}$) | NMB[b] (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | -29 | -11 | -11 | 11 | 0.610 | 10.1 | 40.65 | 14.19 | 0.69 | 1.98 |
| 2 | -52 | -32 | -31 | -7 | 0.632 | 9.8 | 39.11 | 13.59 | 0.83 | 2.40 |
| 3 | -40 | -18 | -18 | 9 | 0.606 | 10.2 | 40.79 | 14.26 | 1.76 | 5.03 |
| 4 | -104 | -82 | -82 | -55 | 0.624 | 10.1 | 40.09 | 14.08 | 1.76 | 5.02 |
| 5 | -140 | -120 | -120 | -95 | 0.630 | 10.0 | 40.06 | 14.04 | 1.51 | 4.30 |
| 6 | -41 | -19 | -19 | 8 | 0.649 | 9.8 | 38.58 | 13.49 | 1.00 | 2.85 |
| 7 | -108 | -86 | -86 | -59 | 0.668 | 9.6 | 37.94 | 13.32 | 1.02 | 2.90 |
| 8 | -71 | -49 | -49 | -22 | 0.624 | 10.0 | 39.94 | 13.87 | 1.65 | 4.74 |
| 9 | -147 | -125 | -125 | -98 | 0.623 | 10.2 | 40.60 | 14.23 | 1.98 | 5.65 |
| 10 | -71 | -49 | -49 | -22 | 0.656 | 9.7 | 38.31 | 13.31 | 1.06 | 3.06 |
| 11 | -156 | -134 | -133 | -106 | 0.657 | 9.8 | 38.95 | 13.65 | 1.49 | 4.25 |

[a] Based on transformed data (i.e., $\ln(PM_{10})$).
[b] Based on back-transformed data.

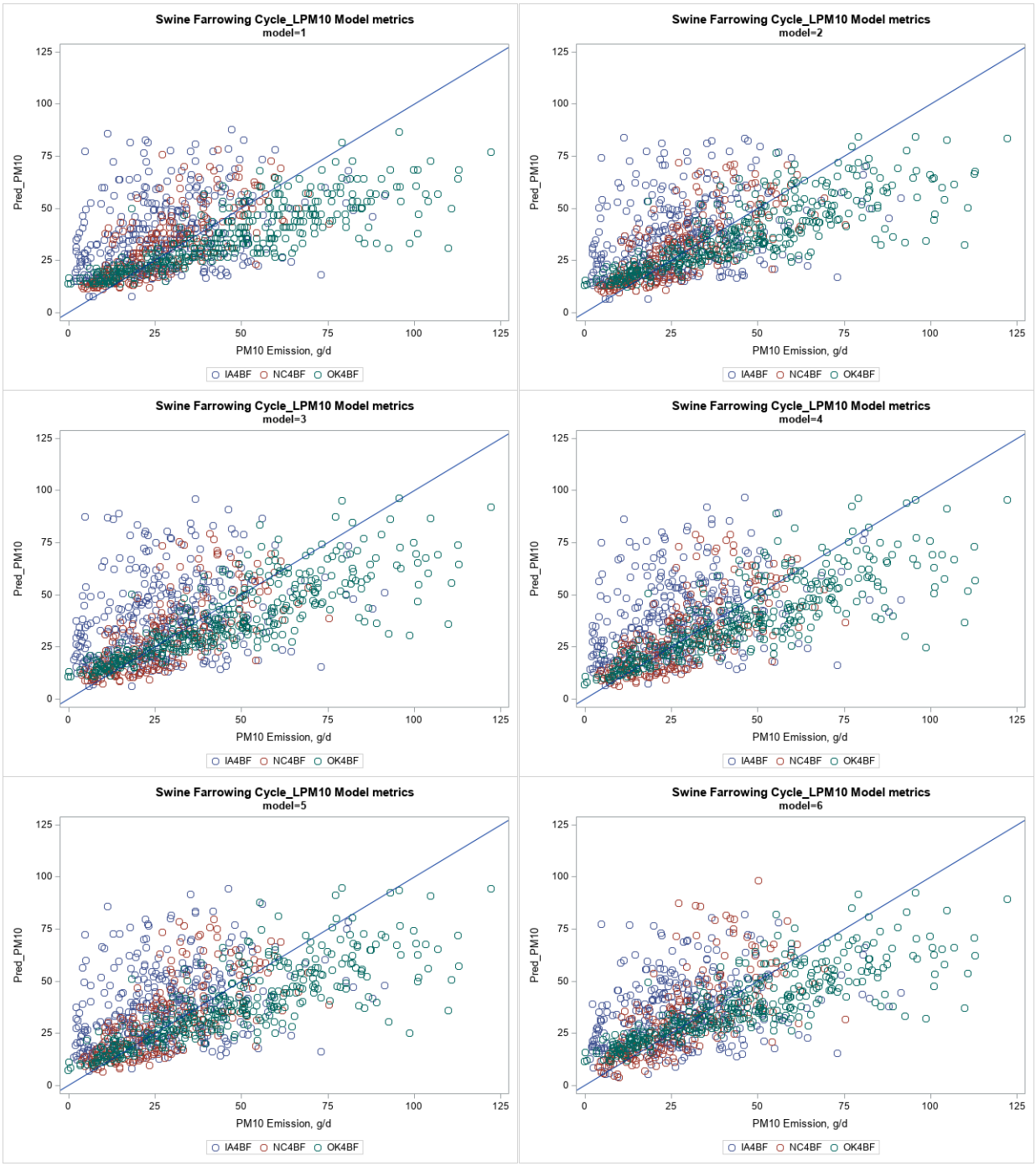


**Figure G-3. Farrowing room $PM_{10}$ one-to-one plots models 1 through 6.**

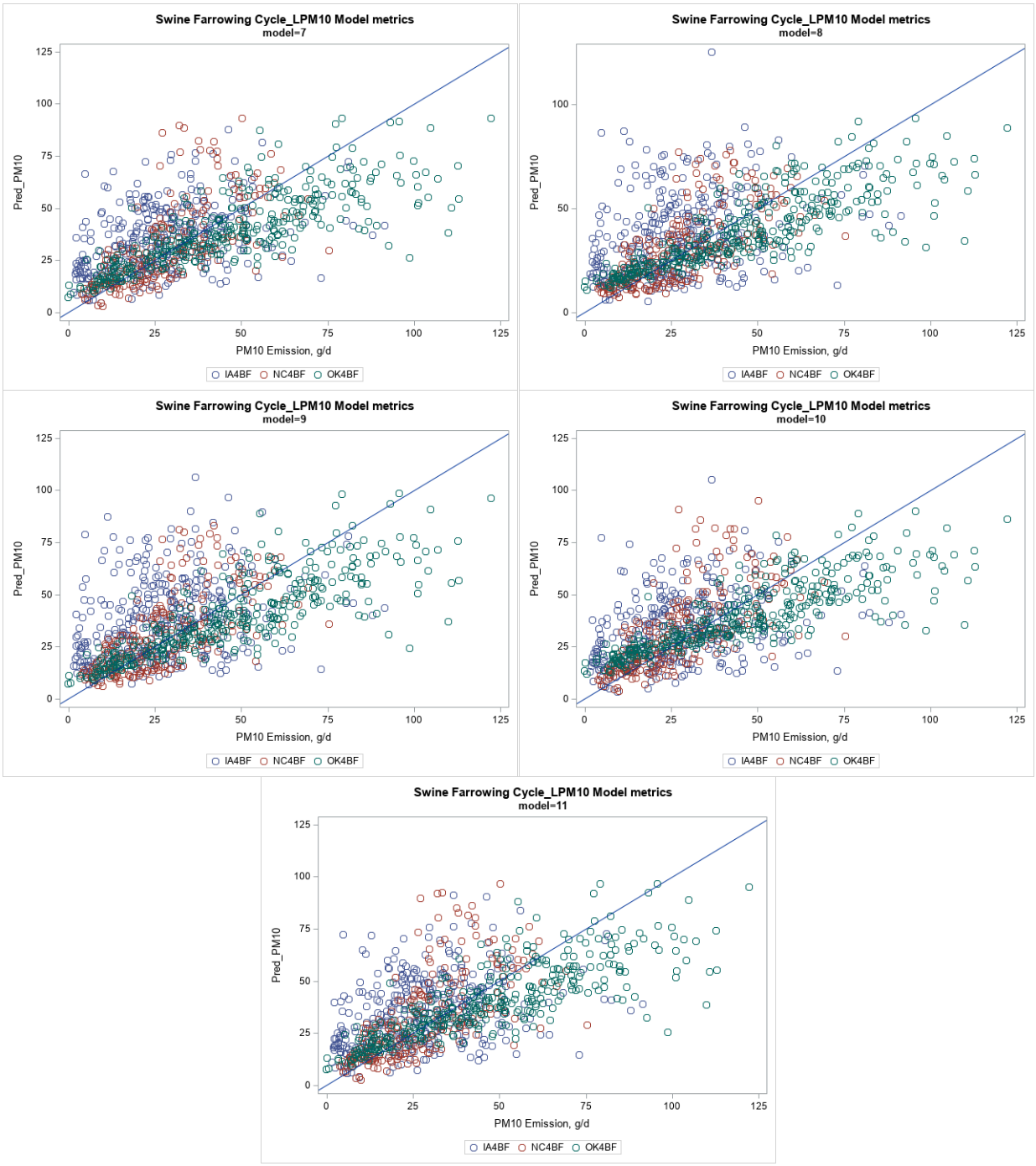


**Figure G-4. Farrowing room $PM_{10}$ one-to-one plots models 7 through 11.**

### G.1.4 $PM_{2.5}$

**Table G-7. Parameter and estimates $PM_{2.5}$ emission models for swine farrowing room.**

| Model | Parameter | Estimate | Standard Error | p-value |
|---|---|---|---|---|
| 1 | Intercept | -1.21456 | 0.19779 | <.0001 |
| | Cycle day | 0.075902 | 0.00225 | <.0001 |
| | Live animal weight | 0.256357 | 0.03492 | <.0001 |
| 2 | Intercept | -1.222947 | 0.20482 | <.0001 |
| | Cycle day | 0.075309 | 0.00212 | <.0001 |
| | Live animal weight | 0.254803 | 0.03335 | <.0001 |
| | Ambient relative humidity | 0.000573 | 0.00294 | 0.8465 |
| 3 | Intercept | -0.966537 | 0.29083 | 0.0015 |
| | Cycle day | 0.065442 | 0.0091 | <.0001 |
| | Ambient temperature | -0.018084 | 0.01225 | 0.1524 |
| | Live animal weight | 0.242206 | 0.05058 | <.0001 |
| | Ambient relative humidity | 0.001018 | 0.00159 | 0.5268 |
| 4 | Intercept | -0.107139 | 0.53486 | 0.8423 |
| | Cycle day | 0.072982 | 0.00857 | <.0001 |
| | Ambient temperature | -0.014718 | 0.00893 | 0.1074 |
| | Live animal weight | 0.211476 | 0.04989 | 0.0001 |
| | Exhaust relative humidity | -0.016091 | 0.00784 | 0.0475 |
| 5 | Intercept | -0.572777 | 0.47918 | 0.2381 |
| | Cycle day | 0.077513 | 0.00748 | <.0001 |
| | Live animal weight | 0.249139 | 0.06454 | 0.0009 |
| | Exhaust relative humidity | -0.013972 | 0.00775 | 0.0822 |
| 6 | Intercept | -1.241043 | 0.27014 | <.0001 |
| | Cycle day | 0.087952 | 0.00353 | <.0001 |
| | Ambient temperature | -0.012621 | 0.00751 | 0.1 |
| | Inventory | 4.939231 | 0.7756 | <.0001 |
| | Ambient relative humidity | 0.001565 | 0.00224 | 0.4913 |
| 7 | Intercept | -0.682623 | 0.34997 | 0.0607 |
| | Cycle day | 0.093276 | 0.0079 | <.0001 |
| | Ambient temperature | -0.008308 | 0.00905 | 0.3637 |
| | Inventory | 4.70608 | 0.85298 | <.0001 |
| | Exhaust relative humidity | -0.010885 | 0.0049 | 0.0347 |
| 8 | Intercept | -5.446906 | 1.24162 | <.0001 |
| | Cycle day | 0.066785 | 0.02129 | 0.006 |
| | Exhaust temperature | 0.179198 | 0.05016 | 0.0009 |
| | Live animal weight | 0.166968 | 0.01505 | <.0001 |
| | Ambient relative humidity | 0.003391 | 0.00639 | 0.5997 |
| 9 | Intercept | -4.073911 | 1.18021 | 0.001 |
| | Cycle day | 0.086992 | 0.0045 | <.0001 |
| | Exhaust temperature | 0.168803 | 0.04758 | 0.0007 |
| | Live animal weight | 0.155647 | 0.03003 | <.0001 |
| | Exhaust relative humidity | -0.014151 | 0.00868 | 0.112 |
| 10 | Intercept | -5.383428 | 0.86921 | <.0001 |
| | Cycle day | 0.100078 | 0.00518 | <.0001 |

| Model | Parameter | Estimate | Standard Error | p-value |
|---|---|---|---|---|
| | Exhaust temperature | 0.167264 | 0.03988 | <.0001 |
| | Inventory | 5.092094 | 0.82731 | <.0001 |
| | Ambient relative humidity | 0.000251 | 0.00367 | 0.9461 |
| 11 | Intercept | -4.615138 | 0.96869 | <.0001 |
| | Cycle day | 0.101842 | 0.00367 | <.0001 |
| | Exhaust temperature | 0.162427 | 0.03734 | <.0001 |
| | Inventory | 4.743317 | 0.81837 | <.0001 |
| | Exhaust relative humidity | -0.012316 | 0.00645 | 0.0664 |

## Table G-8. Fit and evaluation statistics for swine farrowing room $PM_{2.5}$ models tested.

| Model | 2LogL | AIC | AICc | BIC | Corr. | LNME[a] (%) | NME[b] (%) | ME[b] (g day$^{-1}$) | MB[b] (g day$^{-1}$) | NMB[b] (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 21 | 39 | 42 | 62 | 0.578 | 58.6 | 53.65 | 1.90 | 0.36 | 10.27 |
| 2 | 21 | 41 | 45 | 66 | 0.576 | 59.3 | 53.89 | 1.91 | 0.36 | 10.08 |
| 3 | 16 | 38 | 43 | 66 | 0.450 | 61.6 | 64.18 | 2.27 | 0.74 | 20.83 |
| 4 | 12 | 34 | 38 | 61 | 0.494 | 56.1 | 61.84 | 2.19 | 0.77 | 21.69 |
| 5 | 18 | 36 | 39 | 59 | 0.594 | 52.6 | 52.93 | 1.88 | 0.43 | 12.19 |
| 6 | 18 | 40 | 44 | 67 | 0.546 | 57.1 | 63.52 | 2.30 | 0.83 | 22.79 |
| 7 | 16 | 36 | 39 | 61 | 0.577 | 53.2 | 64.32 | 2.33 | 0.90 | 24.96 |
| 8 | 23 | 45 | 50 | 72 | 0.754 | 40.8 | 42.55 | 1.51 | -0.11 | -3.13 |
| 9 | 11 | 33 | 37 | 60 | 0.748 | 51.1 | 43.37 | 1.54 | 0.09 | 2.66 |
| 10 | 7 | 29 | 33 | 56 | 0.725 | 50.4 | 58.84 | 2.13 | 0.77 | 21.39 |
| 11 | 2 | 24 | 28 | 52 | 0.734 | 46.8 | 56.99 | 2.06 | 0.76 | 21.03 |

[a] Based on transformed data (i.e., $\ln(PM_{2.5})$).
[b] Based on back-transformed data.

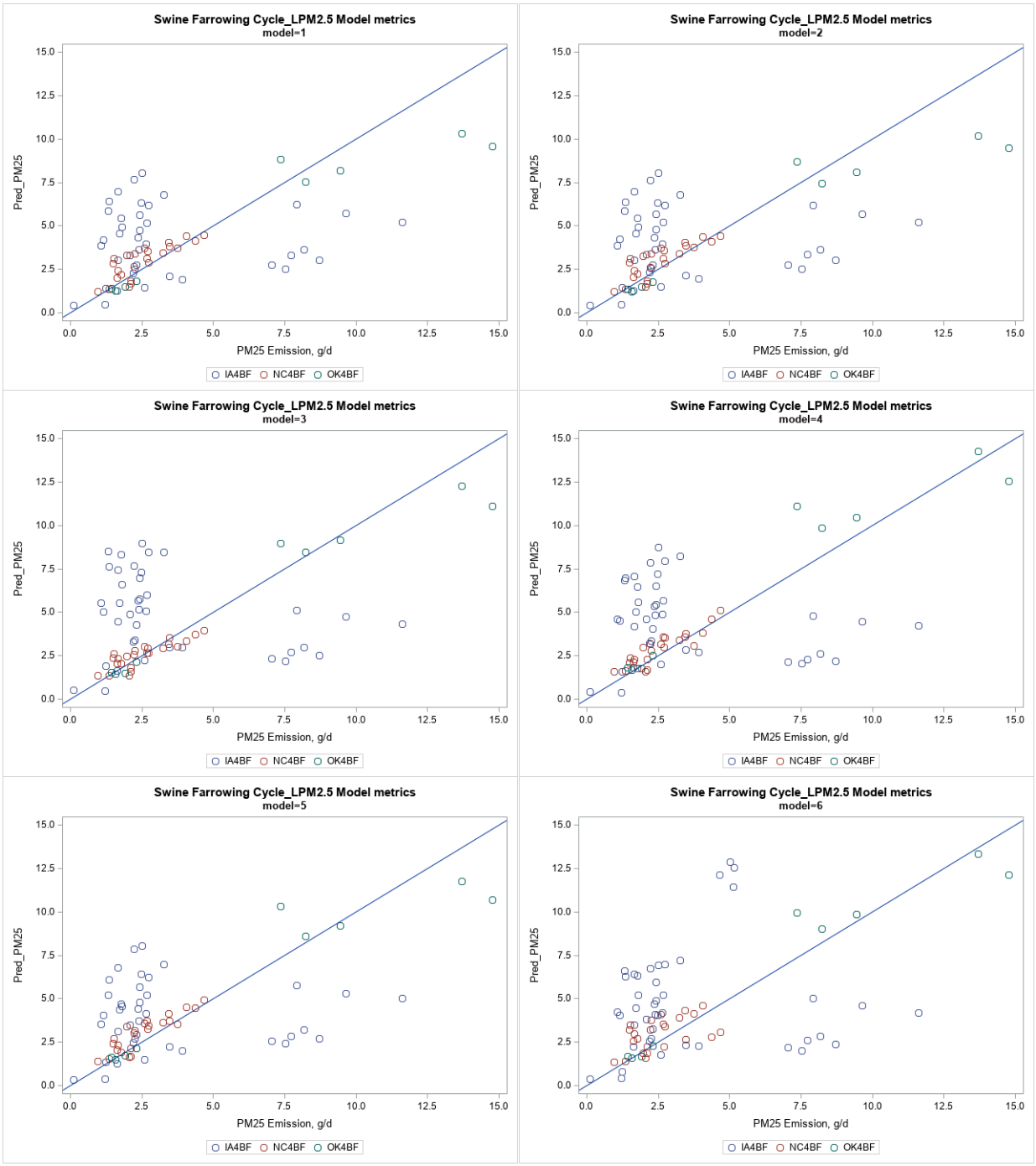


**Figure G-5. Farrowing room $PM_{2.5}$ one-to-one plots models 1 through 6.**

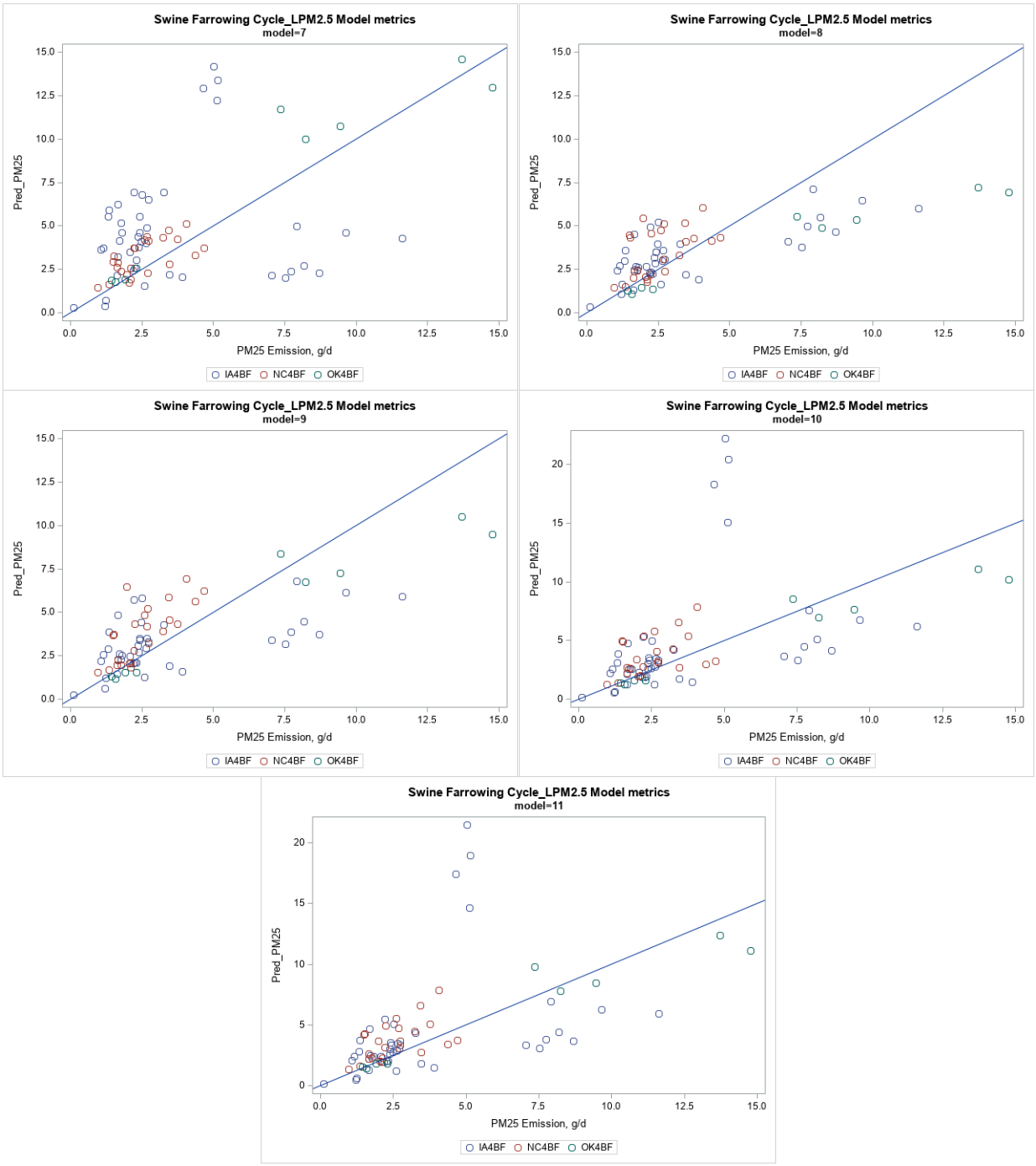


**Figure G-6. Farrowing room $PM_{2.5}$ one-to-one plots for models 7 through 11.**

### G.1.5 Total Suspended Particulates (TSP)

**Table G-9. Parameter and estimates TSP emission models for swine farrowing room.**

| Model | Parameter | Estimate | Standard Error | p-value |
|---|---|---|---|---|
| 1 | Intercept | 2.510049 | 0.44876 | <.0001 |
| | Cycle day | 0.075409 | 0.01396 | <.0001 |
| | Live animal weight | 0.147389 | 0.07907 | 0.0679 |
| 2 | Intercept | 2.858928 | 0.47281 | <.0001 |
| | Cycle day | 0.070551 | 0.01348 | <.0001 |
| | Live animal weight | 0.147305 | 0.07879 | 0.0679 |
| | Ambient relative humidity | -0.004908 | 0.00263 | 0.0644 |
| 3 | Intercept | 2.801817 | 0.53016 | <.0001 |
| | Cycle day | 0.070724 | 0.01347 | <.0001 |
| | Ambient temperature | 0.001602 | 0.0066 | 0.8086 |
| | Live animal weight | 0.152652 | 0.08146 | 0.0663 |
| | Ambient relative humidity | -0.004903 | 0.00264 | 0.0654 |
| 4 | Intercept | 3.621464 | 0.56437 | <.0001 |
| | Cycle day | 0.069119 | 0.01319 | <.0001 |
| | Ambient temperature | 0.009349 | 0.00686 | 0.1758 |
| | Live animal weight | 0.124026 | 0.0784 | 0.1201 |
| | Exhaust relative humidity | -0.018661 | 0.00497 | 0.0003 |
| 5 | Intercept | 3.56584 | 0.52094 | <.0001 |
| | Cycle day | 0.074342 | 0.01373 | <.0001 |
| | Live animal weight | 0.117031 | 0.07536 | 0.1271 |
| | Exhaust relative humidity | -0.015864 | 0.00485 | 0.0014 |
| 6 | Intercept | 3.136307 | 0.38035 | <.0001 |
| | Cycle day | 0.080618 | 0.01299 | <.0001 |
| | Ambient temperature | -0.000143 | 0.00638 | 0.9821 |
| | Inventory | 1.823107 | 0.92016 | 0.0497 |
| | Ambient relative humidity | -0.004698 | 0.00264 | 0.0771 |
| 7 | Intercept | 3.946555 | 0.43644 | <.0001 |
| | Cycle day | 0.076822 | 0.01279 | <.0001 |
| | Ambient temperature | 0.007496 | 0.00661 | 0.2603 |
| | Inventory | 1.31966 | 0.92362 | 0.1558 |
| | Exhaust relative humidity | -0.018571 | 0.00501 | 0.0003 |
| 8 | Intercept | 3.341498 | 0.98955 | 0.001 |
| | Cycle day | 0.070461 | 0.01342 | <.0001 |
| | Exhaust temperature | -0.016835 | 0.03054 | 0.5824 |
| | Live animal weight | 0.136466 | 0.08079 | 0.0971 |
| | Ambient relative humidity | -0.004896 | 0.00263 | 0.065 |
| 9 | Intercept | 3.261496 | 0.97183 | 0.0011 |
| | Cycle day | 0.074396 | 0.01371 | <.0001 |
| | Exhaust temperature | 0.01196 | 0.03205 | 0.7096 |
| | Live animal weight | 0.123135 | 0.077 | 0.116 |
| | Exhaust relative humidity | -0.016381 | 0.00502 | 0.0014 |
| 10 | Intercept | 3.64785 | 0.87406 | <.0001 |
| | Cycle day | 0.079772 | 0.01283 | <.0001 |

| Model | Parameter | Estimate | Standard Error | p-value |
|---|---|---|---|---|
| | Exhaust temperature | -0.019183 | 0.03003 | 0.5242 |
| | Inventory | 1.716278 | 0.92608 | 0.0661 |
| | Ambient relative humidity | -0.004692 | 0.00262 | 0.0762 |
| 11 | Intercept | 3.575734 | 0.85828 | <.0001 |
| | Cycle day | 0.082153 | 0.0127 | <.0001 |
| | Exhaust temperature | 0.010094 | 0.03162 | 0.7501 |
| | Inventory | 1.525284 | 0.86906 | 0.0821 |
| | Exhaust relative humidity | -0.016647 | 0.00503 | 0.0012 |

**Table G-10. Fit and evaluation statistics for swine farrowing room TSP models tested.**

| Model | 2LogL | AIC | AICc | BIC | Corr. | LNME[a] (%) | NME[b] (%) | ME[b] (g day$^{-1}$) | MB[b] (g day$^{-1}$) | NMB[b] (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 76 | 86 | 87 | 99 | 0.647 | 11.6 | 46.24 | 45.18 | 4.22 | 4.32 |
| 2 | 67 | 79 | 80 | 94 | 0.678 | 11.0 | 41.73 | 40.71 | 1.88 | 1.93 |
| 3 | 67 | 81 | 82 | 99 | 0.682 | 10.9 | 41.60 | 40.58 | 1.59 | 1.63 |
| 4 | 56 | 70 | 71 | 87 | 0.749 | 10.4 | 38.74 | 39.12 | -0.36 | -0.36 |
| 5 | 64 | 76 | 77 | 91 | 0.712 | 10.9 | 42.40 | 42.83 | 3.57 | 3.54 |
| 6 | 67 | 81 | 82 | 98 | 0.695 | 10.6 | 40.97 | 39.96 | 1.22 | 1.26 |
| 7 | 57 | 71 | 72 | 88 | 0.759 | 10.4 | 38.64 | 39.01 | -0.66 | -0.65 |
| 8 | 67 | 81 | 82 | 98 | 0.684 | 10.8 | 41.15 | 40.14 | 1.97 | 2.02 |
| 9 | 64 | 78 | 79 | 95 | 0.711 | 10.9 | 42.53 | 42.97 | 3.33 | 3.30 |
| 10 | 67 | 81 | 82 | 98 | 0.701 | 10.5 | 40.32 | 39.33 | 1.36 | 1.39 |
| 11 | 64 | 78 | 79 | 95 | 0.735 | 10.6 | 41.24 | 41.66 | 2.12 | 2.10 |

[a] Based on transformed data (i.e., ln(TSP)).
[b] Based on back-transformed data.

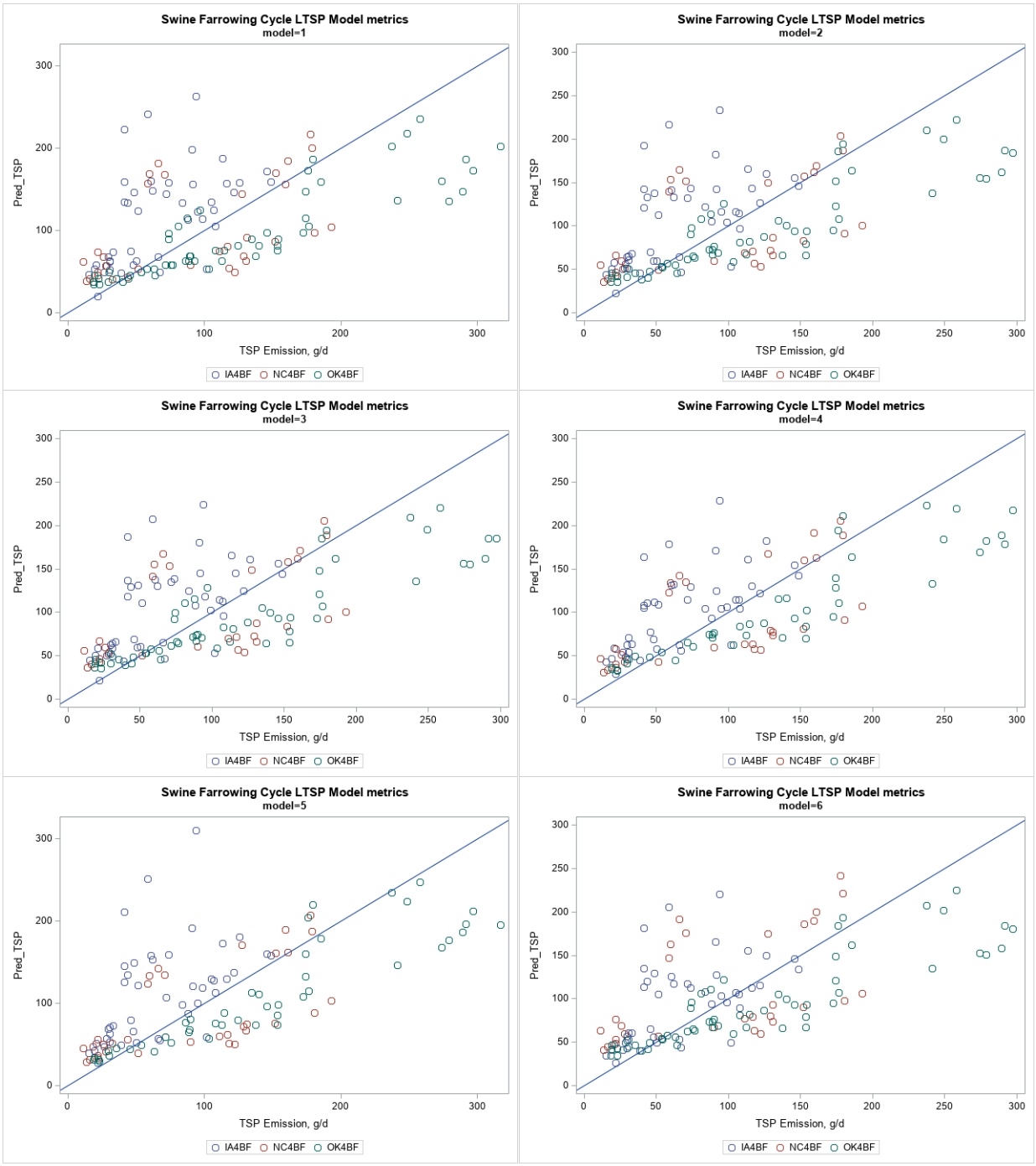


**Figure G-7. Farrowing TSP one-to-one plots form models 1 through 6.**

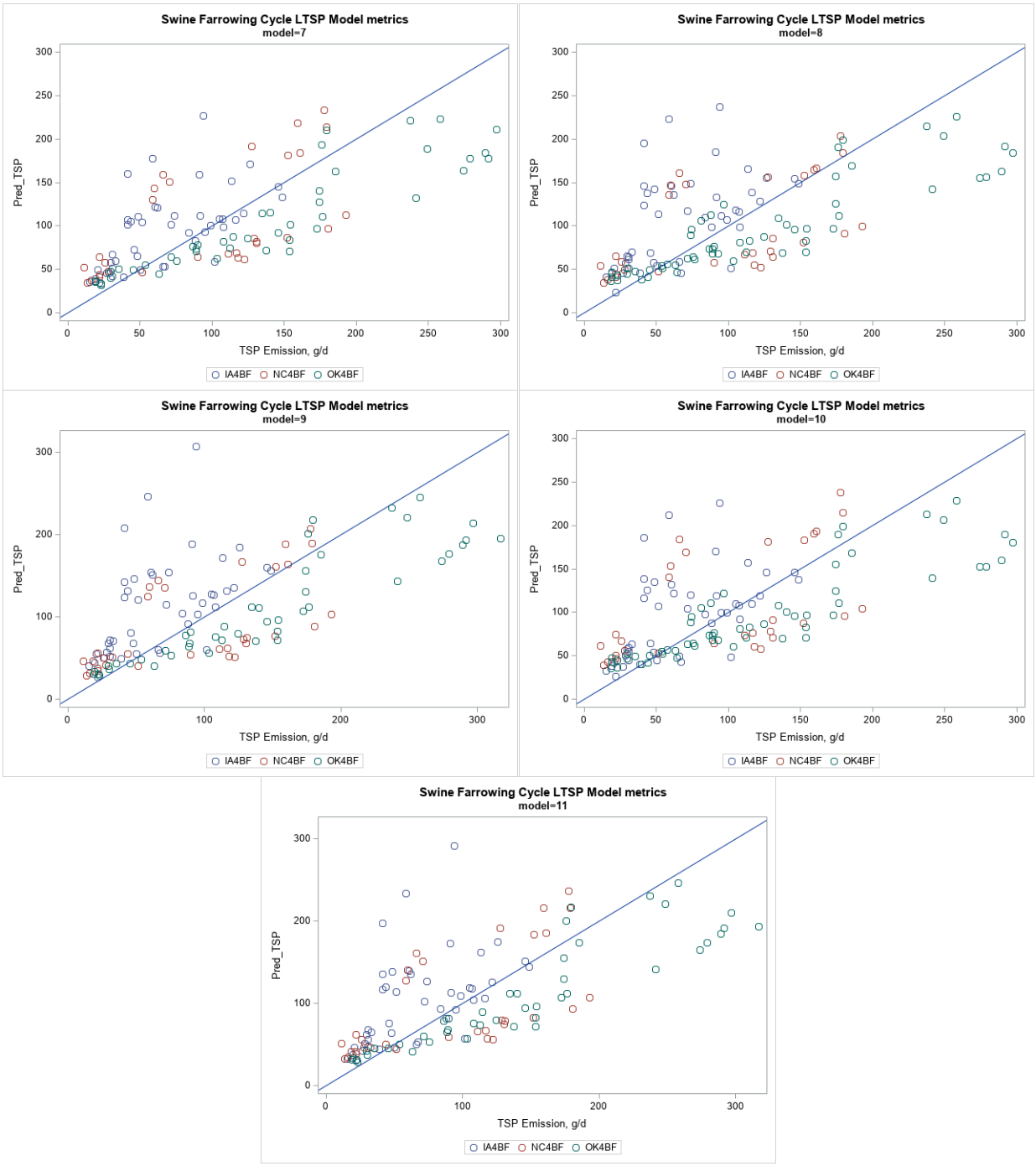


**Figure G-8. Farrowing TSP one-to-one plots form models 7 through 11.**

## G.2 Gestation Barns

### G.2.1 Ammonia ($NH_3$), without pit type

**Table G-11. Parameter and estimates $NH_3$ emission models for swine gestation barn without pit type specified.**

| Model | Parameter | Estimate | Standard Error | p-value |
|---|---|---|---|---|
| 1 | Intercept | -0.124019 | 0.14725 | 0.4013 |
| | Ambient temperature | 0.003627 | 0.00112 | 0.0012 |
| | Exhaust temperature | 0.012324 | 0.00365 | 0.0007 |
| | Live animal weight | 0.009382 | 0.00052 | <.0001 |
| 2 | Intercept | -0.571962 | 0.21034 | 0.0078 |
| | Ambient temperature | 0.003585 | 0.00108 | 0.0009 |
| | Exhaust temperature | 0.012258 | 0.00346 | 0.0004 |
| | Inventory | 2.256826 | 0.1715 | <.0001 |
| 3 | Intercept | -0.380329 | 0.1093 | 0.0007 |
| | Exhaust temperature | 0.024796 | 0.00174 | <.0001 |
| | Live animal weight | 0.009566 | 0.00042 | <.0001 |
| 4 | Intercept | 0.154785 | 0.11861 | 0.1972 |
| | Ambient temperature | 0.006855 | 0.00055 | <.0001 |
| | Live animal weight | 0.009122 | 0.00051 | <.0001 |
| 5 | Intercept | -0.887715 | 0.15215 | <.0001 |
| | Exhaust temperature | 0.02473 | 0.00165 | <.0001 |
| | Inventory | 2.343046 | 0.1268 | <.0001 |
| 6 | Intercept | -0.266956 | 0.19692 | 0.1811 |
| | Ambient temperature | 0.00678 | 0.00052 | <.0001 |
| | Inventory | 2.18221 | 0.16987 | <.0001 |

**Table G-12. Fit and evaluation statistics for swine gestation barn without pit type specified $NH_3$ models tested.**

| Model | 2LogL | AIC | AICc | BIC | Corr. | LNME[a] (%) | NME[b] (%) | ME[b] (kg day$^{-1}$) | MB[b] (kg day$^{-1}$) | NMB[b] (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | -2851 | -2819 | -2819 | -2823 | 0.738 | 12.5 | 36.92 | 4.78 | -0.66 | -5.06 |
| 2 | -2825 | -2793 | -2793 | -2796 | 0.383 | 16.7 | 54.76 | 7.10 | 0.37 | 2.85 |
| 3 | -3006 | -2976 | -2976 | -2979 | 0.747 | 12.8 | 36.75 | 4.65 | -0.66 | -5.17 |
| 4 | -2841 | -2811 | -2811 | -2815 | 0.739 | 12.5 | 36.70 | 4.76 | -0.65 | -5.03 |
| 5 | -2980 | -2950 | -2950 | -2953 | 0.395 | 17.1 | 55.26 | 7.00 | 0.39 | 3.05 |
| 6 | -2816 | -2786 | -2785 | -2789 | 0.421 | 16.3 | 53.09 | 6.88 | 0.23 | 1.76 |

[a] Based on transformed data (i.e., $\ln(NH_3)$).

[b] Based on back-transformed data.

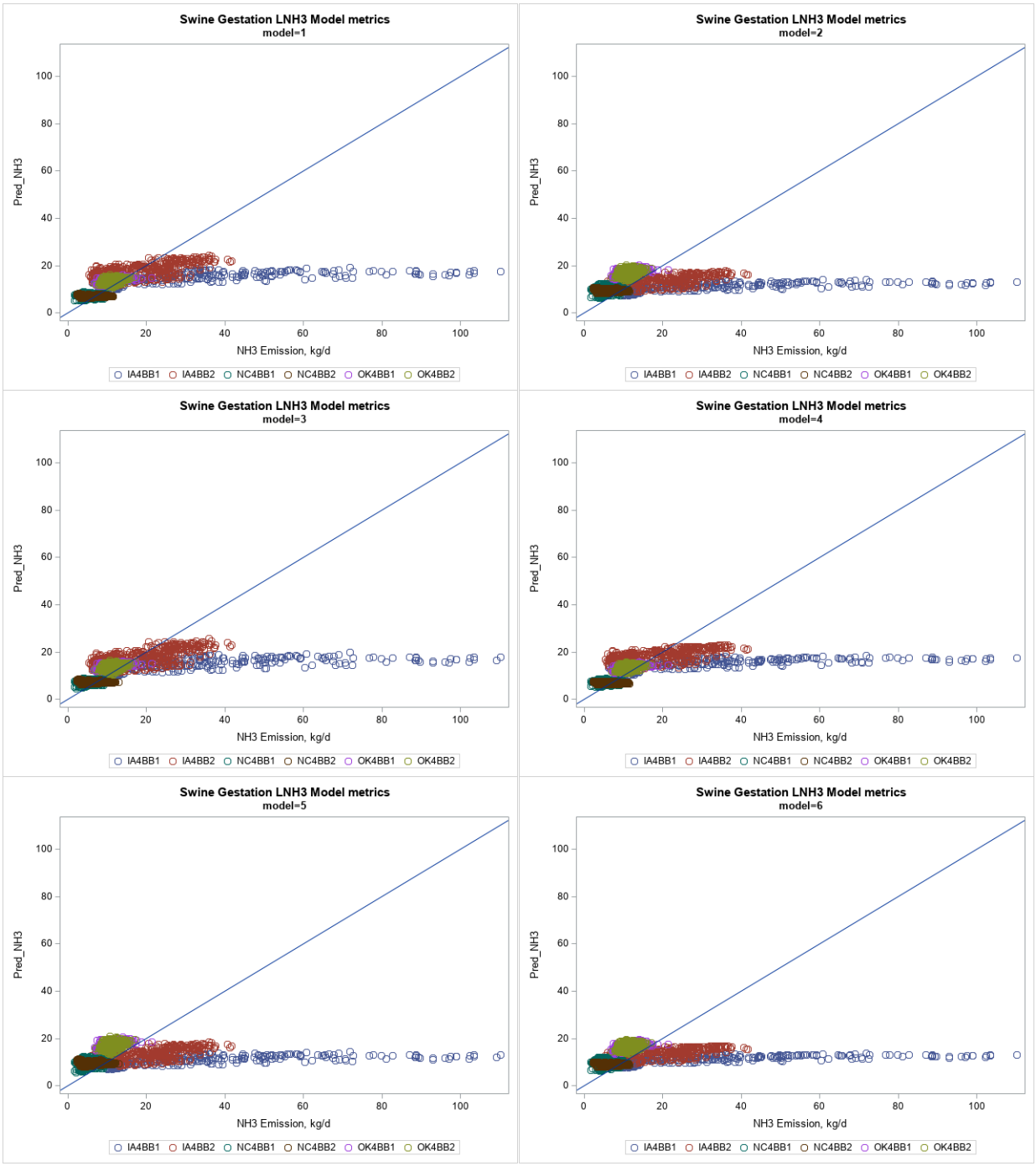


**Figure G-9. Gestation $NH_3$ no pit model one-to-one plots.**

### G.2.2 Ammonia ($NH_3$), with pit type

**Table G-13. Parameter and estimates $NH_3$ emission models for swine gestation barn with pit type specified.**

| Model | Parameter | Estimate | Standard Error | p-value |
|---|---|---|---|---|
| 1 | Deep | 0.820119 | 0.2827 | 0.0045 |
| | Shallow | 0.290714 | 0.23005 | 0.2084 |
| | Ambient temperature | 0.011567 | 0.00157 | <.0001 |
| | Exhaust temperature | 0.000783 | 0.00489 | 0.8726 |
| | Live animal weight | 0.007912 | 0.001 | <.0001 |
| 2 | Deep | 0.837378 | 0.28892 | 0.0045 |
| | Shallow | -0.156823 | 0.29033 | 0.59 |
| | Ambient temperature | 0.011558 | 0.00157 | <.0001 |
| | Exhaust temperature | 0.000673 | 0.00489 | 0.8905 |
| | Inventory | 1.95569 | 0.25514 | <.0001 |
| 3 | Deep | 0.160772 | 0.24154 | 0.507 |
| | Shallow | -0.447705 | 0.18902 | 0.0193 |
| | Exhaust temperature | 0.037453 | 0.00257 | <.0001 |
| | Live animal weight | 0.008436 | 0.00087 | <.0001 |
| 4 | Deep | 0.834777 | 0.26817 | 0.0025 |
| | Shallow | 0.30747 | 0.20558 | 0.1382 |
| | Ambient temperature | 0.011778 | 0.00085 | <.0001 |
| | Live animal weight | 0.007899 | 0.001 | <.0001 |
| 5 | Deep | 0.145302 | 0.24822 | 0.5594 |
| | Shallow | -0.95979 | 0.24429 | 0.0001 |
| | Exhaust temperature | 0.03733 | 0.00258 | <.0001 |
| | Inventory | 2.117453 | 0.22432 | <.0001 |
| 6 | Deep | 0.850101 | 0.27458 | 0.0026 |
| | Shallow | -0.141677 | 0.26961 | 0.6004 |
| | Ambient temperature | 0.011739 | 0.00085 | <.0001 |
| | Inventory | 1.952928 | 0.25467 | <.0001 |

**Table G-14. Fit and evaluation statistics for swine gestation barn with pit type specified $NH_3$ models tested.**

| Model | 2LogL | AIC | AICc | BIC | Corr. | LNME[a] (%) | NME[b] (%) | ME[b] (kg day$^{-1}$) | MB[b] (kg day$^{-1}$) | NMB[b] (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | -2009 | -1995 | -1995 | -1996 | 0.779 | 11.6 | 31.18 | 4.04 | -0.36 | -2.79 |
| 2 | -2007 | -1993 | -1992 | -1994 | 0.776 | 11.7 | 31.26 | 4.05 | -0.37 | -2.88 |
| 3 | -2046 | -2034 | -2034 | -2035 | 0.796 | 11.5 | 30.50 | 3.86 | -0.31 | -2.42 |
| 4 | -2009 | -1997 | -1997 | -1998 | 0.779 | 11.6 | 31.21 | 4.04 | -0.36 | -2.79 |
| 5 | -2044 | -2032 | -2032 | -2033 | 0.794 | 11.5 | 30.56 | 3.87 | -0.31 | -2.48 |
| 6 | -2007 | -1995 | -1994 | -1996 | 0.775 | 11.7 | 31.28 | 4.05 | -0.37 | -2.88 |

[a] Based on transformed data (i.e., $\ln(NH_3)$).

[b] Based on back-transformed data.

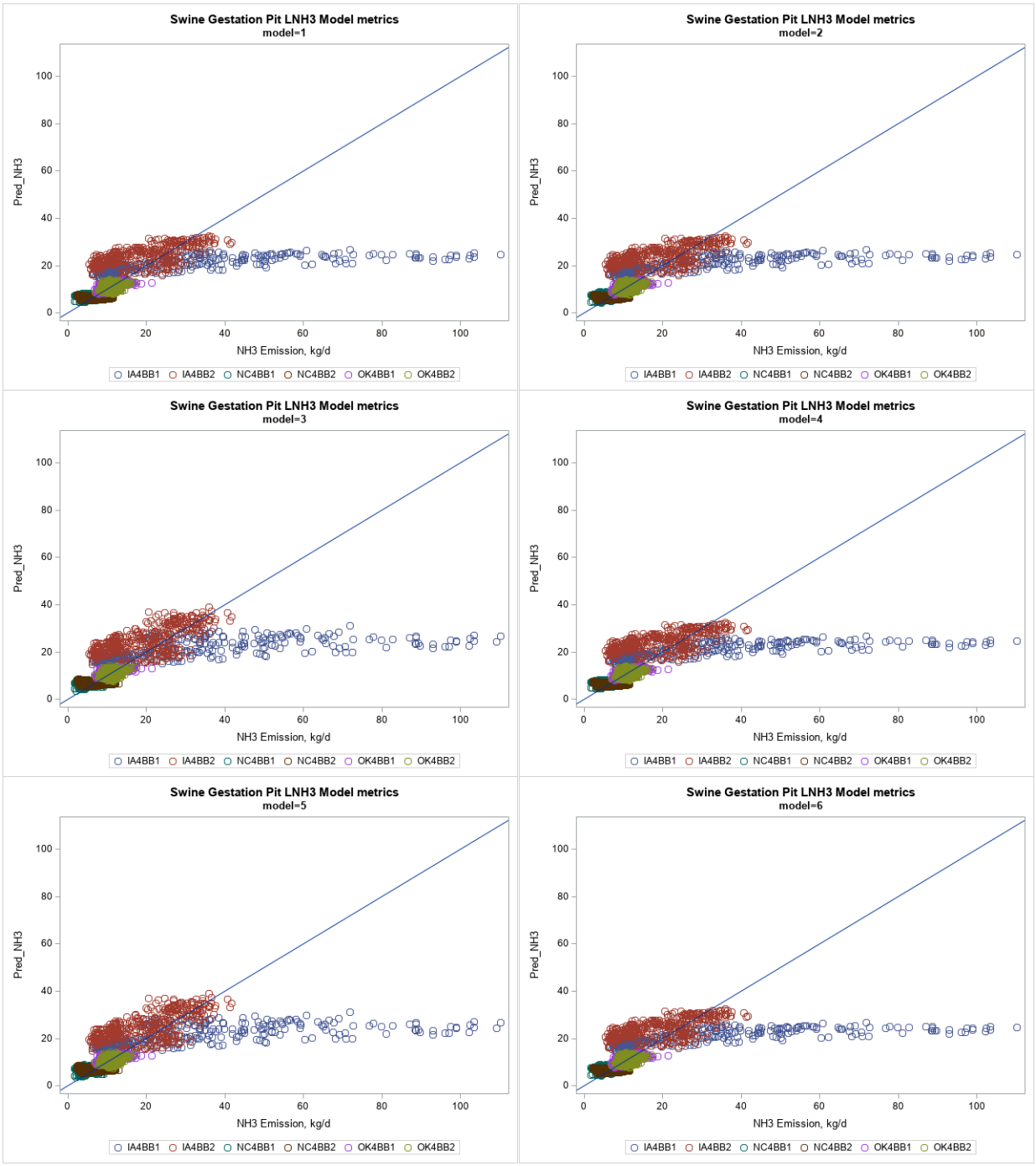


**Figure G-10. Gestation $NH_3$ pit model one-to-one plots.**

### G.2.3 Hydrogen Sulfide ($H_2S$), without pit type

**Table G-15. Parameter and estimates $H_2S$ emission models for swine gestation barn without pit type specified.**

| Model | Parameter | Estimate | Standard Error | p-value |
|---|---|---|---|---|
| 1 | Intercept | 2.340339 | 0.20448 | <.0001 |
| | Ambient temperature | 0.006591 | 0.00213 | 0.002 |
| | Exhaust temperature | -0.01153 | 0.00705 | 0.1021 |
| | Live animal weight | 0.01961 | 0.00055 | <.0001 |
| 2 | Intercept | 1.049288 | 0.22272 | <.0001 |
| | Ambient temperature | 0.006192 | 0.00209 | 0.003 |
| | Exhaust temperature | -0.010592 | 0.00688 | 0.1236 |
| | Inventory | 5.007765 | 0.14404 | <.0001 |
| 3 | Intercept | 2.079784 | 0.14511 | <.0001 |
| | Exhaust temperature | 0.007943 | 0.00315 | 0.0119 |
| | Live animal weight | 0.019339 | 0.0005 | <.0001 |
| 4 | Intercept | 2.077258 | 0.12093 | <.0001 |
| | Ambient temperature | 0.003547 | 0.00098 | 0.0003 |
| | Live animal weight | 0.019862 | 0.00053 | <.0001 |
| 5 | Intercept | 0.803968 | 0.17442 | <.0001 |
| | Exhaust temperature | 0.007805 | 0.0031 | 0.012 |
| | Inventory | 4.955695 | 0.1336 | <.0001 |
| 6 | Intercept | 0.788813 | 0.16547 | <.0001 |
| | Ambient temperature | 0.003397 | 0.00097 | 0.0005 |
| | Inventory | 5.070146 | 0.14418 | <.0001 |

**Table G-16. Fit and evaluation statistics for swine gestation barn without pit type specified $H_2S$ models tested.**

| Model | 2LogL | AIC | AICc | BIC | Corr. | LNME[a] (%) | NME[b] (%) | ME[b] (g day$^{-1}$) | MB[b] (g day$^{-1}$) | NMB[b] (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1241 | 1273 | 1273 | 1270 | 0.851 | 8.7 | 68.73 | 1581.00 | -520.10 | -22.62 |
| 2 | 1265 | 1297 | 1297 | 1293 | 0.467 | 13.1 | 124.00 | 2851.00 | 389.80 | 16.95 |
| 3 | 1556 | 1586 | 1586 | 1583 | 0.847 | 9.0 | 69.46 | 1523.00 | -518.70 | -23.65 |
| 4 | 1244 | 1274 | 1274 | 1271 | 0.848 | 8.8 | 69.33 | 1594.00 | -514.80 | -22.39 |
| 5 | 1575 | 1605 | 1605 | 1602 | 0.471 | 13.2 | 124.40 | 2728.00 | 343.10 | 15.65 |
| 6 | 1267 | 1297 | 1297 | 1293 | 0.446 | 13.3 | 126.80 | 2917.00 | 450.50 | 19.59 |

[a] Based on transformed data (i.e., $\ln(H_2S)$).

[b] Based on back-transformed data.

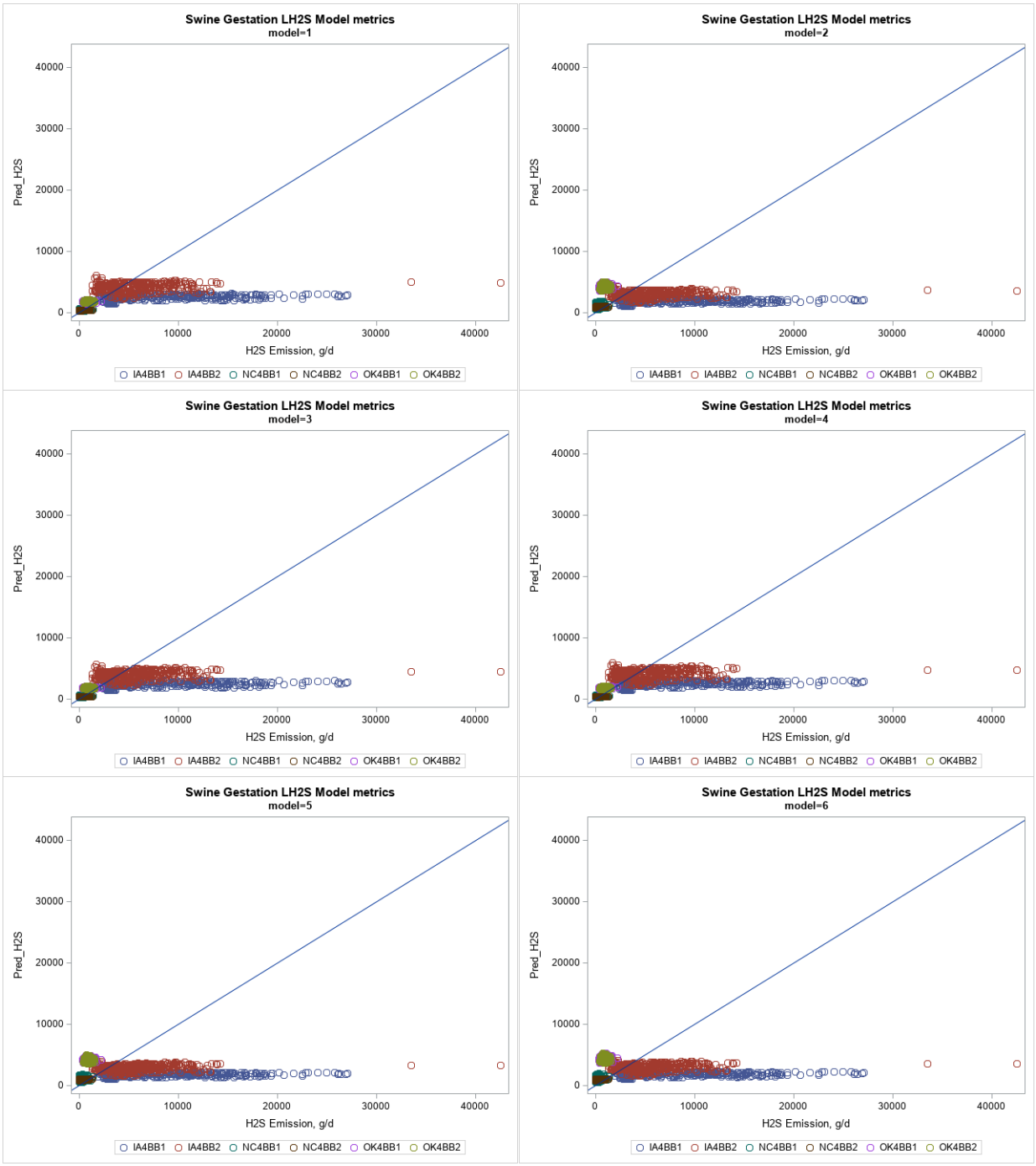


**Figure G-11. Gestation $H_2S$ no pit model one-to-one plots.**

### G.2.4 Hydrogen Sulfide ($H_2S$), with pit type

**Table G-17. Parameter and estimates $H_2S$ emission models for swine gestation barn with pit type specified.**

| Model | Parameter | Estimate | Standard Error | p-value |
|---|---|---|---|---|
| 1 | Deep | 3.343724 | 0.20609 | <.0001 |
| | Shallow | 2.320599 | 0.20474 | <.0001 |
| | Ambient temperature | 0.006075 | 0.00218 | 0.0053 |
| | Exhaust temperature | -0.008389 | 0.00728 | 0.2491 |
| | Live animal weight | 0.019413 | 0.00056 | <.0001 |
| 2 | Deep | 3.16381 | 0.21225 | <.0001 |
| | Shallow | 1.015716 | 0.23834 | <.0001 |
| | Ambient temperature | 0.005911 | 0.00218 | 0.0069 |
| | Exhaust temperature | -0.008324 | 0.0073 | 0.254 |
| | Inventory | 4.996525 | 0.14574 | <.0001 |
| 3 | Deep | 3.163799 | 0.1596 | <.0001 |
| | Shallow | 2.094309 | 0.14531 | <.0001 |
| | Exhaust temperature | 0.009296 | 0.00319 | 0.0037 |
| | Live animal weight | 0.01913 | 0.00051 | <.0001 |
| 4 | Deep | 3.171852 | 0.1471 | <.0001 |
| | Shallow | 2.130472 | 0.12289 | <.0001 |
| | Ambient temperature | 0.003844 | 0.00098 | 0.0001 |
| | Live animal weight | 0.019592 | 0.00054 | <.0001 |
| 5 | Deep | 2.975309 | 0.16444 | <.0001 |
| | Shallow | 0.797081 | 0.17776 | <.0001 |
| | Exhaust temperature | 0.008994 | 0.0032 | 0.0051 |
| | Inventory | 4.938084 | 0.13301 | <.0001 |
| 6 | Deep | 2.990124 | 0.15311 | <.0001 |
| | Shallow | 0.813576 | 0.16124 | <.0001 |
| | Ambient temperature | 0.003696 | 0.00099 | 0.0002 |
| | Inventory | 5.043545 | 0.14044 | <.0001 |

**Table G-18. Fit and evaluation statistics for swine gestation barn with pit type specified $H_2S$ models tested.**

| Model | 2LogL | AIC | AICc | BIC | Corr. | LNME[a] (%) | NME[b] (%) | ME[b] (g day$^{-1}$) | MB[b] (g day$^{-1}$) | NMB[b] (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1197 | 1231 | 1231 | 1227 | 0.913 | 6.1 | 50.90 | 1171.00 | -241.90 | -10.52 |
| 2 | 1208 | 1242 | 1242 | 1238 | 0.911 | 6.1 | 51.24 | 1178.00 | -245.60 | -10.68 |
| 3 | 1509 | 1541 | 1542 | 1538 | 0.912 | 6.3 | 50.25 | 1102.00 | -233.60 | -10.65 |
| 4 | 1198 | 1230 | 1230 | 1227 | 0.913 | 6.1 | 50.68 | 1166.00 | -241.10 | -10.49 |
| 5 | 1517 | 1549 | 1550 | 1546 | 0.910 | 6.3 | 50.59 | 1109.00 | -238.00 | -10.85 |
| 6 | 1209 | 1241 | 1241 | 1237 | 0.911 | 6.1 | 51.03 | 1174.00 | -244.70 | -10.64 |

[a] Based on transformed data (i.e., ln($H_2S$)).

[b] Based on back-transformed data.

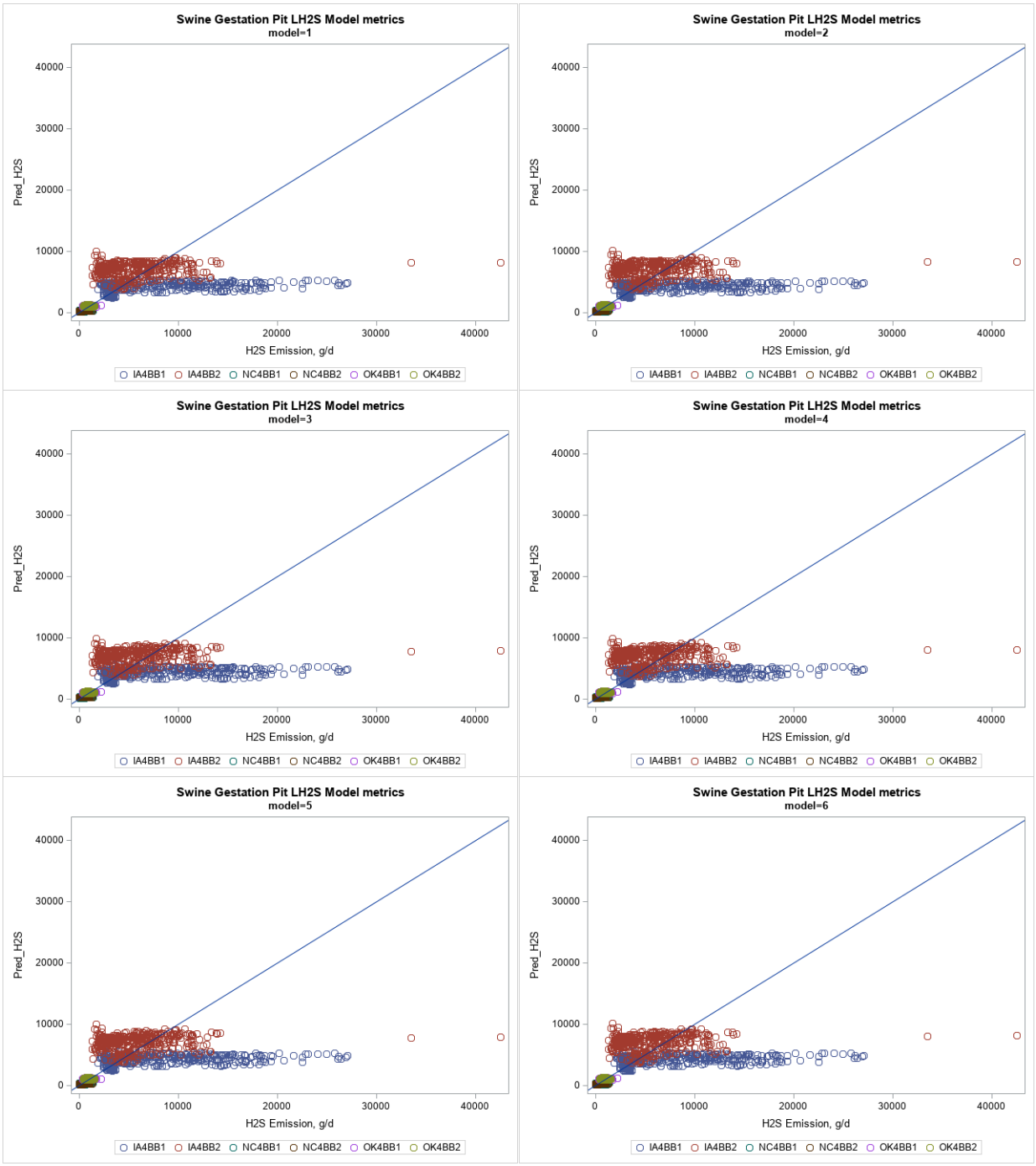


**Figure G-12. Gestation $H_2S$ pit model one-to-one plots.**

### G.2.5 $PM_{10}$

**Table G-19. Parameter and estimates $PM_{10}$ emission models for gestation barn.**

| Model | Parameter | Estimate | Standard Error | p-value |
|---|---|---|---|---|
| 1 | Intercept | 4.746812 | 0.18103 | <.0001 |
| | Live animal weight | 0.005227 | 0.00077 | <.0001 |
| 2 | Intercept | 5.186761 | 0.17987 | <.0001 |
| | Live animal weight | 0.005472 | 0.00076 | <.0001 |
| | Ambient relative humidity | -0.007661 | 0.00053 | <.0001 |
| 3 | Intercept | 5.197462 | 0.19044 | <.0001 |
| | Ambient temperature | 0.001332 | 0.00143 | 0.3515 |
| | Live animal weight | 0.005432 | 0.00077 | <.0001 |
| | Ambient relative humidity | -0.007937 | 0.00056 | <.0001 |
| 4 | Intercept | 6.009517 | 0.16609 | <.0001 |
| | Ambient temperature | 0.006093 | 0.00134 | <.0001 |
| | Live animal weight | 0.005005 | 0.00064 | <.0001 |
| | Exhaust relative humidity | -0.021745 | 0.00094 | <.0001 |
| 5 | Intercept | 6.222609 | 0.15542 | <.0001 |
| | Live animal weight | 0.004471 | 0.00061 | <.0001 |
| | Exhaust relative humidity | -0.022127 | 0.00096 | <.0001 |
| 6 | Intercept | 5.513233 | 0.32609 | <.0001 |
| | Ambient temperature | 0.001056 | 0.00143 | 0.4592 |
| | Inventory | 0.835821 | 0.28124 | 0.0048 |
| | Ambient relative humidity | -0.007848 | 0.00057 | <.0001 |
| 7 | Intercept | 5.935606 | 0.28506 | <.0001 |
| | Ambient temperature | 0.005531 | 0.00134 | <.0001 |
| | Inventory | 1.109027 | 0.24632 | <.0001 |
| | Exhaust relative humidity | -0.021621 | 0.00096 | <.0001 |
| 8 | Intercept | 5.562154 | 0.22881 | <.0001 |
| | Exhaust temperature | -0.011494 | 0.00423 | 0.0068 |
| | Live animal weight | 0.004915 | 0.00077 | <.0001 |
| | Ambient relative humidity | -0.007907 | 0.00054 | <.0001 |
| 9 | Intercept | 6.240271 | 0.20282 | <.0001 |
| | Exhaust temperature | -0.000553 | 0.00407 | 0.8919 |
| | Live animal weight | 0.004443 | 0.00064 | <.0001 |
| | Exhaust relative humidity | -0.022132 | 0.00096 | <.0001 |
| 10 | Intercept | 5.794705 | 0.30808 | <.0001 |
| | Exhaust temperature | -0.015872 | 0.00406 | 0.0001 |
| | Inventory | 0.8952 | 0.26107 | 0.0012 |
| | Ambient relative humidity | -0.007825 | 0.00055 | <.0001 |
| 11 | Intercept | 6.145041 | 0.28393 | <.0001 |
| | Exhaust temperature | -0.005697 | 0.0039 | 0.1444 |
| | Inventory | 1.127905 | 0.2377 | <.0001 |
| | Exhaust relative humidity | -0.022088 | 0.00097 | <.0001 |

**Table G-20. Fit and evaluation statistics for swine gestation barn $PM_{10}$ models tested.**

| Model | 2LogL | AIC | AICc | BIC | Corr. | LNME[a] (%) | NME[b] (%) | ME[b] (g day$^{-1}$) | MB[b] (g day$^{-1}$) | NMB[b] (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 847 | 875 | 875 | 872 | 0.319 | 6.7 | 34.98 | 142.80 | 3.39 | 0.83 |
| 2 | 607 | 637 | 638 | 634 | 0.374 | 6.6 | 34.96 | 143.30 | 9.14 | 2.23 |
| 3 | 589 | 621 | 621 | 617 | 0.371 | 6.6 | 34.95 | 143.80 | 9.28 | 2.26 |
| 4 | 303 | 335 | 335 | 331 | 0.439 | 6.4 | 35.11 | 143.90 | 13.96 | 3.41 |
| 5 | 372 | 402 | 402 | 399 | 0.425 | 6.6 | 36.34 | 147.80 | 15.59 | 3.83 |
| 6 | 613 | 645 | 646 | 642 | 0.259 | 6.9 | 37.79 | 155.50 | 7.89 | 1.92 |
| 7 | 328 | 360 | 360 | 356 | 0.357 | 6.9 | 38.85 | 159.20 | 17.88 | 4.36 |
| 8 | 601 | 633 | 633 | 629 | 0.377 | 6.6 | 34.90 | 143.10 | 9.68 | 2.36 |
| 9 | 372 | 404 | 404 | 400 | 0.425 | 6.6 | 36.35 | 147.90 | 15.65 | 3.85 |
| 10 | 620 | 652 | 652 | 649 | 0.309 | 6.9 | 37.24 | 152.70 | 7.04 | 1.72 |
| 11 | 390 | 422 | 422 | 419 | 0.369 | 7.0 | 39.85 | 162.10 | 20.55 | 5.05 |

[a] Based on transformed data (i.e., $\ln(PM_{10})$).

[b] Based on back-transformed data.

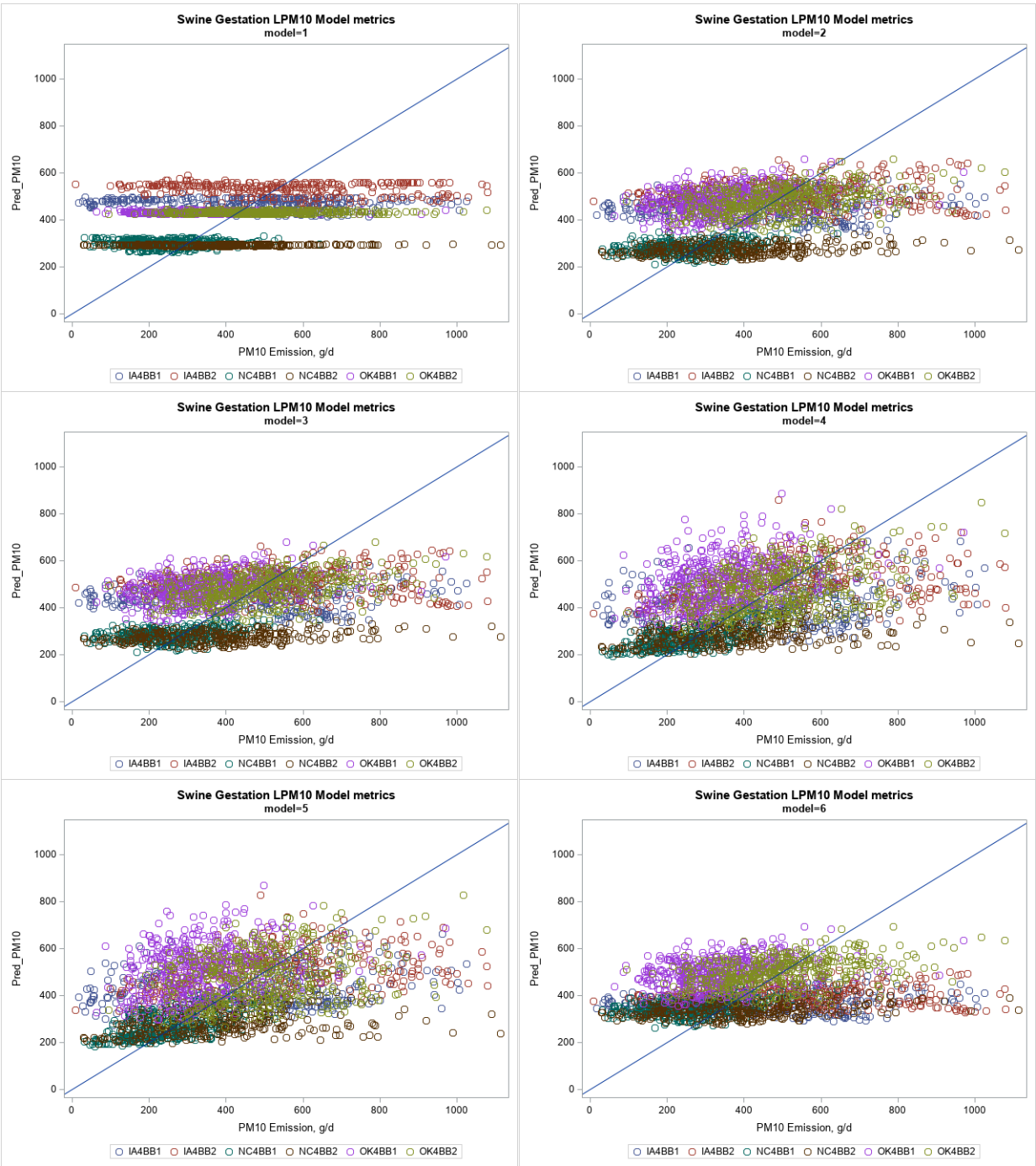


**Figure G-13. Gestation $PM_{10}$ one-to-one plots for models 1 through 6.**

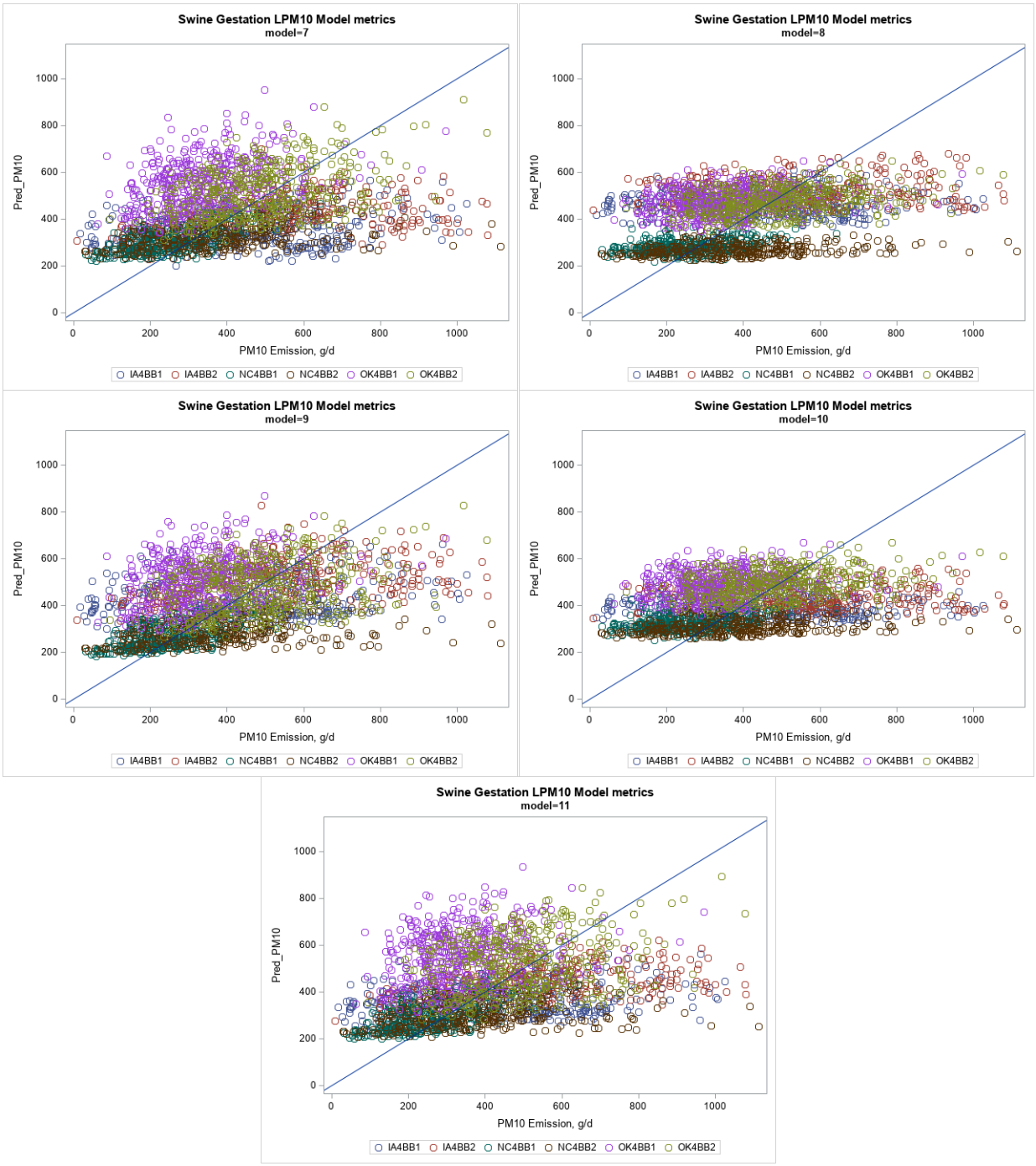


**Figure G-14. Gestation $PM_{10}$ one-to-one plots for models 7 through 11.**

### G.2.6 $PM_{2.5}$

**Table G-21. Parameter and estimates $PM_{2.5}$ emission models for swine gestation barn.**

| Model | Parameter | Estimate | Standard Error | p-value |
|---|---|---|---|---|
| 1 | Intercept | 4.88715 | 0.07109 | <.0001 |
| | Live animal weight | 0.0007 | 0.00031 | 0.027 |
| 2 | Intercept | 4.824807 | 0.08396 | <.0001 |
| | Live animal weight | 0.000689 | 0.00031 | 0.0281 |
| | Ambient relative humidity | 0.001005 | 0.00074 | 0.1745 |
| 3 | Intercept | 4.880687 | 0.09764 | <.0001 |
| | Ambient temperature | -0.001111 | 0.0011 | 0.3165 |
| | Live animal weight | 0.0006 | 0.00031 | 0.0592 |
| | Ambient relative humidity | 0.000681 | 0.00079 | 0.3921 |
| 4 | Intercept | 4.749922 | 0.11574 | <.0001 |
| | Ambient temperature | -0.001287 | 0.00102 | 0.2118 |
| | Live animal weight | 0.000536 | 0.00031 | 0.0884 |
| | Exhaust relative humidity | 0.003155 | 0.00158 | 0.0484 |
| 5 | Intercept | 4.712665 | 0.1142 | <.0001 |
| | Live animal weight | 0.00064 | 0.00031 | 0.0404 |
| | Exhaust relative humidity | 0.00309 | 0.0016 | 0.0553 |
| 6 | Intercept | 4.896295 | 0.17405 | <.0001 |
| | Ambient temperature | -0.001522 | 0.00109 | 0.168 |
| | Inventory | 0.10554 | 0.12992 | 0.4193 |
| | Ambient relative humidity | 0.000885 | 0.00089 | 0.3194 |
| 7 | Intercept | 4.79353 | 0.16774 | <.0001 |
| | Ambient temperature | -0.00173 | 0.00103 | 0.0967 |
| | Inventory | 0.05847 | 0.11824 | 0.6227 |
| | Exhaust relative humidity | 0.003508 | 0.00161 | 0.0313 |
| 8 | Intercept | 5.078659 | 0.14699 | <.0001 |
| | Exhaust temperature | -0.006301 | 0.00306 | 0.0425 |
| | Live animal weight | 0.000344 | 0.00034 | 0.3117 |
| | Ambient relative humidity | 0.000265 | 0.0008 | 0.7409 |
| 9 | Intercept | 4.923306 | 0.14416 | <.0001 |
| | Exhaust temperature | -0.006049 | 0.00274 | 0.0306 |
| | Live animal weight | 0.000307 | 0.00033 | 0.3526 |
| | Exhaust relative humidity | 0.002892 | 0.00155 | 0.0644 |
| 10 | Intercept | 5.132446 | 0.19452 | <.0001 |
| | Exhaust temperature | -0.007596 | 0.00274 | 0.0068 |
| | Inventory | 0.047445 | 0.12546 | 0.7064 |
| | Ambient relative humidity | 0.000259 | 0.00089 | 0.771 |
| 11 | Intercept | 4.969183 | 0.16959 | <.0001 |
| | Exhaust temperature | -0.00721 | 0.00245 | 0.0044 |
| | Inventory | 0.036209 | 0.11101 | 0.7454 |
| | Exhaust relative humidity | 0.003035 | 0.00156 | 0.0545 |

**Table G-22. Fit and evaluation statistics for swine gestation barn $PM_{2.5}$ models tested.**

| Model | 2LogL | AIC | AICc | BIC | Corr. | LNME[a] (%) | NME[b] (%) | ME[b] (g day$^{-1}$) | MB[b] (g day$^{-1}$) | NMB[b] (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | -192 | -184 | -184 | -185 | 0.176 | 2.2 | 39.47 | 17.03 | -0.01 | -0.03 |
| 2 | -194 | -184 | -183 | -185 | 0.204 | 2.1 | 39.23 | 16.93 | -0.01 | -0.02 |
| 3 | -191 | -179 | -179 | -180 | 0.214 | 2.1 | 39.33 | 17.04 | 0.00 | 0.00 |
| 4 | -189 | -177 | -177 | -179 | 0.236 | 2.1 | 39.53 | 16.94 | 0.01 | 0.02 |
| 5 | -191 | -181 | -181 | -182 | 0.218 | 2.1 | 39.18 | 16.72 | 0.00 | 0.00 |
| 6 | -188 | -176 | -176 | -177 | 0.167 | 2.2 | 39.91 | 17.29 | 0.00 | 0.01 |
| 7 | -187 | -175 | -174 | -176 | 0.201 | 2.2 | 40.06 | 17.17 | 0.01 | 0.03 |
| 8 | -198 | -186 | -185 | -187 | 0.264 | 2.1 | 39.15 | 16.89 | 0.00 | 0.01 |
| 9 | -196 | -184 | -183 | -185 | 0.280 | 2.1 | 39.38 | 16.81 | 0.01 | 0.03 |
| 10 | -197 | -185 | -184 | -186 | 0.255 | 2.1 | 39.28 | 16.95 | 0.00 | 0.01 |
| 11 | -195 | -183 | -183 | -184 | 0.273 | 2.1 | 39.54 | 16.88 | 0.01 | 0.03 |

[a] Based on transformed data (i.e., $\ln(PM_{2.5})$).

[b] Based on back-transformed data.

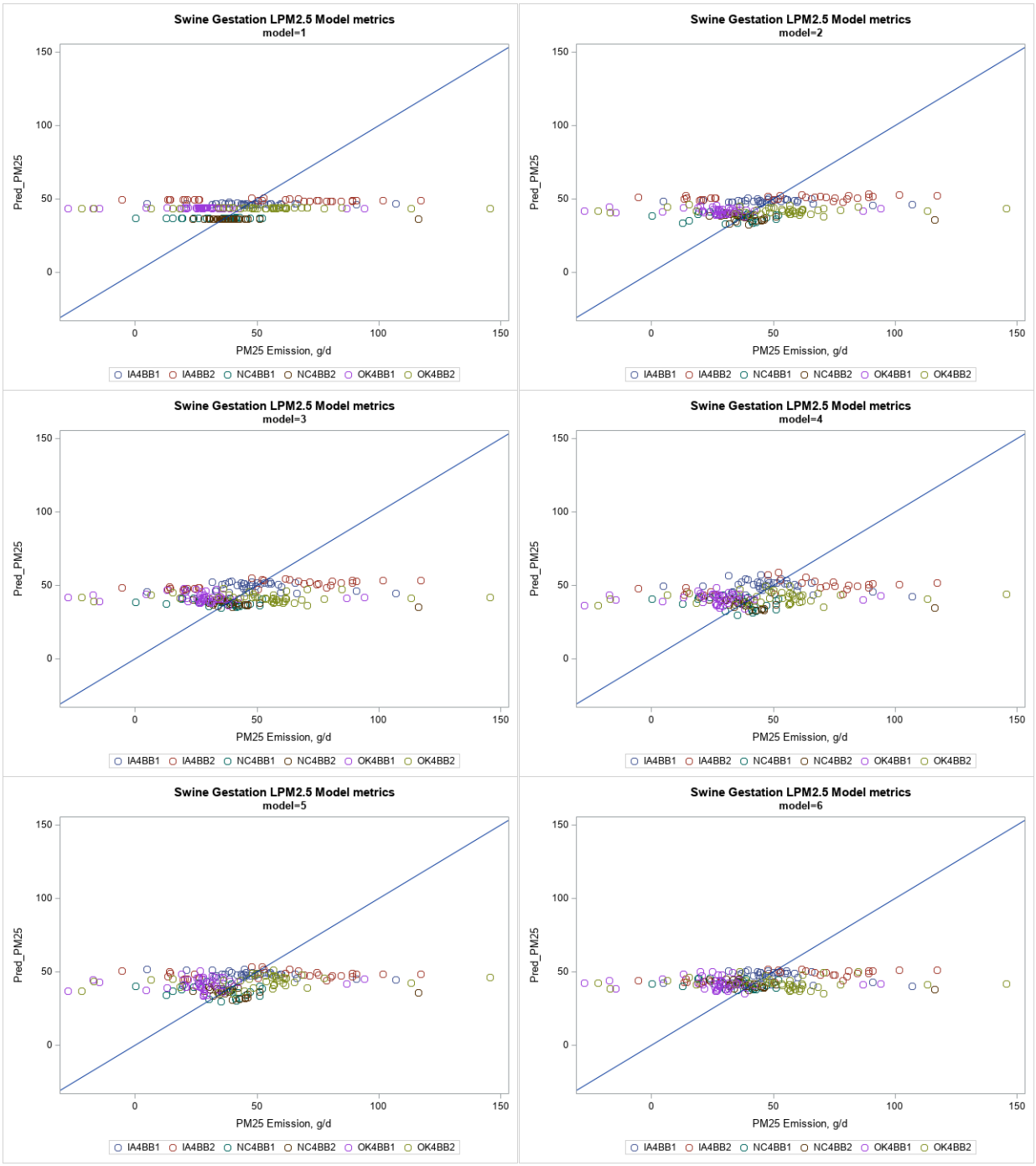


**Figure G-15. Gestation $PM_{2.5}$ one-to-one plots form models 1 through 6.**

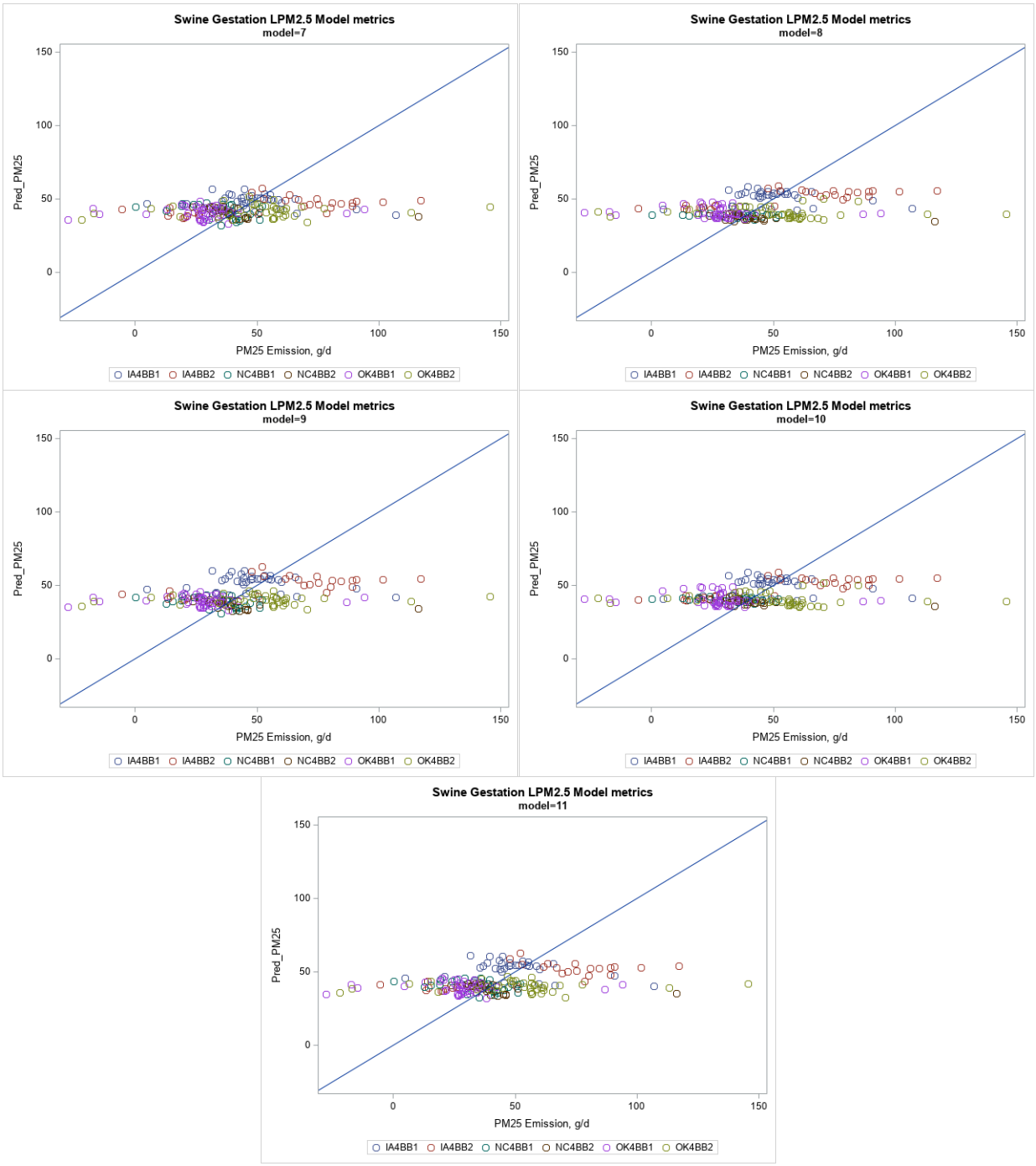


**Figure G-16. Gestation $PM_{2.5}$ one-to-one plots form models 7 through 11.**

### G.2.7 Total Suspended Particulates (TSP)

**Table G-23. Parameter and estimates TSP emission models for swine gestation barn.**

| Model | Parameter | Estimate | Standard Error | p-value |
|---|---|---|---|---|
| 1 | Intercept | 5.047799 | 0.50254 | <.0001 |
| | Live animal weight | 0.006649 | 0.00206 | 0.0048 |
| 2 | Intercept | 5.533966 | 0.56243 | <.0001 |
| | Live animal weight | 0.006601 | 0.0023 | 0.012 |
| | Ambient relative humidity | -0.008 | 0.00126 | <.0001 |
| 3 | Intercept | 5.718378 | 0.61185 | <.0001 |
| | Ambient temperature | -0.003629 | 0.00358 | 0.3121 |
| | Live animal weight | 0.006107 | 0.00242 | 0.0228 |
| | Ambient relative humidity | -0.008349 | 0.00129 | <.0001 |
| 4 | Intercept | 6.587825 | 0.50241 | <.0001 |
| | Ambient temperature | 0.001207 | 0.00295 | 0.6835 |
| | Live animal weight | 0.005874 | 0.00189 | 0.0071 |
| | Exhaust relative humidity | -0.02364 | 0.00236 | <.0001 |
| 5 | Intercept | 6.500666 | 0.42744 | <.0001 |
| | Live animal weight | 0.006073 | 0.00166 | 0.0021 |
| | Exhaust relative humidity | -0.022781 | 0.00222 | <.0001 |
| 6 | Intercept | 6.375716 | 0.8023 | <.0001 |
| | Ambient temperature | -0.005564 | 0.00341 | 0.1041 |
| | Inventory | 0.7009 | 0.74125 | 0.36 |
| | Ambient relative humidity | -0.008471 | 0.0013 | <.0001 |
| 7 | Intercept | 7.043938 | 0.69332 | <.0001 |
| | Ambient temperature | -0.000342 | 0.00247 | 0.89 |
| | Inventory | 0.813449 | 0.63836 | 0.2241 |
| | Exhaust relative humidity | -0.023564 | 0.0024 | <.0001 |
| 8 | Intercept | 6.336514 | 0.69604 | <.0001 |
| | Exhaust temperature | -0.019719 | 0.00831 | 0.0189 |
| | Live animal weight | 0.005016 | 0.0025 | 0.0607 |
| | Ambient relative humidity | -0.008459 | 0.00126 | <.0001 |
| 9 | Intercept | 6.863691 | 0.54038 | <.0001 |
| | Exhaust temperature | -0.009764 | 0.00659 | 0.141 |
| | Live animal weight | 0.005357 | 0.00186 | 0.0094 |
| | Exhaust relative humidity | -0.022867 | 0.00224 | <.0001 |
| 10 | Intercept | 7.09542 | 0.64832 | <.0001 |
| | Exhaust temperature | -0.027513 | 0.00711 | 0.0002 |
| | Inventory | 0.515996 | 0.65632 | 0.444 |
| | Ambient relative humidity | -0.008555 | 0.00127 | <.0001 |
| 11 | Intercept | 7.443337 | 0.46078 | <.0001 |
| | Exhaust temperature | -0.017032 | 0.00268 | <.0001 |
| | Inventory | 0.722282 | 0.49451 | 0.1627 |
| | Exhaust relative humidity | -0.022716 | 0.00226 | <.0001 |

**Table G-24. Fit and evaluation statistics for swine gestation barn TSP models tested.**

| Model | 2LogL | AIC | AICc | BIC | Corr. | LNME[a] (%) | NME[b] (%) | ME[b] (g day$^{-1}$) | MB[b] (g day$^{-1}$) | NMB[b] (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 57 | 85 | 86 | 82 | 0.371 | 7.1 | 39.70 | 282.00 | 6.29 | 0.89 |
| 2 | 20 | 50 | 52 | 47 | 0.414 | 7.1 | 39.89 | 281.20 | 9.74 | 1.38 |
| 3 | 19 | 51 | 53 | 48 | 0.435 | 7.0 | 38.89 | 274.20 | 6.31 | 0.90 |
| 4 | -29 | 3 | 5 | | 0.621 | 6.2 | 34.70 | 246.50 | 1.11 | 0.16 |
| 5 | -37 | -7 | -5 | -10 | 0.621 | 6.0 | 33.77 | 241.70 | 2.38 | 0.33 |
| 6 | 25 | 57 | 59 | 54 | 0.388 | 7.3 | 40.90 | 288.30 | -0.70 | -0.10 |
| 7 | -21 | 11 | 13 | 8 | 0.588 | 6.5 | 37.23 | 264.50 | -1.38 | -0.19 |
| 8 | 17 | 49 | 51 | 46 | 0.449 | 6.8 | 37.58 | 265.00 | 3.48 | 0.49 |
| 9 | -38 | -6 | -4 | -9 | 0.622 | 5.9 | 33.04 | 236.40 | 3.15 | 0.44 |
| 10 | 21 | 53 | 55 | 50 | 0.443 | 7.0 | 38.63 | 272.30 | -7.09 | -1.01 |
| 11 | -31 | 1 | 3 | -2 | 0.614 | 6.1 | 34.26 | 245.10 | -4.52 | -0.63 |

[a] Based on transformed data (i.e., ln(TSP)).

[b] Based on back-transformed data.

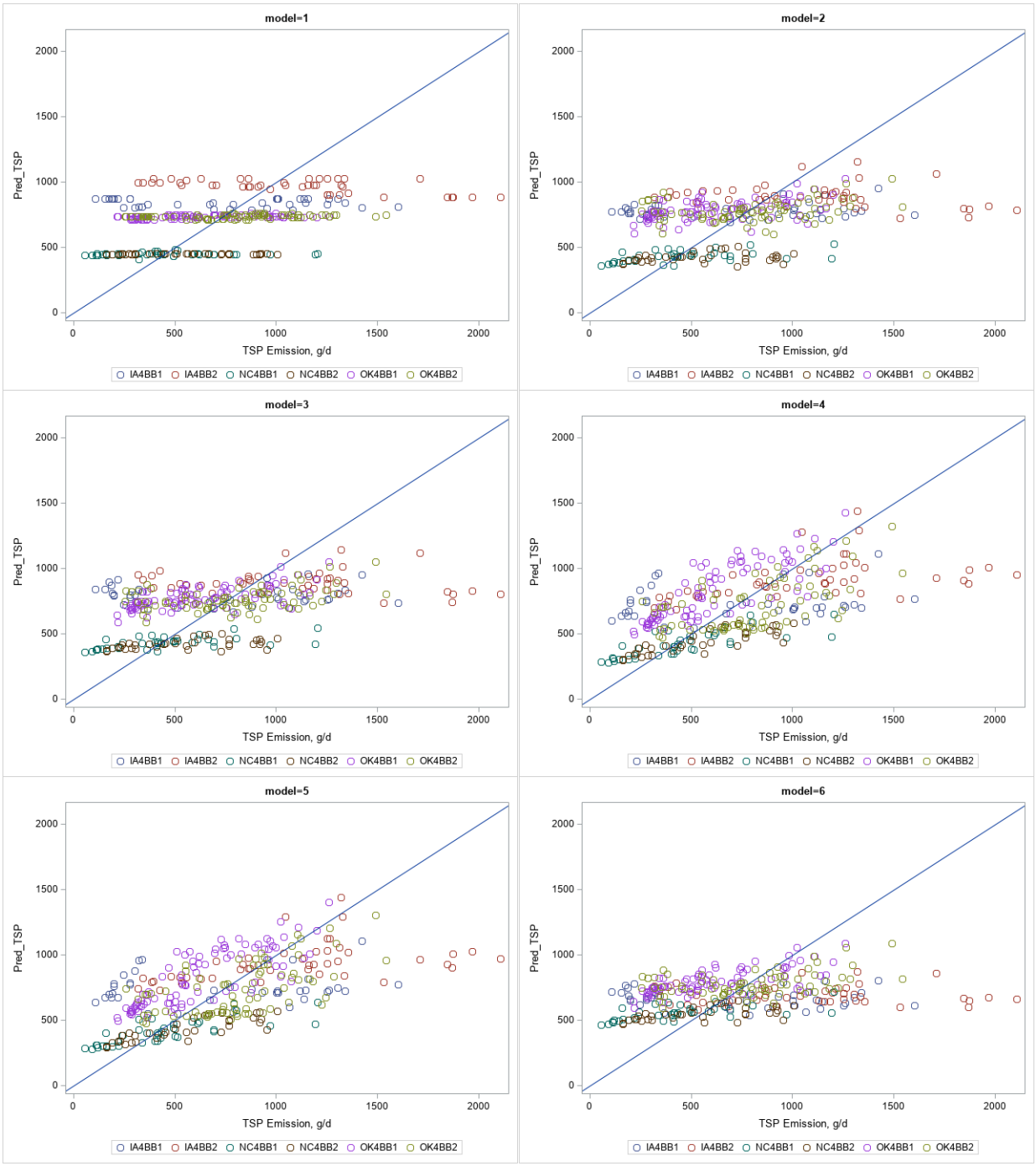


**Figure G-17. Gestation TSP one-to-one plots form models 1 through 6.**

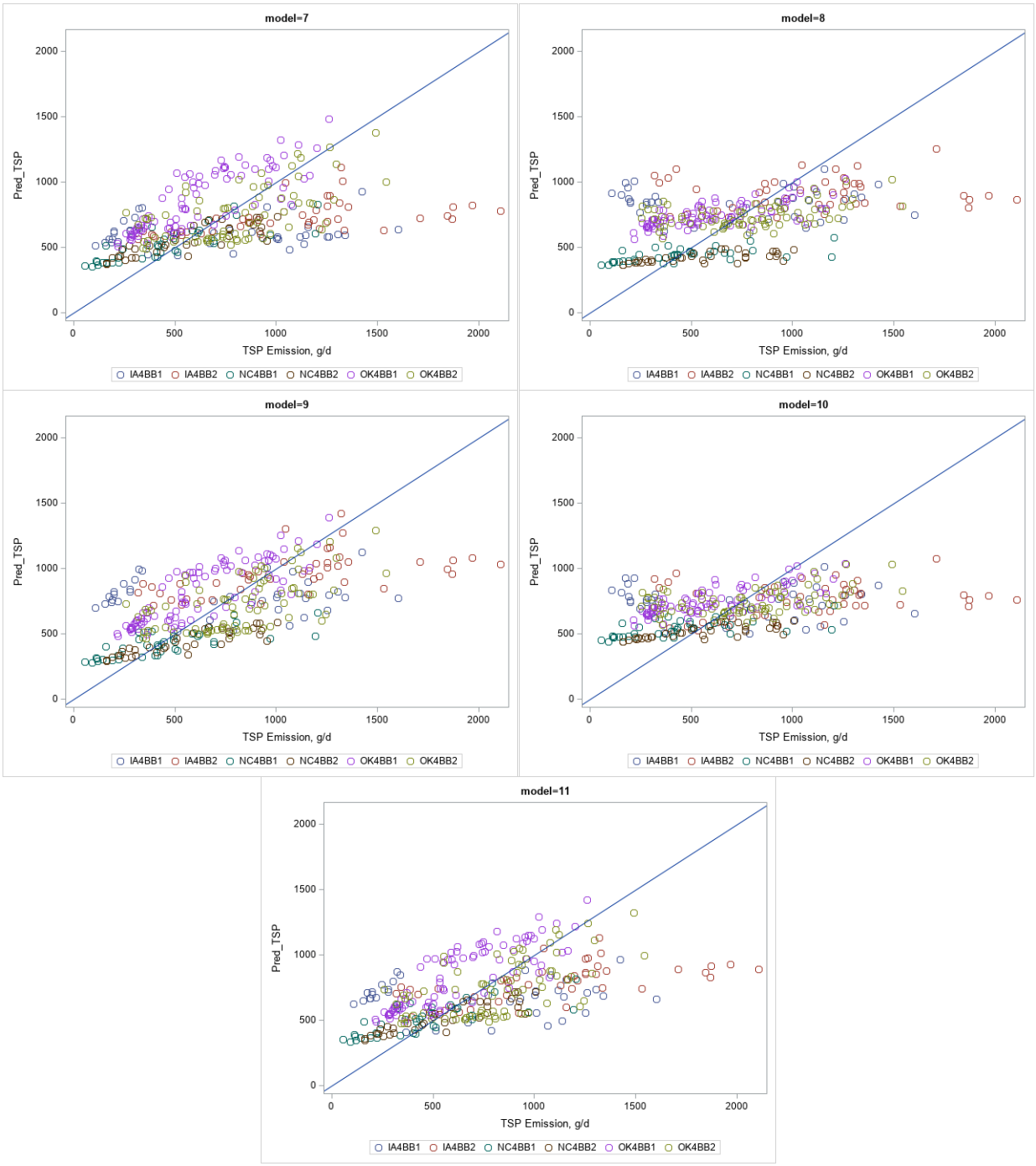


**Figure G-18. Gestation TSP one-to-one plots form models 7 through 11.**

## G.3 Grow-Finish Barns

### G.3.1 Ammonia ($NH_3$), without pit type

**Table G-25. Parameter and estimates $NH_3$ emission models for swine grow-finish barn without pit type specified.**

| Model | Parameter | Estimate | Standard Error | p-value |
|---|---|---|---|---|
| 1 | Intercept | 1.028629 | 0.06199 | <.0001 |
| | Ambient temperature | 0.004347 | 0.00132 | 0.001 |
| | Exhaust temperature | 0.013342 | 0.00314 | <.0001 |
| | Live animal weight | 0.008451 | 0.00052 | <.0001 |
| 2 | Intercept | 1.267617 | 0.07386 | <.0001 |
| | Ambient temperature | 0.004228 | 0.00137 | 0.002 |
| | Exhaust temperature | 0.015666 | 0.00328 | <.0001 |
| | Inventory | 0.177549 | 0.04043 | <.0001 |
| 3 | Intercept | 0.91324 | 0.05235 | <.0001 |
| | Exhaust temperature | 0.021452 | 0.00185 | <.0001 |
| | Live animal weight | 0.00836 | 0.00051 | <.0001 |
| 4 | Intercept | 1.236262 | 0.03804 | <.0001 |
| | Ambient temperature | 0.008953 | 0.0008 | <.0001 |
| | Live animal weight | 0.008939 | 0.00051 | <.0001 |
| 5 | Intercept | 1.171164 | 0.06556 | <.0001 |
| | Exhaust temperature | 0.023489 | 0.00195 | <.0001 |
| | Inventory | 0.154185 | 0.0388 | <.0001 |
| 6 | Intercept | 1.492383 | 0.05647 | <.0001 |
| | Ambient temperature | 0.009613 | 0.00084 | <.0001 |
| | Inventory | 0.235848 | 0.03939 | <.0001 |

**Table G-26. Fit and evaluation statistics for swine grow-finish barn without pit type specified $NH_3$ models tested.**

| Model | 2LogL | AIC | AICc | BIC | Corr. | LNME[a] (%) | NME[b] (%) | ME[b] (kg day$^{-1}$) | MB[b] (kg day$^{-1}$) | NMB[b] (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | -2883 | -2847 | -2847 | -2848 | 0.681 | 13.2 | 27.13 | 1.65 | 0.01 | 0.21 |
| 2 | -2755 | -2719 | -2719 | -2720 | 0.238 | 17.9 | 36.31 | 2.21 | 0.03 | 0.47 |
| 3 | -2968 | -2934 | -2934 | -2935 | 0.693 | 13.3 | 27.01 | 1.63 | -0.01 | -0.13 |
| 4 | -2866 | -2832 | -2832 | -2833 | 0.674 | 13.3 | 27.44 | 1.67 | 0.03 | 0.44 |
| 5 | -2831 | -2797 | -2797 | -2798 | 0.304 | 18.0 | 36.34 | 2.20 | 0 | 0.01 |
| 6 | -2734 | -2700 | -2700 | -2701 | 0.188 | 18.1 | 36.73 | 2.24 | 0.05 | 0.73 |

[a] Based on transformed data (i.e., $\ln(NH_3)$).

[b] Based on back-transformed data.

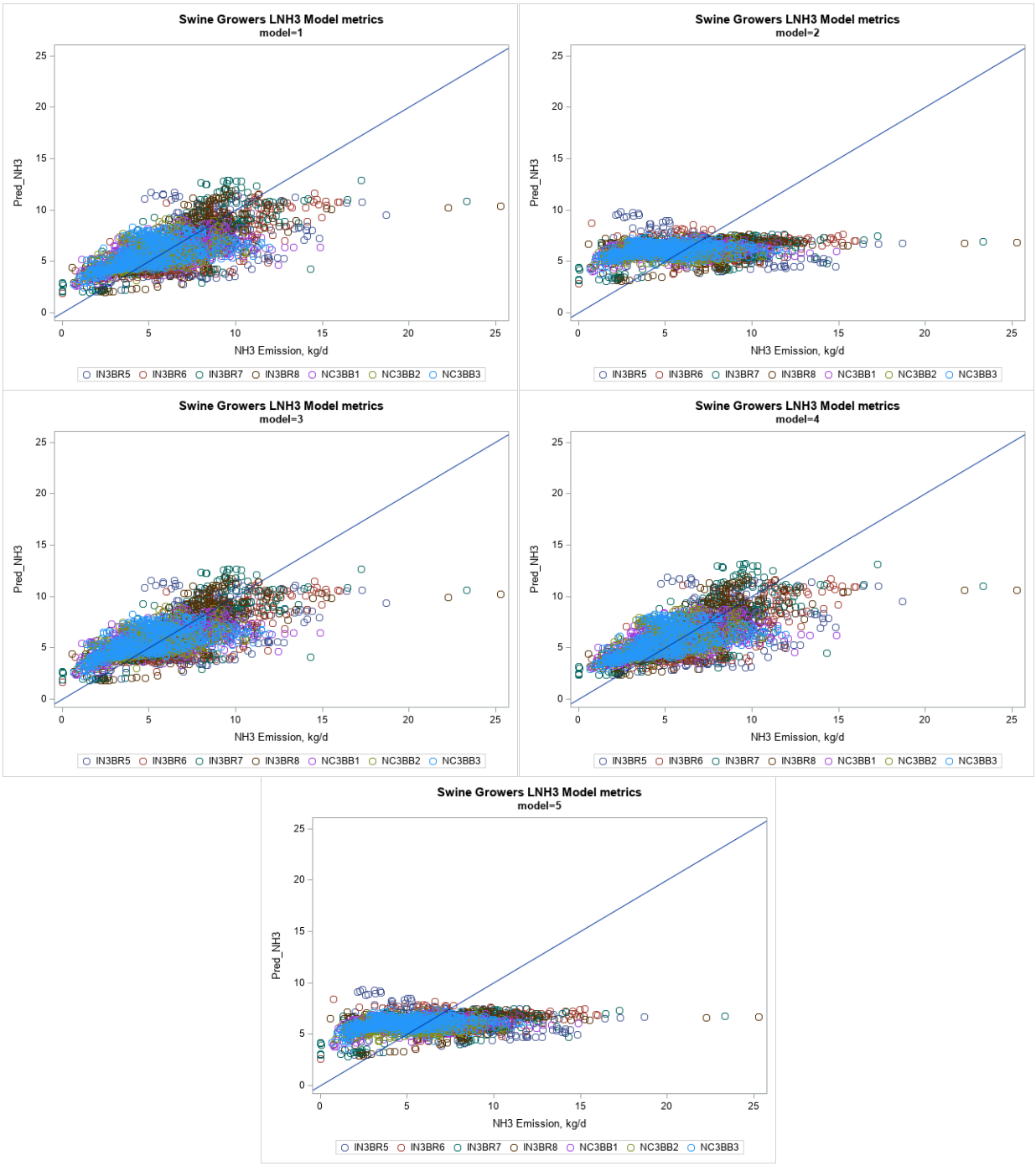


**Figure G-19. Grow-finish $NH_3$ no pit model one-to-one plots.**

### G.3.2 Ammonia ($NH_3$), with pit type

**Table G-27. Parameter and estimates $NH_3$ emission models for swine grow-finish barn with pit type specified.**

| Model | Parameter | Estimate | Standard Error | p-value |
|---|---|---|---|---|
| 1 | Deep | 1.124059 | 0.064 | <.0001 |
| | Shallow | 0.920418 | 0.06548 | <.0001 |
| | Ambient temperature | 0.004275 | 0.00132 | 0.0012 |
| | Exhaust temperature | 0.013952 | 0.00313 | <.0001 |
| | Live animal weight | 0.00808 | 0.00052 | <.0001 |
| 2 | Deep | 1.415308 | 0.08386 | <.0001 |
| | Shallow | 1.151833 | 0.07895 | <.0001 |
| | Ambient temperature | 0.00398 | 0.00137 | 0.0037 |
| | Exhaust temperature | 0.016534 | 0.00329 | <.0001 |
| | Inventory | 0.144983 | 0.04258 | 0.0007 |
| 3 | Deep | 1.007922 | 0.05438 | <.0001 |
| | Shallow | 0.809468 | 0.05609 | <.0001 |
| | Exhaust temperature | 0.02195 | 0.00185 | <.0001 |
| | Live animal weight | 0.00799 | 0.0005 | <.0001 |
| 4 | Deep | 1.342386 | 0.04249 | <.0001 |
| | Shallow | 1.142239 | 0.04362 | <.0001 |
| | Ambient temperature | 0.009077 | 0.00081 | <.0001 |
| | Live animal weight | 0.008545 | 0.00051 | <.0001 |
| 5 | Deep | 1.327761 | 0.07679 | <.0001 |
| | Shallow | 1.06203 | 0.07049 | <.0001 |
| | Exhaust temperature | 0.02388 | 0.00195 | <.0001 |
| | Inventory | 0.122264 | 0.04096 | 0.0029 |
| 6 | Deep | 1.644386 | 0.07165 | <.0001 |
| | Shallow | 1.398875 | 0.06257 | <.0001 |
| | Ambient temperature | 0.009662 | 0.00084 | <.0001 |
| | Inventory | 0.208959 | 0.04138 | <.0001 |

**Table G-28. Fit and evaluation statistics for swine grow-finish barn with pit type specified $NH_3$ models tested.**

| Model | 2LogL | AIC | AICc | BIC | Corr. | LNME[a] (%) | NME[b] (%) | ME[b] (kg day$^{-1}$) | MB[b] (kg day$^{-1}$) | NMB[b] (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | -2903 | -2865 | -2865 | -2866 | 0.719 | 12.2 | 25.50 | 1.56 | 0.04 | 0.61 |
| 2 | -2767 | -2729 | -2729 | -2730 | 0.402 | 16.6 | 33.26 | 2.03 | 0.02 | 0.32 |
| 3 | -2988 | -2952 | -2952 | -2953 | 0.731 | 12.3 | 25.37 | 1.53 | 0.02 | 0.29 |
| 4 | -2885 | -2849 | -2848 | -2850 | 0.712 | 12.4 | 25.80 | 1.57 | 0.05 | 0.80 |
| 5 | -2844 | -2808 | -2808 | -2809 | 0.450 | 16.6 | 33.11 | 2.00 | -0.01 | -0.13 |
| 6 | -2744 | -2708 | -2708 | -2709 | 0.353 | 17.0 | 34.13 | 2.08 | 0.04 | 0.67 |

[a] Based on transformed data (i.e., $\ln(NH_3)$).
[b] Based on back-transformed data.

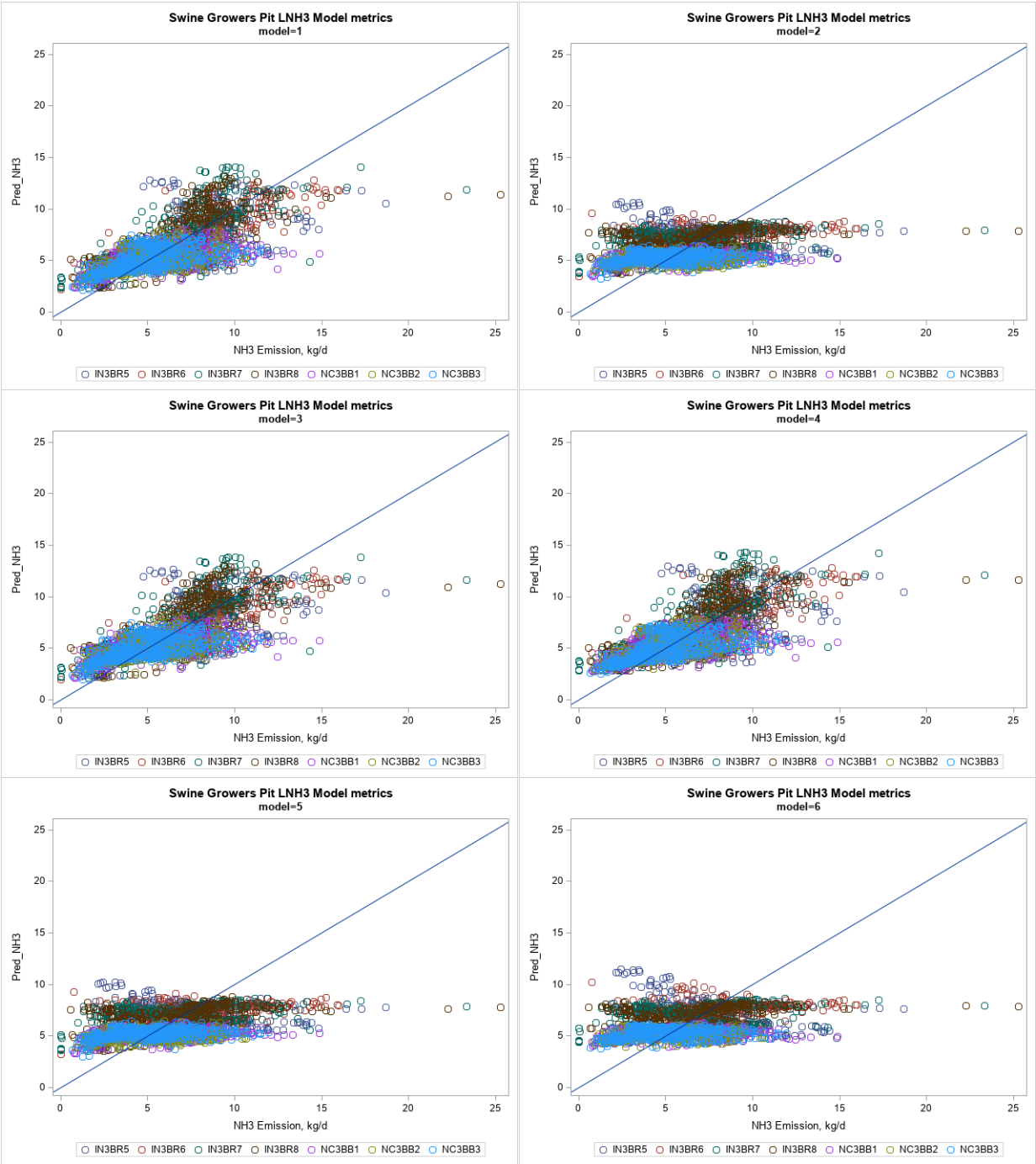


**Figure G-20. Grow-finish $NH_3$ pit model one-to-one plots.**

### G.3.3 Hydrogen Sulfide ($H_2S$), without pit type

**Table G-29. Parameter and estimates $H_2S$ emission models for swine grow-finish barn without pit type specified.**

| Model | Parameter | Estimate | Standard Error | p-value |
|---|---|---|---|---|
| 1 | Intercept | 3.828226 | 0.15457 | <.0001 |
| | Ambient temperature | -0.010738 | 0.00256 | <.0001 |
| | Exhaust temperature | 0.014873 | 0.00716 | 0.038 |
| | Live animal weight | 0.016662 | 0.00153 | <.0001 |
| 2 | Intercept | 4.352401 | 0.15505 | <.0001 |
| | Ambient temperature | -0.010445 | 0.00264 | <.0001 |
| | Exhaust temperature | 0.012584 | 0.0075 | 0.0936 |
| | Inventory | 0.479303 | 0.07728 | <.0001 |
| 3 | Intercept | 4.114478 | 0.13359 | <.0001 |
| | Exhaust temperature | -0.00728 | 0.00442 | 0.0997 |
| | Live animal weight | 0.017307 | 0.00153 | <.0001 |
| 4 | Intercept | 4.081979 | 0.095 | <.0001 |
| | Ambient temperature | -0.006592 | 0.00161 | <.0001 |
| | Live animal weight | 0.017163 | 0.00151 | <.0001 |
| 5 | Intercept | 4.637743 | 0.13164 | <.0001 |
| | Exhaust temperature | -0.009723 | 0.00454 | 0.0324 |
| | Inventory | 0.538907 | 0.07433 | <.0001 |
| 6 | Intercept | 4.559343 | 0.09387 | <.0001 |
| | Ambient temperature | -0.00696 | 0.00163 | <.0001 |
| | Inventory | 0.519982 | 0.07361 | <.0001 |

**Table G-30. Fit and evaluation statistics for swine grow-finish barn without pit type specified $H_2S$ models tested.**

| Model | 2LogL | AIC | AICc | BIC | Corr. | LNME[a] (%) | NME[b] (%) | ME[b] (g day$^{-1}$) | MB[b] (g day$^{-1}$) | NMB[b] (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3110 | 3146 | 3146 | 3145 | 0.377 | 17.4 | 83.94 | 294.40 | 15.79 | 4.50 |
| 2 | 3174 | 3210 | 3210 | 3209 | 0.225 | 18.1 | 89.75 | 314.80 | 1.88 | 0.54 |
| 3 | 3207 | 3241 | 3241 | 3240 | 0.369 | 17.7 | 84.29 | 294.20 | 15.14 | 4.34 |
| 4 | 3114 | 3148 | 3148 | 3147 | 0.371 | 17.5 | 84.30 | 295.70 | 17.28 | 4.93 |
| 5 | 3270 | 3304 | 3304 | 3303 | 0.188 | 18.3 | 90.85 | 317.00 | 4.91 | 1.41 |
| 6 | 3177 | 3211 | 3211 | 3210 | 0.205 | 18.1 | 90.38 | 317.00 | 4.15 | 1.18 |

[a] Based on transformed data (i.e., $\ln(H_2S)$).
[b] Based on back-transformed data.

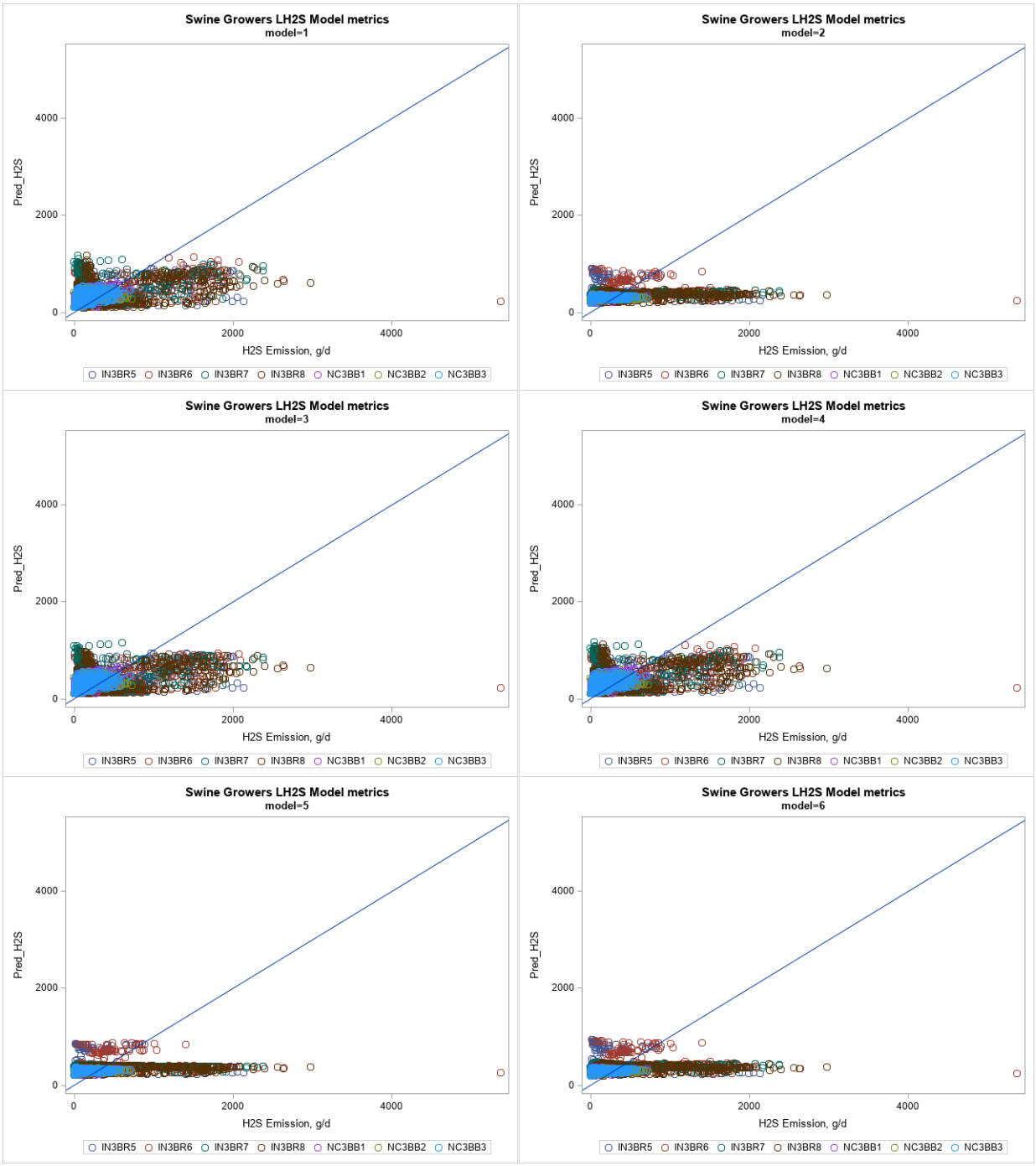


**Figure G-21. Grow-finish $H_2S$ no pit model one-to-one plots.**

### G.3.4 Hydrogen Sulfide ($H_2S$), with pit type

**Table G-31. Parameter and estimates $H_2S$ emission models for swine grow-finish barn with pit type specified.**

| Model | Parameter | Estimate | Standard Error | p-value |
|---|---|---|---|---|
| 1 | Deep | 4.881262 | 0.20312 | <.0001 |
| | Shallow | 4.076802 | 0.20572 | <.0001 |
| | Ambient temperature | -0.007641 | 0.0033 | 0.0205 |
| | Exhaust temperature | 0.006977 | 0.00859 | 0.4169 |
| | Live animal weight | 0.013027 | 0.00176 | <.0001 |
| 2 | Deep | 5.194357 | 0.20687 | <.0001 |
| | Shallow | 4.361626 | 0.213 | <.0001 |
| | Ambient temperature | -0.007357 | 0.00335 | 0.0284 |
| | Exhaust temperature | 0.005595 | 0.00883 | 0.5262 |
| | Inventory | 0.507381 | 0.10628 | <.0001 |
| 3 | Deep | 5.055498 | 0.18008 | <.0001 |
| | Shallow | 4.226298 | 0.18395 | <.0001 |
| | Exhaust temperature | -0.007016 | 0.00514 | 0.1728 |
| | Live animal weight | 0.013636 | 0.00174 | <.0001 |
| 4 | Deep | 4.991579 | 0.15159 | <.0001 |
| | Shallow | 4.190492 | 0.15138 | <.0001 |
| | Ambient temperature | -0.005539 | 0.00202 | 0.0062 |
| | Live animal weight | 0.013317 | 0.00173 | <.0001 |
| 5 | Deep | 5.369327 | 0.18585 | <.0001 |
| | Shallow | 4.513433 | 0.19158 | <.0001 |
| | Exhaust temperature | -0.007894 | 0.00521 | 0.1299 |
| | Inventory | 0.536013 | 0.10299 | <.0001 |
| 6 | Deep | 5.277375 | 0.16029 | <.0001 |
| | Shallow | 4.450293 | 0.16093 | <.0001 |
| | Ambient temperature | -0.005676 | 0.00203 | 0.0052 |
| | Inventory | 0.527087 | 0.102 | <.0001 |

**Table G-32. Fit and evaluation statistics for swine grow-finish barn with pit type specified $H_2S$ models tested.**

| Model | 2LogL | AIC | AICc | BIC | Corr. | LNME[a] (%) | NME[b] (%) | ME[b] (g day$^{-1}$) | MB[b] (g day$^{-1}$) | NMB[b] (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3656 | 3670 | 3670 | 3669 | 0.466 | 16.2 | 76.24 | 267.40 | 2.40 | 0.68 |
| 2 | 3686 | 3700 | 3700 | 3699 | 0.357 | 17.3 | 85.62 | 300.30 | 10.25 | 2.92 |
| 3 | 3766 | 3778 | 3778 | 3778 | 0.474 | 16.2 | 75.65 | 264.00 | 1.61 | 0.46 |
| 4 | 3656 | 3668 | 3669 | 3668 | 0.463 | 16.3 | 76.41 | 268.00 | 3.24 | 0.92 |
| 5 | 3798 | 3810 | 3810 | 3810 | 0.361 | 17.4 | 85.54 | 298.50 | 10.01 | 2.87 |
| 6 | 3686 | 3698 | 3698 | 3698 | 0.352 | 17.4 | 86.14 | 302.10 | 11.61 | 3.31 |

[a] Based on transformed data (i.e., $\ln(H_2S)$).
[b] Based on back-transformed data.

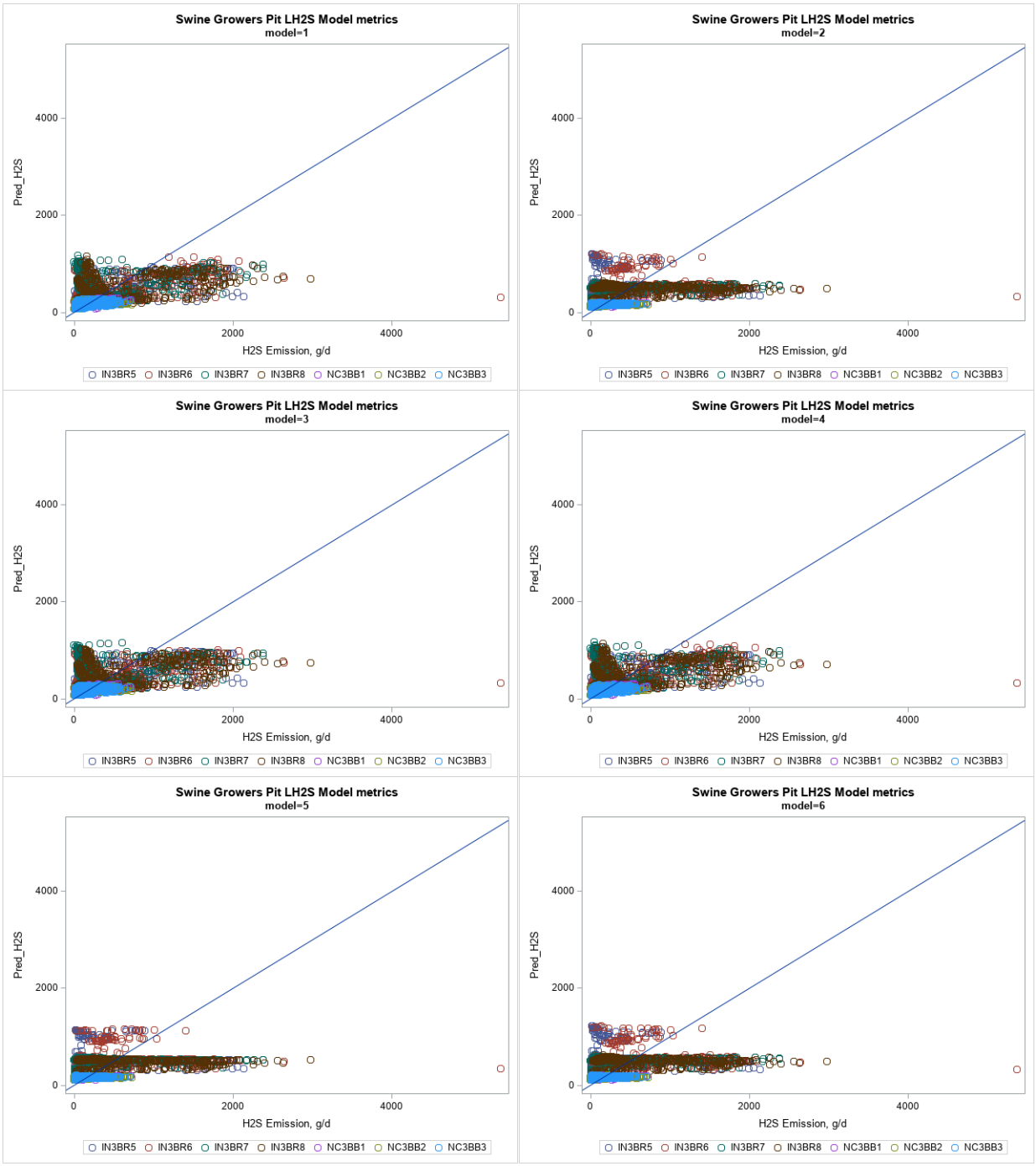


**Figure G-22. Grow-finish $H_2S$ pit model one-to-one plots.**

### G.3.5 $PM_{10}$

**Table G-33. Parameter and estimates $PM_{10}$ emission models for swine grow-finish barn.**

| Model | Parameter | Estimate | Standard Error | p-value |
|---|---|---|---|---|
| 1 | Intercept | 4.827106 | 0.03924 | <.0001 |
| | Live animal weight | 0.011002 | 0.00067 | <.0001 |
| 2 | Intercept | 5.503943 | 0.04999 | <.0001 |
| | Live animal weight | 0.010447 | 0.00066 | <.0001 |
| | Ambient relative humidity | -0.009403 | 0.00044 | <.0001 |
| 3 | Intercept | 5.564278 | 0.05544 | <.0001 |
| | Ambient temperature | -0.001788 | 0.00119 | 0.1334 |
| | Live animal weight | 0.010349 | 0.00067 | <.0001 |
| | Ambient relative humidity | -0.009768 | 0.00046 | <.0001 |
| 4 | Intercept | 6.22421 | 0.06152 | <.0001 |
| | Ambient temperature | -0.000996 | 0.00109 | 0.3618 |
| | Live animal weight | 0.009964 | 0.00063 | <.0001 |
| | Exhaust relative humidity | -0.022081 | 0.00073 | <.0001 |
| 5 | Intercept | 6.196228 | 0.05891 | <.0001 |
| | Live animal weight | 0.010083 | 0.00062 | <.0001 |
| | Exhaust relative humidity | -0.021951 | 0.00073 | <.0001 |
| 6 | Intercept | 5.600317 | 0.0722 | <.0001 |
| | Ambient temperature | -0.003256 | 0.00123 | 0.0084 |
| | Inventory | 0.613269 | 0.06046 | <.0001 |
| | Ambient relative humidity | -0.009898 | 0.00046 | <.0001 |
| 7 | Intercept | 6.354881 | 0.07914 | <.0001 |
| | Ambient temperature | -0.002687 | 0.00114 | 0.0187 |
| | Inventory | 0.50206 | 0.0585 | <.0001 |
| | Exhaust relative humidity | -0.022166 | 0.00073 | <.0001 |
| 8 | Intercept | 5.677437 | 0.07953 | <.0001 |
| | Exhaust temperature | -0.007965 | 0.00279 | 0.0044 |
| | Live animal weight | 0.010555 | 0.00068 | <.0001 |
| | Ambient relative humidity | -0.009319 | 0.00044 | <.0001 |
| 9 | Intercept | 6.406988 | 0.08168 | <.0001 |
| | Exhaust temperature | -0.009524 | 0.00254 | 0.0002 |
| | Live animal weight | 0.010212 | 0.00065 | <.0001 |
| | Exhaust relative humidity | -0.02188 | 0.00073 | <.0001 |
| 10 | Intercept | 5.736529 | 0.09043 | <.0001 |
| | Exhaust temperature | -0.011636 | 0.00289 | <.0001 |
| | Inventory | 0.673236 | 0.05806 | <.0001 |
| | Ambient relative humidity | -0.009382 | 0.00043 | <.0001 |
| 11 | Intercept | 6.544987 | 0.09438 | <.0001 |
| | Exhaust temperature | -0.013957 | 0.00264 | <.0001 |
| | Inventory | 0.607481 | 0.05467 | <.0001 |
| | Exhaust relative humidity | -0.022011 | 0.00073 | <.0001 |

**Table G-34. Fit and evaluation statistics for swine grow-finish barn $PM_{10}$ models tested.**

| Model | 2LogL | AIC | AICc | BIC | Corr. | LNME[a] (%) | NME[b] (%) | ME[b] (g day$^{-1}$) | MB[b] (g day$^{-1}$) | NMB[b] (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | -380 | -348 | -348 | -349 | 0.587 | 5.3 | 39.51 | 73.33 | 3.94 | 2.12 |
| 2 | -765 | -731 | -731 | -732 | 0.618 | 5.1 | 37.86 | 70.51 | 4.30 | 2.31 |
| 3 | -683 | -647 | -647 | -648 | 0.613 | 5.2 | 38.39 | 71.83 | 4.56 | 2.44 |
| 4 | -1024 | -988 | -987 | -989 | 0.640 | 5.0 | 36.13 | 67.73 | 3.41 | 1.82 |
| 5 | -1098 | -1064 | -1063 | -1064 | 0.641 | 4.9 | 35.72 | 66.39 | 3.42 | 1.84 |
| 6 | -577 | -541 | -540 | -542 | 0.279 | 7.0 | 51.70 | 96.73 | 8.97 | 4.79 |
| 7 | -894 | -858 | -858 | -859 | 0.298 | 7.0 | 51.70 | 96.93 | 9.96 | 5.32 |
| 8 | -773 | -737 | -737 | -738 | 0.611 | 5.2 | 38.32 | 71.36 | 4.57 | 2.45 |
| 9 | -1111 | -1075 | -1075 | -1076 | 0.629 | 5.0 | 36.44 | 67.74 | 3.96 | 2.13 |
| 10 | -671 | -635 | -635 | -636 | 0.266 | 7.0 | 52.06 | 96.95 | 10.30 | 5.53 |
| 11 | -995 | -959 | -959 | -960 | 0.277 | 7.1 | 53.48 | 99.40 | 13.52 | 7.27 |

[a] Based on transformed data (i.e., $\ln(PM_{10})$).

[b] Based on back-transformed data.

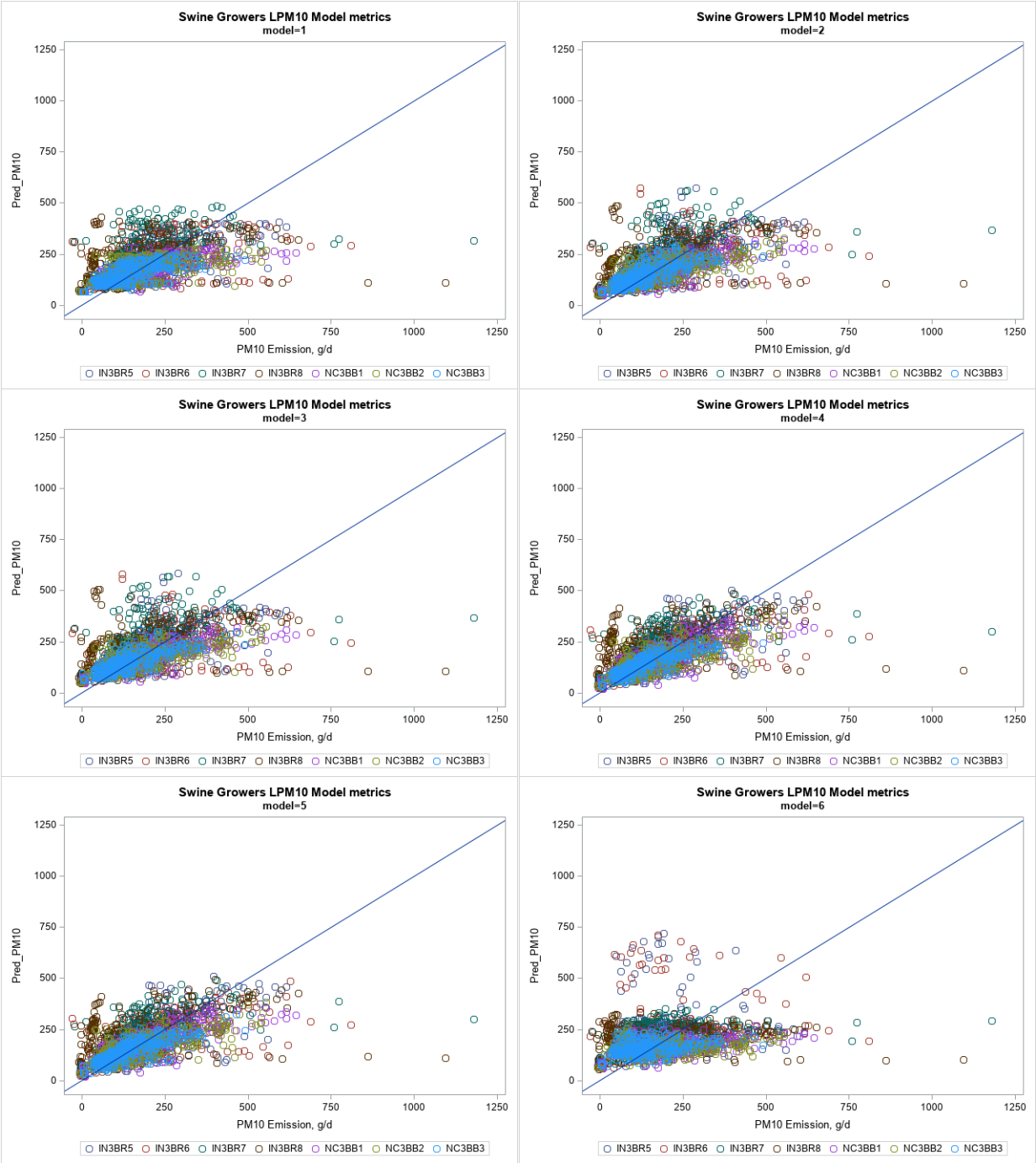


**Figure G-23. Grow-finish $PM_{10}$ one-to-one plots for models 1 through 6.**

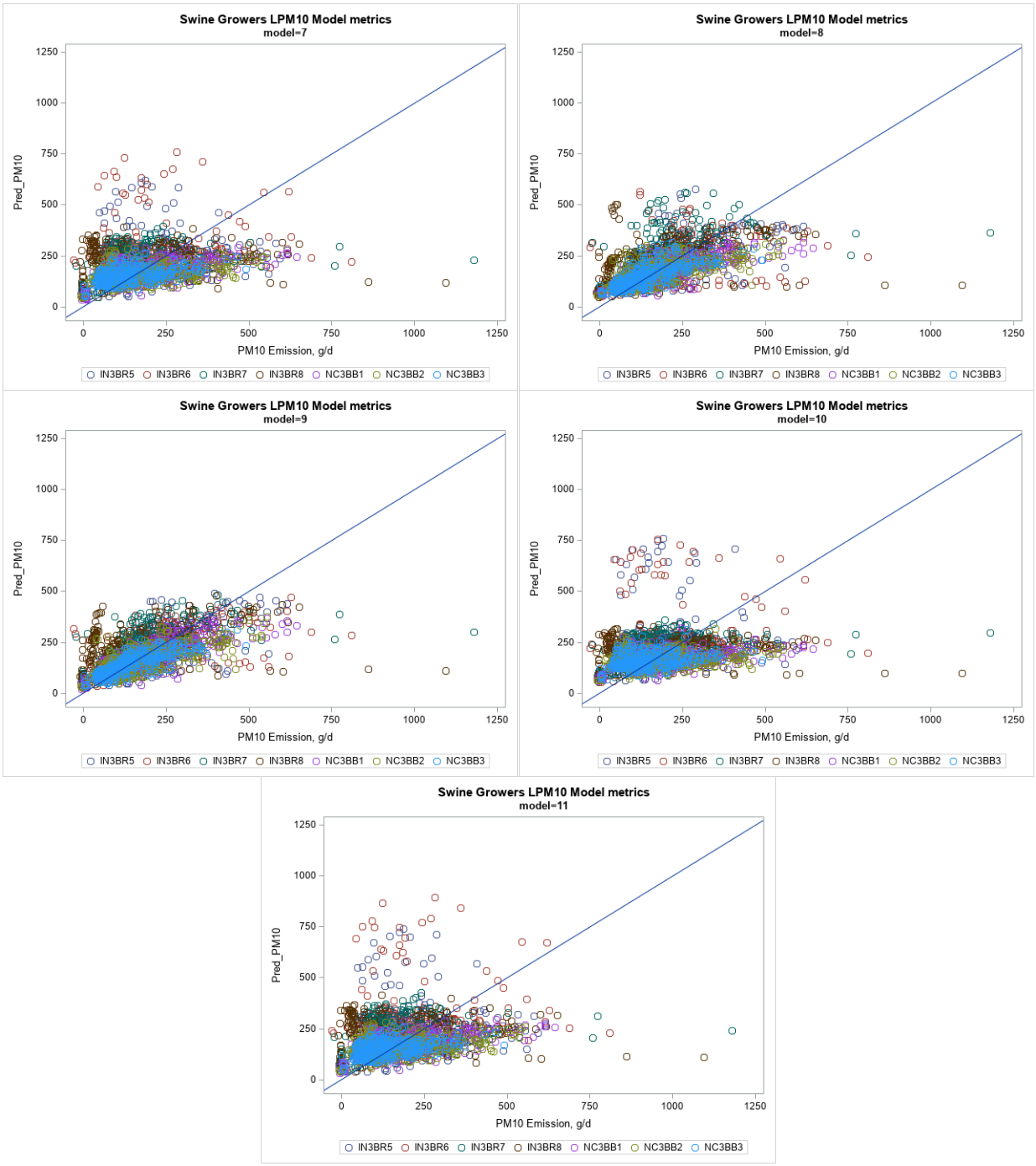


**Figure G-24. Grow-finish $PM_{10}$ one-to-one plots for models 7 through 11.**

### G.3.6 $PM_{2.5}$

**Table G-35. Parameter and estimates $PM_{2.5}$ emission models for swine grow-finish barn.**

| Model | Parameter | Estimate | Standard Error | p-value |
|---|---|---|---|---|
| 1 | Intercept | 2.302348 | 0.11809 | <.0001 |
| | Live animal weight | 0.011715 | 0.00236 | 0.0001 |
| 2 | Intercept | 2.495313 | 0.18659 | <.0001 |
| | Live animal weight | 0.010663 | 0.00319 | 0.0032 |
| | Ambient relative humidity | -0.002096 | 0.00081 | 0.0108 |
| 3 | Intercept | 2.53771 | 0.19484 | <.0001 |
| | Ambient temperature | 0.009621 | 0.00485 | 0.0514 |
| | Live animal weight | 0.008145 | 0.00432 | 0.0697 |
| | Ambient relative humidity | -0.003306 | 0.00102 | 0.0017 |
| 4 | Intercept | 2.288922 | 0.12719 | <.0001 |
| | Live animal weight | 0.00903 | 0.00405 | 0.0338 |
| | Ambient temperature | 0.007974 | 0.00484 | 0.1041 |
| 5 | Intercept | 2.663306 | 0.2194 | <.0001 |
| | Ambient temperature | 0.010045 | 0.00452 | 0.0296 |
| | Live animal weight | 0.009193 | 0.00382 | 0.0225 |
| | Exhaust relative humidity | -0.006906 | 0.002 | 0.0008 |
| 6 | Intercept | 2.622421 | 0.18732 | <.0001 |
| | Live animal weight | 0.011931 | 0.00267 | 0.0004 |
| | Exhaust relative humidity | -0.005534 | 0.00156 | 0.0006 |
| 7 | Intercept | 3.005931 | 0.51392 | <.0001 |
| | Ambient temperature | 0.012476 | 0.00222 | <.0001 |
| | Inventory | 0.002496 | 0.7139 | 0.9972 |
| | Ambient relative humidity | -0.004533 | 0.00083 | <.0001 |
| 8 | Intercept | 3.342486 | 0.6318 | <.0001 |
| | Ambient temperature | 0.011141 | 0.00257 | <.0001 |
| | Inventory | -0.000151 | 0.91844 | 0.9999 |
| | Exhaust relative humidity | -0.009457 | 0.00078 | <.0001 |
| 9 | Intercept | 3.425887 | 0.56136 | <.0001 |
| | Inventory | -0.068691 | 0.83535 | 0.9355 |
| | Exhaust relative humidity | -0.006851 | 0.00119 | <.0001 |
| 10 | Intercept | 2.166443 | 0.26835 | <.0001 |
| | Exhaust temperature | 0.026396 | 0.02002 | 0.1941 |
| | Live animal weight | 0.0091 | 0.00556 | 0.1142 |
| | Exhaust relative humidity | -0.006921 | 0.00229 | 0.0031 |
| 11 | Intercept | 2.340817 | 0.45361 | <.0001 |
| | Exhaust temperature | 0.034826 | 0.00664 | <.0001 |
| | Inventory | -0.09203 | 0.62158 | 0.8838 |
| | Ambient relative humidity | -0.003798 | 0.00077 | <.0001 |
| 12 | Intercept | 2.683586 | 0.58096 | <.0001 |

| Model | Parameter | Estimate | Standard Error | p-value |
|---|---|---|---|---|
| | Exhaust temperature | 0.033497 | 0.01025 | 0.0017 |
| | Inventory | -0.094859 | 0.78141 | 0.9045 |
| | Exhaust relative humidity | -0.008958 | 0.0011 | <.0001 |
| 13 | Intercept | 3.425856 | 0.50153 | <.0001 |
| | Inventory | -0.068685 | 0.66384 | 0.919 |
| | Exhaust relative humidity | -0.006851 | 0.00205 | 0.0011 |

**Table G-36. Fit and evaluation statistics for swine grow-finish barn $PM_{2.5}$ models tested.**

| Model | 2LogL | AIC | AICc | BIC | Corr. | LNME[a] (%) | NME[b] (%) | ME[b] (g day$^{-1}$) | MB[b] (g day$^{-1}$) | NMB[b] (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | -134 | -102 | -100 | -103 | 0.528 | 9.6 | 52.19 | 6.17 | 0.56 | 4.70 |
| 2 | -188 | -154 | -152 | -155 | 0.601 | 9.1 | 49.67 | 5.87 | 0.28 | 2.36 |
| 3 | -173 | -137 | -134 | -138 | 0.596 | 9.9 | 48.76 | 5.66 | -0.36 | -3.06 |
| 4 | -157 | -123 | -121 | -124 | 0.600 | 9.6 | 48.49 | 5.63 | -0.29 | -2.48 |
| 5 | -175 | -139 | -136 | -140 | 0.559 | 10.1 | 49.10 | 5.73 | -0.21 | -1.81 |
| 6 | -141 | -107 | -104 | -108 | 0.493 | 10.1 | 54.03 | 6.30 | 0.71 | 6.08 |
| 7 | -142 | -106 | -103 | -107 | 0.063 | 13.0 | 64.66 | 7.51 | 0.29 | 2.53 |
| 8 | -141 | -105 | -102 | -106 | -0.077 | 13.1 | 66.72 | 7.78 | 0.46 | 3.92 |
| 9 | -115 | -81 | -79 | -82 | -0.209 | 13.1 | 67.27 | 7.85 | 0.11 | 0.98 |
| 10 | -163 | -127 | -124 | -128 | 0.499 | 11.0 | 52.96 | 6.18 | -0.02 | -0.16 |
| 11 | -132 | -96 | -93 | -97 | 0.046 | 13.8 | 65.83 | 7.64 | 0.31 | 2.70 |
| 12 | -132 | -96 | -93 | -97 | -0.086 | 14.0 | 67.53 | 7.88 | 0.46 | 3.92 |
| 13 | -115 | -81 | -79 | -82 | -0.209 | 13.1 | 67.27 | 7.85 | 0.11 | 0.98 |

[a] Based on transformed data (i.e., $\ln(PM_{2.5})$).
[b] Based on back-transformed data.

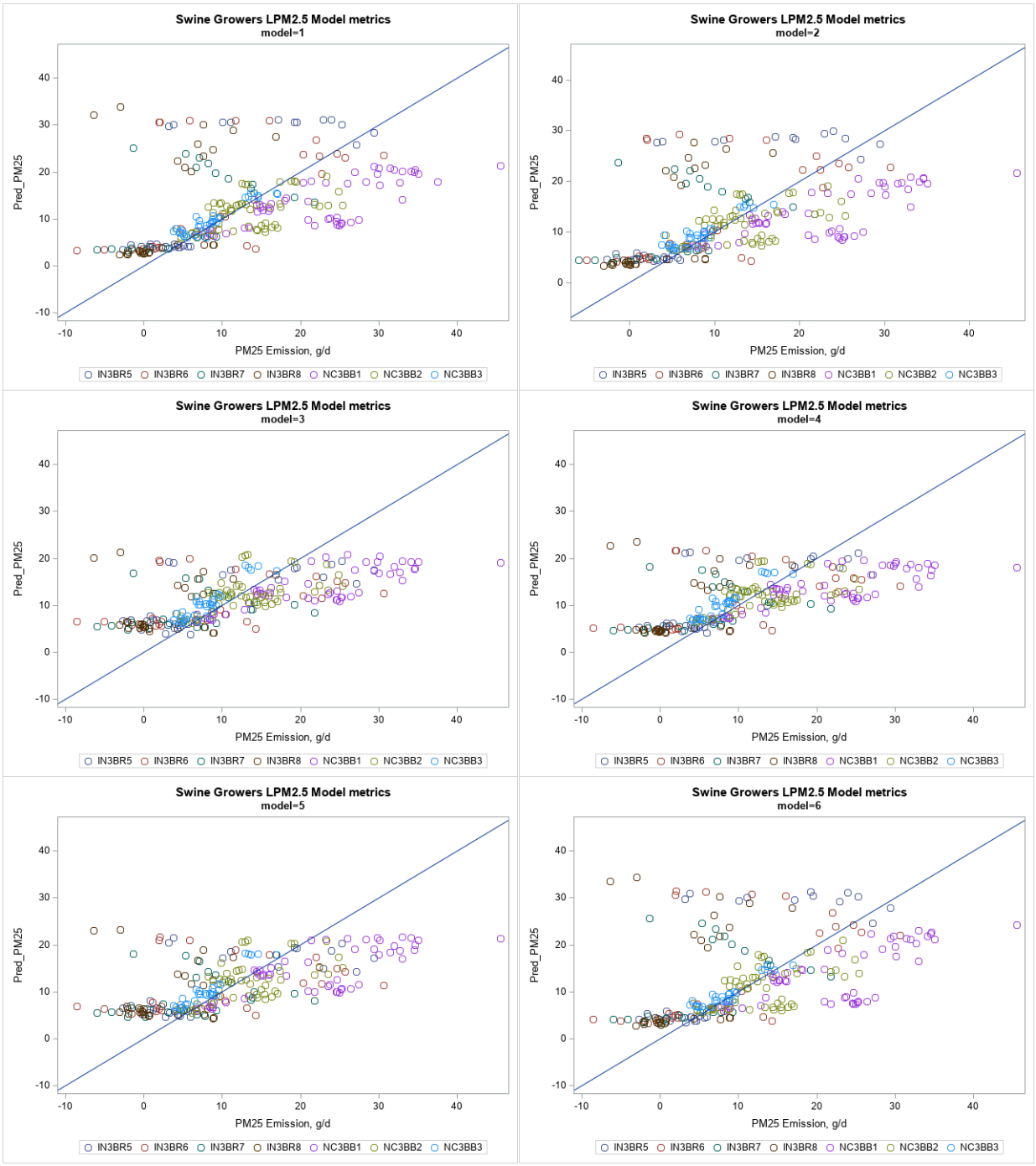


**Figure G-25. Grow-finish $PM_{2.5}$ one-to-one plots for models 1 through 6.**

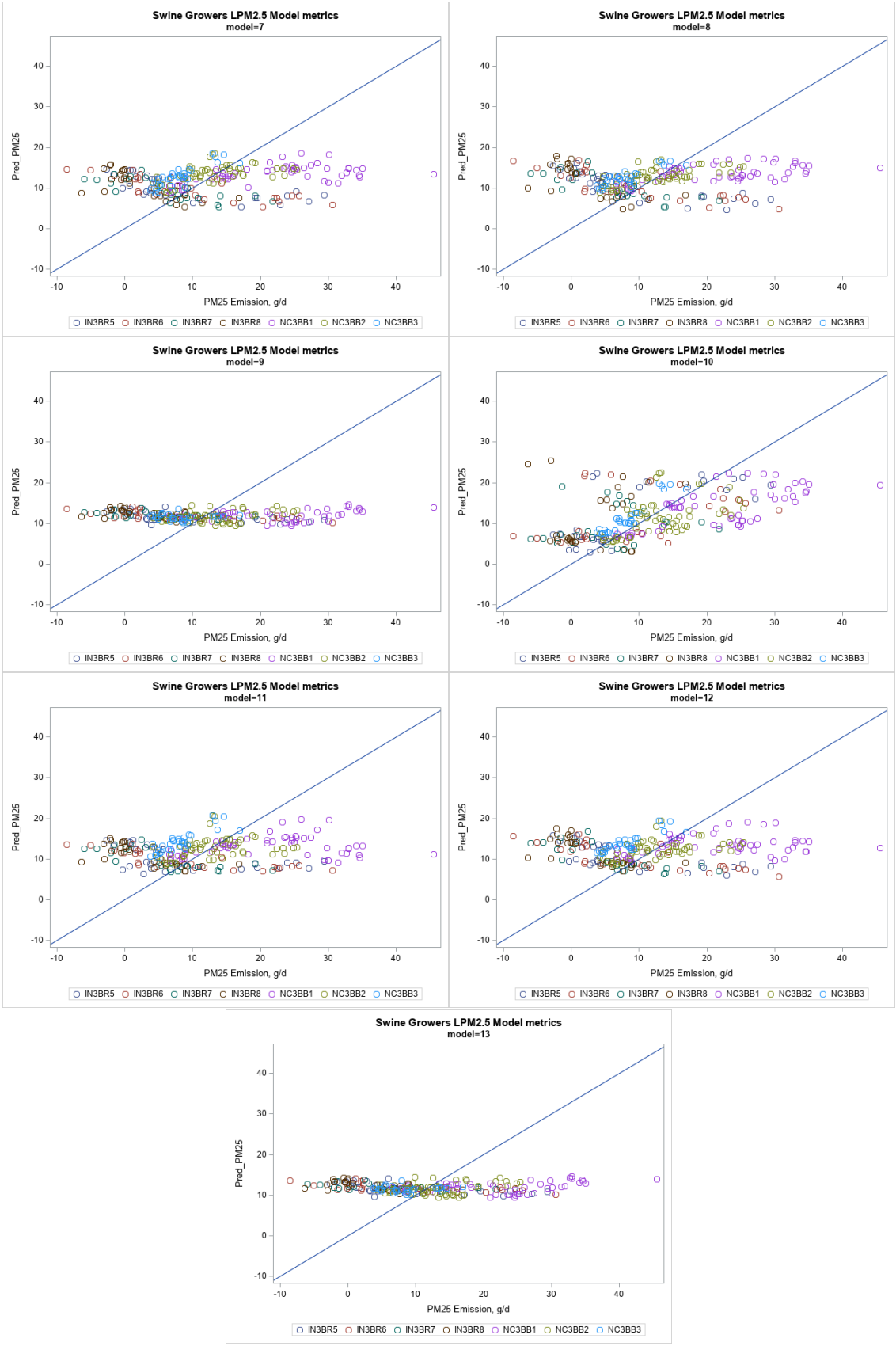


**Figure G-26. Grow-finish $PM_{2.5}$ one-to-one plots for models 7 through 13.**

### G.3.7 Total Suspended Particulates (TSP)

**Table G-37. Parameter and estimates TSP emission models for swine grow-finish barn.**

| Model | Parameter | Estimate | Standard Error | p-value |
|---|---|---|---|---|
| 1 | Intercept | 5.815769 | 0.18411 | <.0001 |
| | Live animal weight | 0.009746 | 0.00262 | 0.0005 |
| 2 | Intercept | 6.26614 | 0.23119 | <.0001 |
| | Live animal weight | 0.011813 | 0.00296 | 0.0007 |
| | Ambient relative humidity | -0.008831 | 0.00185 | <.0001 |
| 3 | Intercept | 6.559145 | 0.27572 | <.0001 |
| | Ambient temperature | -0.009011 | 0.00442 | 0.043 |
| | Live animal weight | 0.010805 | 0.00357 | 0.0059 |
| | Ambient relative humidity | -0.009409 | 0.00203 | <.0001 |
| 4 | Intercept | 6.039034 | 0.20592 | <.0001 |
| | Live animal weight | 0.009656 | 0.00273 | 0.001 |
| | Ambient temperature | -0.012453 | 0.00421 | 0.0035 |
| 5 | Intercept | 7.245363 | 0.22578 | <.0001 |
| | Ambient temperature | -0.008719 | 0.00366 | 0.0184 |
| | Live animal weight | 0.01074 | 0.002 | <.0001 |
| | Exhaust relative humidity | -0.023151 | 0.00305 | <.0001 |
| 6 | Intercept | 7.136576 | 0.21238 | <.0001 |
| | LIVE ANIMAL WEIGHT | 0.010837 | 0.00188 | <.0001 |
| | Exhaust relative humidity | -0.023971 | 0.003 | <.0001 |
| 7 | Intercept | 6.399395 | 0.33301 | <.0001 |
| | Ambient temperature | -0.01102 | 0.00415 | 0.0086 |
| | Inventory | 0.791571 | 0.28704 | 0.0074 |
| | Ambient relative humidity | -0.006994 | 0.00209 | 0.001 |
| 8 | Intercept | 7.180636 | 0.34955 | <.0001 |
| | Ambient temperature | -0.009588 | 0.00394 | 0.0157 |
| | Inventory | 0.613911 | 0.27245 | 0.0273 |
| | Exhaust relative humidity | -0.019279 | 0.00317 | <.0001 |
| 9 | Intercept | 7.092621 | 0.31383 | <.0001 |
| | Exhaust temperature | -0.034546 | 0.01049 | 0.0012 |
| | Live animal weight | 0.011308 | 0.00235 | <.0001 |
| | Ambient relative humidity | -0.008224 | 0.00192 | <.0001 |
| 10 | Intercept | 8.191352 | 0.35972 | <.0001 |
| | Exhaust temperature | -0.033454 | 0.01041 | 0.0016 |
| | Live animal weight | 0.010413 | 0.00231 | 0.0003 |
| | Exhaust relative humidity | -0.027139 | 0.00342 | <.0001 |
| 11 | Intercept | 6.850755 | 0.40872 | <.0001 |
| | Exhaust temperature | -0.030522 | 0.0108 | 0.0051 |
| | Inventory | 0.842748 | 0.27876 | 0.0035 |
| | Ambient relative humidity | -0.006462 | 0.00195 | 0.0011 |

| Model | Parameter | Estimate | Standard Error | p-value |
|---|---|---|---|---|
| 12 | Intercept | 7.673387 | 0.58625 | <.0001 |
| | Exhaust temperature | -0.027327 | 0.01192 | 0.0232 |
| | Inventory | 0.851755 | 0.31108 | 0.009 |
| | Exhaust relative humidity | -0.022106 | 0.00421 | <.0001 |
| 13 | Intercept | 6.799693 | 0.40577 | <.0001 |
| | Inventory | 1.028981 | 0.272 | 0.0006 |
| | Exhaust relative humidity | -0.020994 | 0.00403 | <.0001 |

**Table G-38. Fit and evaluation statistics for swine grow finish barn TSP models tested.**

| Model | 2LogL | AIC | AICc | BIC | Corr. | LNME[a] (%) | NME[b] (%) | ME[b] (g day$^{-1}$) | MB[b] (g day$^{-1}$) | NMB[b] (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | -4 | 4 | 4 | 3 | 0.416 | 6.6 | 37.64 | 261.50 | 8.34 | 1.20 |
| 2 | -56 | -22 | -19 | -23 | 0.565 | 5.9 | 34.59 | 240.30 | 3.08 | 0.44 |
| 3 | -35 | 1 | 5 | | 0.614 | 5.9 | 33.72 | 241.70 | -4.06 | -0.57 |
| 4 | 10 | 20 | 20 | 19 | 0.436 | 6.8 | 39.85 | 285.70 | 16.21 | 2.26 |
| 5 | -38 | -26 | -25 | -26 | 0.773 | 4.8 | 28.35 | 203.20 | -16.39 | -2.29 |
| 6 | -56 | -46 | -46 | -46 | 0.789 | 4.8 | 27.84 | 193.50 | -20.26 | -2.92 |
| 7 | 2 | 14 | 14 | 13 | 0.629 | 6.2 | 34.94 | 250.40 | -16.01 | -2.23 |
| 8 | -22 | -10 | -9 | -10 | 0.697 | 5.5 | 31.60 | 226.60 | -16.13 | -2.25 |
| 9 | -32 | -20 | -19 | -20 | 0.612 | 5.8 | 34.11 | 237.00 | -4.86 | -0.70 |
| 10 | -107 | -71 | -68 | -72 | 0.807 | 4.5 | 26.62 | 185.00 | -21.12 | -3.04 |
| 11 | -21 | -9 | -9 | -10 | 0.641 | 6.1 | 35.24 | 244.90 | -16.32 | -2.35 |
| 12 | -96 | -60 | -56 | -61 | 0.716 | 5.1 | 30.06 | 208.90 | -7.86 | -1.13 |
| 13 | -89 | -55 | -52 | -55 | 0.748 | 4.9 | 28.69 | 199.40 | -13.86 | -2.00 |

[a] Based on transformed data (i.e., ln(TSP)).
[b] Based on back-transformed data.

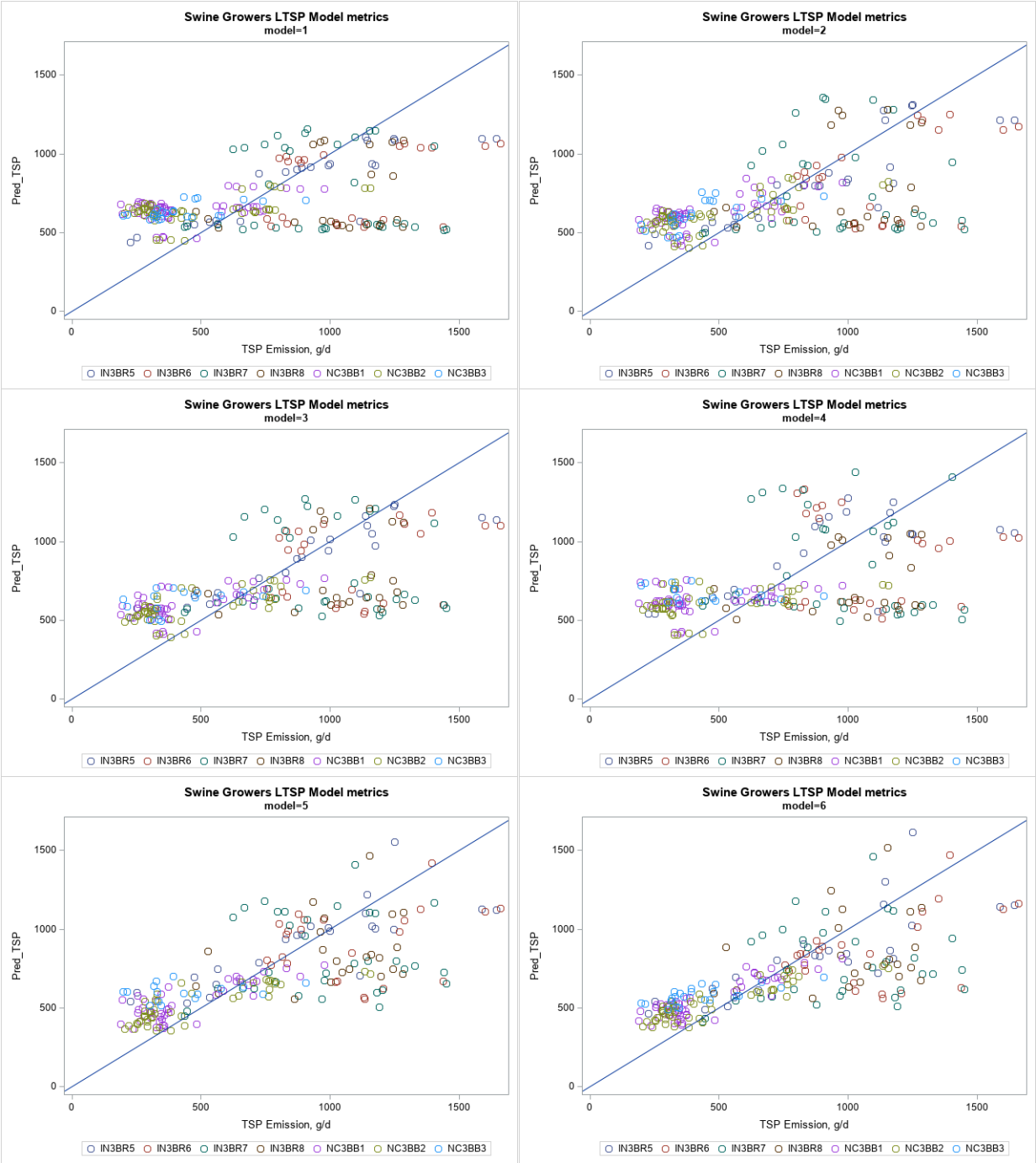


**Figure G-27. Grow-finish TSP one-to-one plots for models 1 through 6.**

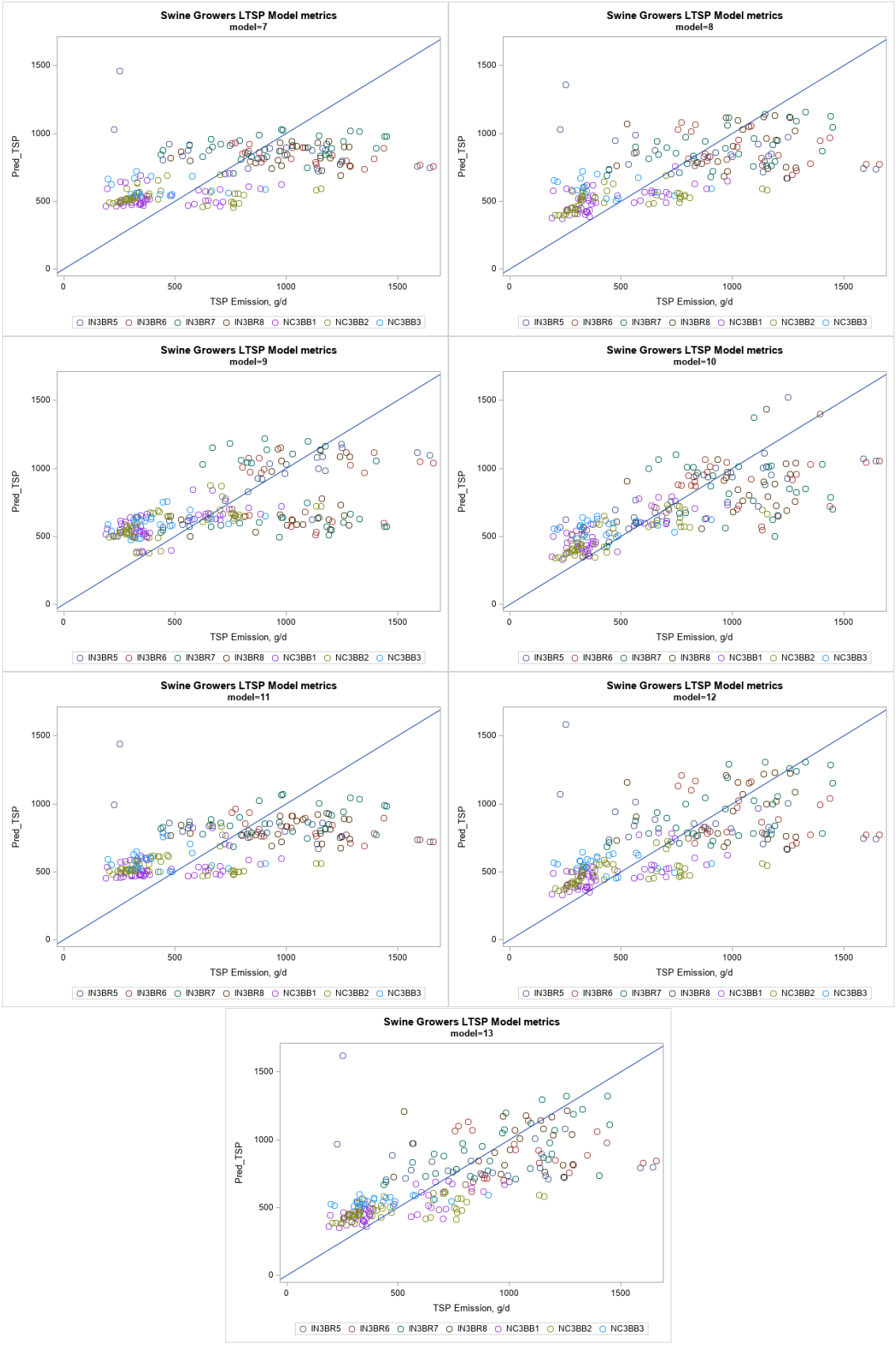


**Figure G-28. Grow-finish TSP one-to-one plots for models 7 through 13.**

## G.4 Swine Gestation Lagoons

### G.4.1 Ammonia ($NH_3$)

**Table G-39. Parameter and estimates $NH_3$ emission models for swine gestation lagoons.**

| Model | Parameter | Estimate | Standard Error | p-value |
|---|---|---|---|---|
| 1 | Intercept | 0.875636 | 0.18288 | 0.0001 |
| | Air Temp | 0.023209 | 0.0073 | 0.0021 |
| | Lagoon Temp | 0.031408 | 0.01196 | 0.0115 |
| 2 | Intercept | 1.344128 | 0.11277 | <.0001 |
| | Air Temp | 0.029756 | 0.00492 | <.0001 |
| 3 | Intercept | 0.771804 | 0.19814 | 0.0009 |
| | Lagoon Temp | 0.057949 | 0.00946 | <.0001 |
| 4 | Intercept | 0.556905 | 0.16137 | 0.0023 |
| | Air Temp | 0.012147 | 0.00565 | 0.0346 |
| | Lagoon Temp | 0.045369 | 0.00987 | <.0001 |
| | Wind speed | 0.062766 | 0.00781 | <.0001 |
| 5 | Intercept | 0.582053 | 0.07702 | <.0001 |
| | Air Temp | 0.055673 | 0.00268 | <.0001 |
| | Wind speed | 0.091428 | 0.01123 | <.0001 |
| 6 | Intercept | 0.486491 | 0.16366 | 0.0072 |
| | Lagoon Temp | 0.059394 | 0.00766 | <.0001 |
| | Wind speed | 0.066408 | 0.00778 | <.0001 |
| 7 | Intercept | 1.335634 | 1.97264 | **0.5006** |
| | Air Temp | 0.0646 | 0.01385 | <.0001 |
| | Lagoon Temp | -0.018755 | 0.01441 | **0.1974** |
| | pH | -0.022843 | 0.24719 | **0.9266** |
| 8 | Intercept | 1.965956 | 2.47673 | **0.4301** |
| | Air Temp | 0.027168 | 0.00701 | 0.0002 |
| | pH | -0.074201 | 0.31181 | **0.8126** |
| 9 | Intercept | 0.265574 | 2.55621 | **0.9176** |
| | Lagoon Temp | 0.052431 | 0.0123 | 0.0004 |
| | pH | 0.073016 | 0.31363 | **0.8166** |
| 10 | Intercept | -0.860651 | 1.95067 | **0.6604** |
| | Air Temp | 0.010235 | 0.00606 | **0.097** |
| | Lagoon Temp | 0.045602 | 0.01183 | 0.0005 |
| | Wind speed | 0.05794 | 0.00855 | <.0001 |
| | pH | 0.181902 | 0.23885 | **0.4488** |
| 11 | Intercept | 1.492571 | 1.38919 | **0.2863** |
| | Air Temp | 0.055412 | 0.00409 | <.0001 |
| | Wind speed | 0.108678 | 0.01318 | <.0001 |
| | pH | -0.128854 | 0.17588 | **0.4662** |
| 12 | Intercept | -0.759231 | 1.9849 | **0.7032** |
| | Lagoon Temp | 0.056318 | 0.01014 | <.0001 |
| | Wind speed | 0.060473 | 0.00861 | <.0001 |
| | pH | 0.164322 | 0.24292 | **0.501** |

**Table G-40. Fit and evaluation statistics for swine gestation lagoons $NH_3$ models tested.**

| Model | 2LogL | AIC | AICc | BIC | Corr. | LNME[a] (%) | NME[b] (%) | ME[b] (g day$^{-1}$m$^{-2}$) | MB[b] (g day$^{-1}$m$^{-2}$) | NMB[b] (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | -18 | -8 | -8 | -13 | 0.766 | 16.295 | 35.896 | 2.392 | 0.022 | 0.333 |
| 2 | -17 | -9 | -9 | -13 | 0.827 | 18.015 | 41.954 | 2.523 | -0.427 | -7.097 |
| 3 | -9 | -1 | 0 | -4 | 0.706 | 18.238 | 40.226 | 2.68 | 0.187 | 2.803 |
| 4 | -67 | -55 | -54 | -61 | 0.859 | 13.151 | 28.712 | 1.913 | -0.184 | -2.766 |
| 5 | 22 | 30 | 30 | 26 | 0.894 | 10.626 | 23.847 | 1.434 | -0.001 | -0.009 |
| 6 | -63 | -53 | -52 | -57 | 0.838 | 13.975 | 30.47 | 2.03 | -0.136 | -2.045 |
| 7 | 59 | 69 | 70 | 65 | 0.731 | 15.613 | 37.344 | 2.199 | -0.013 | -0.215 |
| 8 | -4 | 6 | 6 | 1 | 0.721 | 17.35 | 43.439 | 2.558 | -0.281 | -4.771 |
| 9 | -5 | 5 | 6 | 0 | 0.626 | 19.201 | 45.922 | 2.704 | 0.229 | 3.895 |
| 10 | -45 | -31 | -30 | -38 | 0.804 | 14.232 | 32.578 | 1.918 | -0.102 | -1.727 |
| 11 | 13 | 23 | 24 | 19 | 0.87 | 10.135 | 24.827 | 1.462 | 0.027 | 0.462 |
| 12 | -43 | -31 | -29 | -36 | 0.787 | 14.884 | 33.651 | 1.982 | -0.069 | -1.18 |

[a] Based on transformed data (i.e., $\ln(NH_3)$).

[b] Based on back-transformed data.

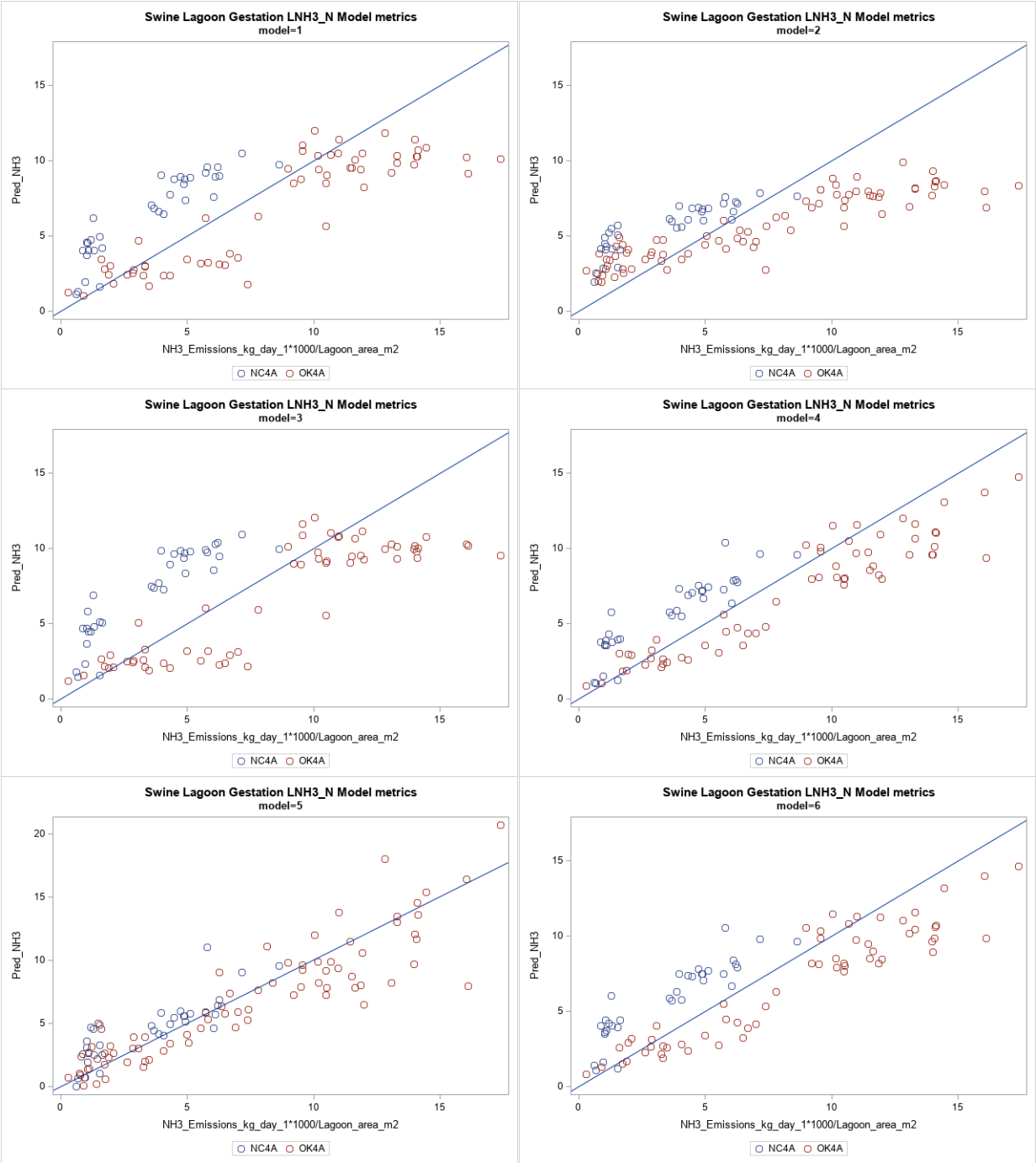


**Figure G-29. Gestation lagoon $NH_3$ one-to-one plots for models 1 through 6.**

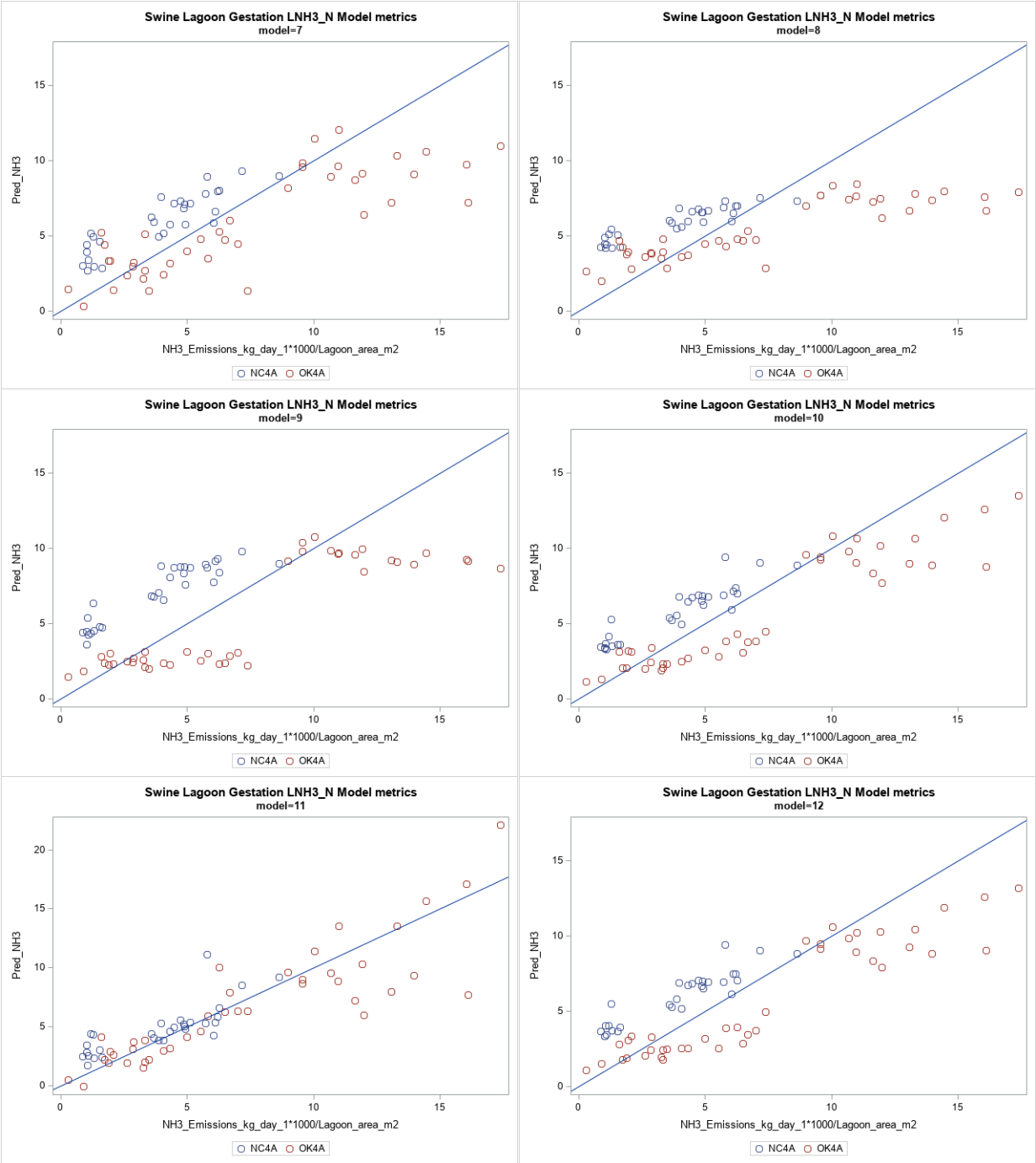


**Figure G-30. Gestation lagoon $NH_3$ one-to-one plots for models 7 through 12.**

### G.4.2 Hydrogen Sulfide ($H_2S$)

**Table G-41. Parameter and estimates $H_2S$ emission models for swine gestation lagoons.**

| Model | Parameter | Estimate | Standard Error | p-value |
|---|---|---|---|---|
| 1 | Intercept | 6.478992 | 0.3387 | <.0001 |
| | Ambient temperature | 0.119184 | 0.02631 | <.0001 |
| | Lagoon temperature | -0.173902 | 0.03106 | <.0001 |
| 2 | Intercept | 6.428343 | 0.23161 | <.0001 |
| | Ambient temperature | -0.02363 | 0.0111 | 0.0379 |
| 3 | Intercept | 6.196805 | 0.44893 | <.0001 |
| | Lagoon temperature | -0.050033 | 0.02127 | 0.0315 |
| 4 | Intercept | 5.022463 | 0.36237 | <.0001 |
| | Ambient temperature | 0.094013 | 0.03212 | 0.0065 |
| | Lagoon temperature | -0.111776 | 0.03607 | 0.0035 |
| | Wind speed | 0.168391 | 0.04212 | 0.0004 |
| 5 | Intercept | 6.52387 | 0.31046 | <.0001 |
| | Ambient temperature | -0.024557 | 0.01148 | 0.0377 |
| | Wind speed | -0.006003 | 0.03223 | 0.853 |
| 6 | Intercept | 5.410901 | 0.43287 | <.0001 |
| | Lagoon temperature | -0.03885 | 0.01718 | 0.0362 |
| | Wind speed | 0.129965 | 0.03991 | 0.0017 |
| 7 | Intercept | 10.448431 | 6.025 | 0.0951 |
| | Ambient temperature | 0.070218 | 0.02918 | 0.0221 |
| | Lagoon temperature | -0.169165 | 0.03307 | <.0001 |
| | pH | -0.401988 | 0.76214 | 0.6023 |
| 8 | Intercept | -1.986147 | 6.45492 | 0.7604 |
| | Ambient temperature | -0.007457 | 0.0233 | 0.751 |
| | pH | 0.959146 | 0.83502 | 0.2595 |
| 9 | Intercept | 5.691389 | 6.28786 | 0.3721 |
| | Lagoon temperature | -0.097135 | 0.0202 | 0.0014 |
| | pH | 0.188021 | 0.79272 | 0.814 |
| 10 | Intercept | 9.548496 | 6.33186 | 0.1478 |
| | Ambient temperature | 0.075029 | 0.03012 | 0.018 |
| | Lagoon temperature | -0.167581 | 0.03433 | <.0001 |
| | Wind speed | 0.022008 | 0.03533 | 0.5395 |
| | pH | -0.312304 | 0.79045 | 0.697 |
| 11 | Intercept | -1.061752 | 6.97035 | 0.8799 |
| | Ambient temperature | -0.00625 | 0.02337 | 0.7908 |
| | Wind speed | -0.0109 | 0.03269 | 0.7416 |
| | pH | 0.843677 | 0.89476 | 0.3528 |
| 12 | Intercept | 5.355561 | 6.73864 | 0.4328 |
| | Lagoon temperature | -0.09578 | 0.02179 | 0.001 |
| | Wind speed | 0.005886 | 0.03421 | 0.8648 |
| | pH | 0.224932 | 0.83865 | 0.7903 |
| 13 | Intercept | 4.833256 | 0.25025 | <.0001 |
| | Wind speed | 0.099772 | 0.04391 | 0.0253 |

## Table G-42. Fit and evaluation statistics for swine gestation lagoons $H_2S$ models tested.

| Model | 2LogL | AIC | AICc | BIC | Corr. | LNME[a] (%) | NME[b] (%) | ME[b] (g day$^{-1}$ m$^{-2}$) | MB[b] (g day$^{-1}$ m$^{-2}$) | NMB[b] (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 130 | 140 | 141 | 136 | 0.582 | 8.754 | 80.366 | 135.590 | -23.980 | -14.210 |
| 2 | 163 | 179 | 180 | 171 | -0.177 | 21.321 | 129.280 | 290.340 | -1.231 | -0.548 |
| 3 | 148 | 156 | 157 | 152 | 0.369 | 11.441 | 113.030 | 190.700 | -7.692 | -4.559 |
| 4 | 116 | 136 | 139 | 127 | 0.649 | 8.604 | 78.233 | 131.990 | -23.690 | -14.040 |
| 5 | 159 | 177 | 179 | 169 | 0.422 | 21.661 | 128.370 | 293.870 | -1.208 | -0.528 |
| 6 | 139 | 149 | 150 | 144 | 0.553 | 10.151 | 100.300 | 169.210 | -14.820 | -8.786 |
| 7 | 25 | 37 | 40 | 31 | 0.659 | 5.498 | 44.493 | 86.622 | -15.580 | -8.000 |
| 8 | 39 | 49 | 51 | 44 | 0.501 | 14.121 | 122.060 | 237.640 | -5.118 | -2.629 |
| 9 | 30 | 40 | 42 | 35 | 0.636 | 7.120 | 66.732 | 129.920 | -19.410 | -9.971 |
| 10 | 25 | 39 | 43 | 32 | 0.67 | 5.353 | 44.321 | 86.286 | -13.470 | -6.919 |
| 11 | 39 | 51 | 54 | 45 | 0.576 | 14.782 | 127.820 | 248.860 | 1.017 | 0.523 |
| 12 | 30 | 42 | 45 | 37 | 0.646 | 7.108 | 66.745 | 129.940 | -18.600 | -9.556 |
| 13 | 213 | 221 | 221 | 217 | 0.472 | 13.718 | 117.860 | 269.800 | -23.280 | -10.170 |

[a] Based on transformed data (i.e., $\ln(H_2S)$).
[b] Based on back-transformed data.

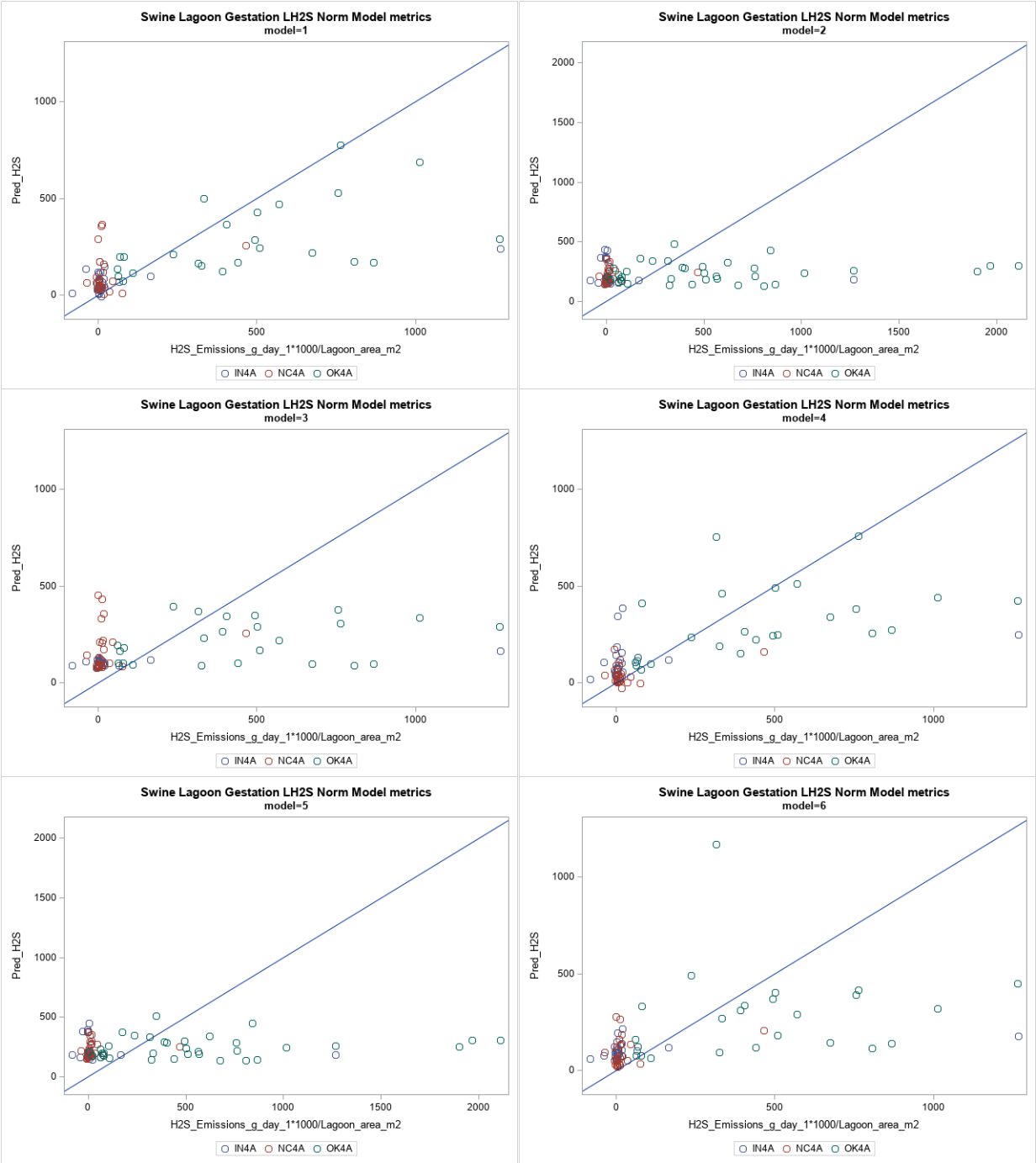


**Figure G-31. Gestation Lagoon $H_2S$ one-to-one plots for models 1 through 6.**

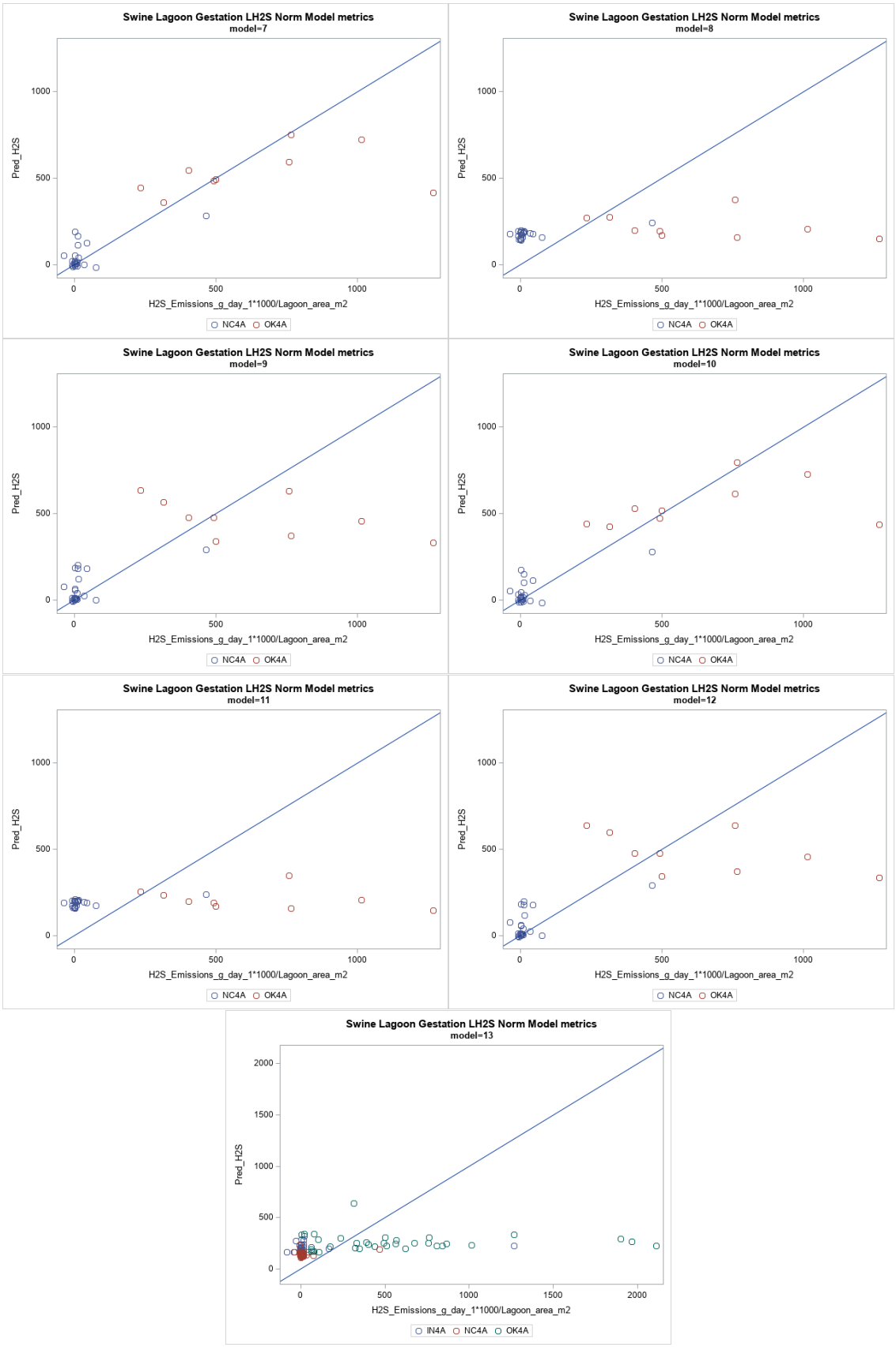


**Figure G-32. Gestation Lagoon $H_2S$ one-to-one plots for models 7 through 13.**

## G.5 Swine Grow Finish Lagoons

### G.5.1 Ammonia ($NH_3$)

**Table G-43. Parameter and estimates $NH_3$ emission models for swine grow-finish lagoons.**

| Model | Parameter | Estimate | Standard Error | p-value |
|---|---|---|---|---|
| 1 | Intercept | -0.566633 | 0.2496 | **0.0593** |
| | Ambient temperature | 0.023119 | 0.01253 | 0.0717 |
| | Lagoon temperature | 0.087319 | 0.01867 | <.0001 |
| 2 | Intercept | -0.049884 | 0.67955 | **0.942** |
| | Ambient temperature | 0.038719 | 0.01238 | 0.0027 |
| 3 | Intercept | -0.603991 | 0.24051 | 0.0407 |
| | Lagoon temperature | 0.112214 | 0.01316 | <.0001 |
| 4 | Intercept | -1.128417 | 0.1993 | <.0001 |
| | Ambient temperature | 0.016087 | 0.01227 | **0.1974** |
| | Lagoon temperature | 0.09329 | 0.01491 | <.0001 |
| | Wind speed | 0.13032 | 0.03173 | 0.0002 |
| 5 | Intercept | -0.680078 | 0.24813 | 0.0169 |
| | Ambient temperature | 0.085372 | 0.01423 | 0.0033 |
| | Wind speed | 0.131932 | 0.05442 | 0.02 |
| 6 | Intercept | -1.171433 | 0.18552 | <.0001 |
| | Lagoon temperature | 0.109863 | 0.00817 | <.0001 |
| | Wind speed | 0.138518 | 0.03068 | <.0001 |
| 7 | Intercept | -5.963413 | 3.94171 | **0.1557** |
| | Ambient temperature | 0.021854 | 0.01447 | **0.1385** |
| | Lagoon temperature | 0.125063 | 0.02234 | <.0001 |
| | pH | 0.638838 | 0.48002 | **0.2076** |
| 8 | Intercept | -0.836278 | 11.0659 | **0.9412** |
| | Ambient temperature | 0.045035 | 0.01714 | 0.0113 |
| | pH | 0.096251 | 1.41519 | **0.9471** |
| 9 | Intercept | -6.654716 | 3.89618 | **0.1143** |
| | Lagoon temperature | 0.150671 | 0.01457 | <.0001 |
| | pH | 0.718096 | 0.47492 | **0.1574** |
| 10 | Intercept | -7.928994 | 2.74523 | 0.0095 |
| | Ambient temperature | 0.00609 | 0.01416 | **0.6696** |
| | Lagoon temperature | 0.13598 | 0.01904 | <.0001 |
| | Wind speed | 0.157811 | 0.03288 | <.0001 |
| | pH | 0.80741 | 0.33239 | 0.0256 |
| 11 | Intercept | 6.210049 | 5.48066 | **0.2827** |
| | Ambient temperature | 0.019652 | 0.01157 | 0.0963 |
| | WIND SPEED | 0.076797 | 0.03599 | 0.0393 |
| | pH | -0.758828 | 0.70323 | **0.3056** |
| 12 | Intercept | -8.252853 | 2.65417 | 0.0068 |
| | Lagoon temperature | 0.143149 | 0.00982 | <.0001 |
| | Wind speed | 0.162008 | 0.03126 | <.0001 |
| | pH | 0.843797 | 0.3231 | 0.019 |

**Table G-44. Fit and evaluation statistics for swine grow-finish lagoons $NH_3$ models tested.**

| Model | 2LogL | AIC | AICc | BIC | Corr. | LNME[a] (%) | NME[b] (%) | ME[b] (kg day$^{-1}$m$^{-2}$) | MB[b] (kg day$^{-1}$m$^{-2}$) | NMB[b] (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 53 | 67 | 69 | 58 | 0.845 | 42.59 | 39.524 | 1.666 | 0.027 | 0.629 |
| 2 | 55 | 67 | 68 | 59 | 0.867 | 74.251 | 52.802 | 2.16 | -15.06 | -15.06 |
| 3 | 57 | 69 | 70 | 61 | 0.82 | 45.432 | 42.25 | 1.781 | 0.083 | 1.974 |
| 4 | 26 | 42 | 45 | 32 | 0.93 | 28.226 | 29.839 | 1.307 | -0.064 | -1.463 |
| 5 | 64 | 74 | 75 | 67 | 0.91 | 34.087 | 28.822 | 1.223 | -0.208 | -4.913 |
| 6 | 28 | 42 | 44 | 33 | 0.926 | 28.844 | 30.255 | 1.326 | -0.083 | -1.889 |
| 7 | 52 | 68 | 71 | 58 | 0.824 | 55.311 | 36.98 | 1.363 | 0.217 | 5.885 |
| 8 | 54 | 68 | 70 | 58 | 0.845 | 78.857 | 57.059 | 2.091 | -0.641 | -17.500 |
| 9 | 55 | 69 | 71 | 60 | 0.801 | 58.121 | 39.615 | 1.46 | 0.262 | 7.104 |
| 10 | 24 | 42 | 46 | 30 | 0.933 | 32.017 | 22.087 | 0.851 | 0.04 | 1.037 |
| 11 | 51 | 63 | 65 | 55 | 0.82 | 66.418 | 58.211 | 2.228 | -0.609 | -15.91 |
| 12 | 24 | 40 | 44 | 30 | 0.932 | 32.283 | 21.941 | 0.845 | 0.033 | 0.848 |

[a] Based on transformed data (i.e., $\ln(NH_3)$).

[b] Based on back-transformed data.

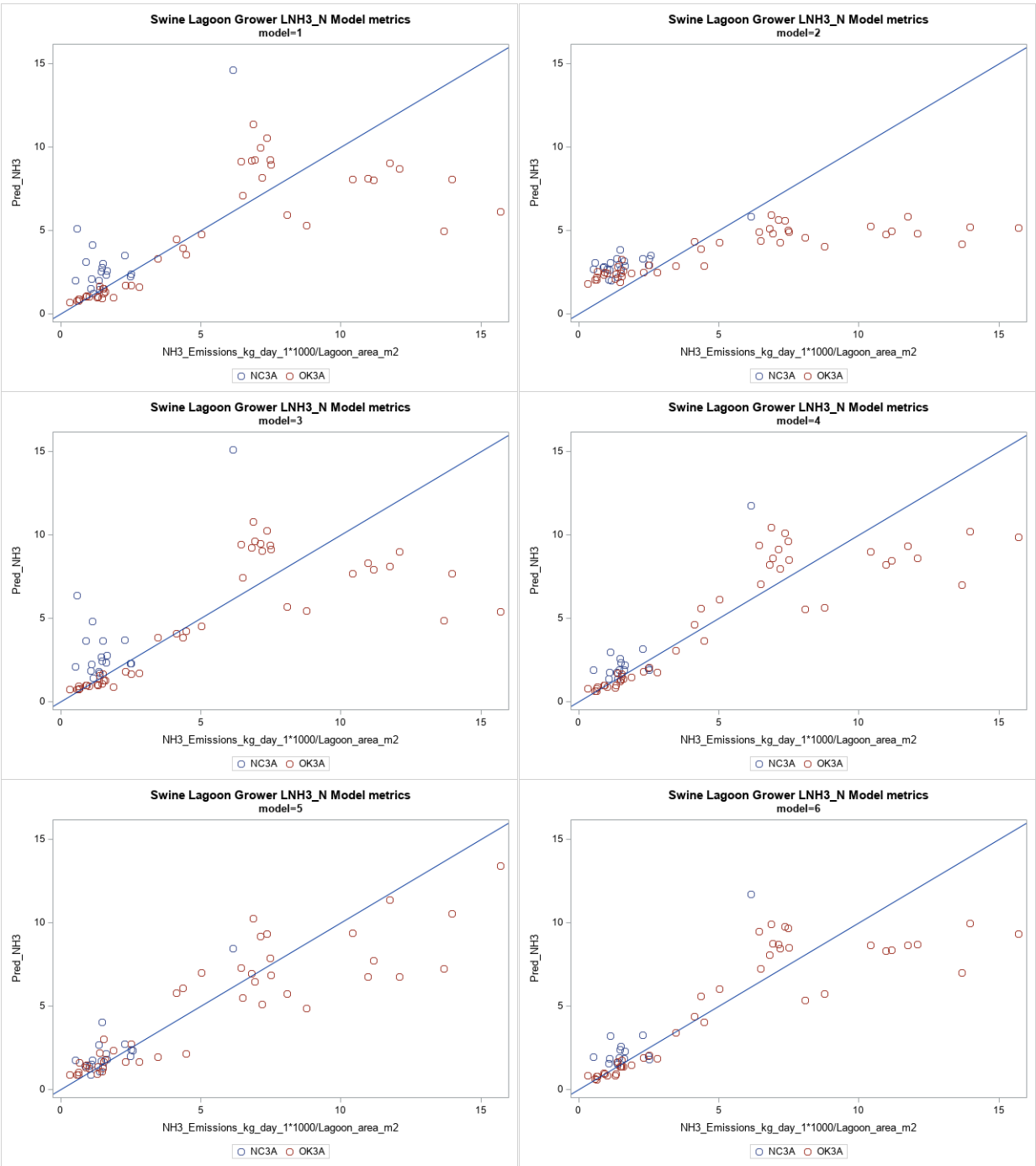


**Figure G-33. Grower-finish lagoon $NH_3$ one-to-one plots for models 1 through 6.**

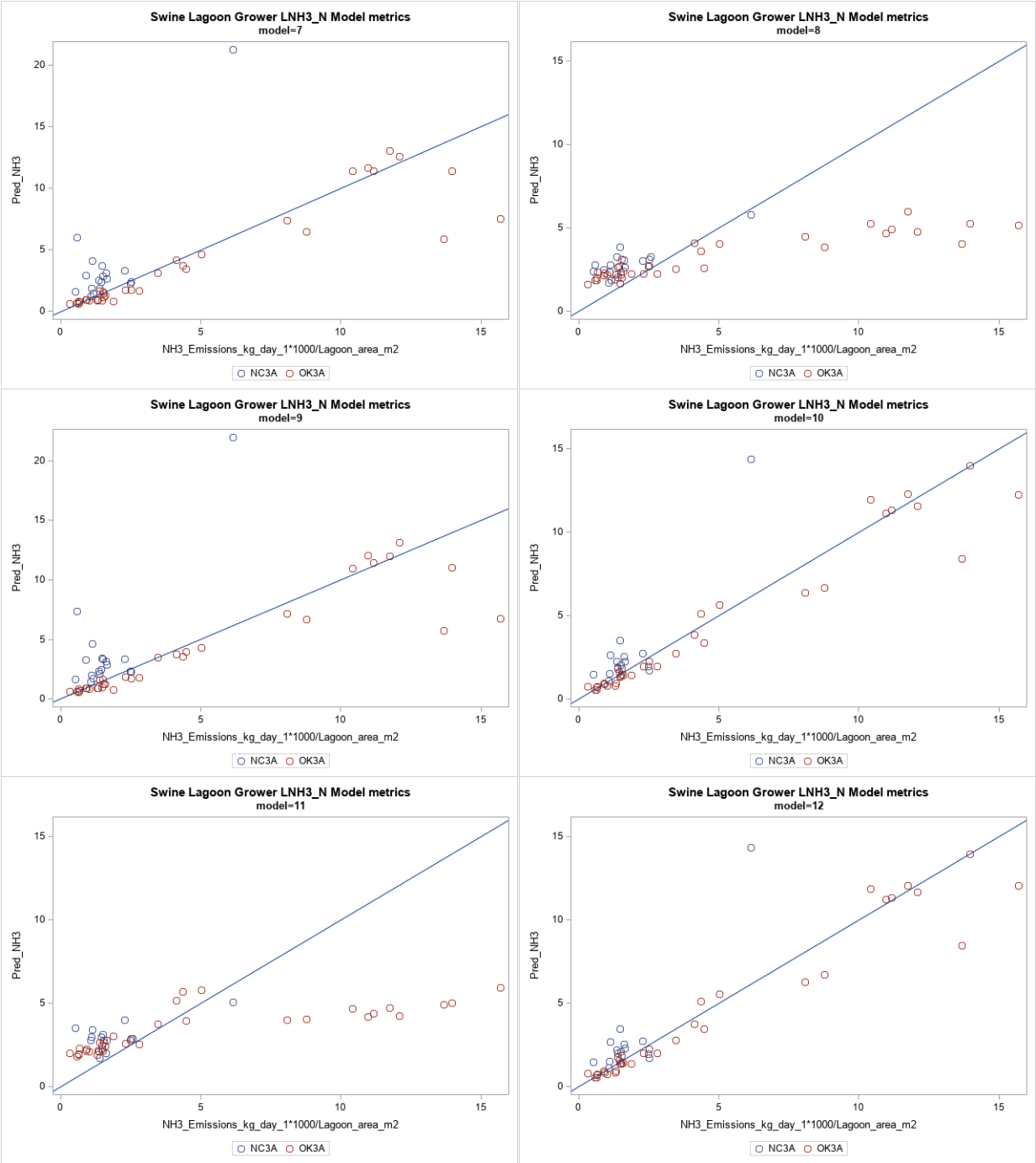


**Figure G-34. Grower-finish lagoon $NH_3$ one-to-one plots for models 7 through 12.**

### G.5.2 Hydrogen Sulfide ($H_2S$)

**Table G-45. Parameter and estimates $H_2S$ emission models for swine grow-finish lagoons.**

| Model | Parameter | Estimate | Standard Error | p-value |
|---|---|---|---|---|
| 1 | Intercept | 2.73314 | 1.04953 | 0.0248 |
| | Air temperature | 0.083699 | 0.03236 | 0.0141 |
| | Lagoon temperature | 0.041352 | 0.06788 | **0.5489** |
| 2 | Intercept | 3.735991 | 0.60044 | <.0001 |
| | Air temperature | 0.084295 | 0.02491 | 0.0014 |
| 3 | Intercept | 2.54563 | 1.16909 | 0.0553 |
| | Lagoon temperature | 0.131182 | 0.06277 | **0.061** |
| 4 | Intercept | 1.458511 | 0.92977 | **0.1337** |
| | Air temperature | 0.049379 | 0.03397 | **0.1581** |
| | Lagoon temperature | 0.078182 | 0.05821 | **0.1918** |
| | Wind speed | 0.263928 | 0.09545 | 0.008 |
| 5 | Intercept | 3.166201 | 0.54568 | <.0001 |
| | Air temperature | 0.052501 | 0.02584 | 0.0481 |
| | Wind speed | 0.221709 | 0.08295 | 0.0099 |
| 6 | Intercept | 1.261412 | 0.87337 | **0.1675** |
| | Lagoon temperature | 0.12634 | 0.04316 | 0.0126 |
| | Wind speed | 0.303785 | 0.08537 | 0.0009 |
| 7 | Intercept | 22.901945 | 4.09576 | <.0001 |
| | Air temperature | 0.116961 | 0.02952 | 0.0004 |
| | Lagoon temperature | 0.055851 | 0.0407 | **0.1784** |
| | pH | -2.574006 | 0.50141 | <.0001 |
| 8 | Intercept | 25.573479 | 3.83417 | <.0001 |
| | Air temperature | 0.150334 | 0.01514 | <.0001 |
| | pH | -2.869505 | 0.47948 | <.0001 |
| 9 | Intercept | 18.670458 | 4.80653 | 0.0015 |
| | Lagoon temperature | 0.193279 | 0.02407 | <.0001 |
| | pH | -2.080679 | 0.59078 | 0.0031 |
| 10 | Intercept | 24.000677 | 4.08593 | <.0001 |
| | Air temperature | 0.092797 | 0.02822 | 0.0033 |
| | Lagoon temperature | 0.043962 | 0.03778 | **0.2534** |
| | Wind speed | 0.26001 | 0.09257 | 0.0071 |
| | pH | -2.831053 | 0.50683 | <.0001 |
| 11 | Intercept | 26.266885 | 3.81109 | <.0001 |
| | Air temperature | 0.115684 | 0.01854 | <.0001 |
| | Wind speed | 0.279819 | 0.09384 | 0.0045 |
| | pH | -3.09202 | 0.48223 | <.0001 |
| 12 | Intercept | 21.446313 | 4.66658 | 0.0003 |
| | Lagoon temperature | 0.139203 | 0.02672 | <.0001 |
| | Wind speed | 0.342479 | 0.09143 | 0.0005 |
| | pH | -2.575565 | 0.58147 | 0.0004 |
| 13 | Intercept | 3.694758 | 0.49199 | <.0001 |
| | Wind speed | 0.279011 | 0.0731 | 0.0004 |

## Table G-46. Fit and evaluation statistics for swine grow-finish lagoons $H_2S$ models tested.

| Model | 2LogL | AIC | AICc | BIC | Corr. | LNME[a] (%) | NME[b] (%) | ME[b] (g day$^{-1}$ m$^{-2}$) | MB[b] (g day$^{-1}$ m$^{-2}$) | NMB[b] (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 173 | 187 | 189 | 178 | 0.512 | 27.635 | 94.597 | 349.48 | 33.493 | 9.066 |
| 2 | 193 | 205 | 207 | 197 | 0.354 | 30.692 | 98.557 | 385.62 | 95.359 | 24.372 |
| 3 | 179 | 191 | 193 | 183 | 0.47 | 28.625 | 99.14 | 366.26 | 31.839 | 8.618 |
| 4 | 165 | 181 | 184 | 170 | 0.668 | 23.766 | 74.5 | 275.23 | 34.591 | 9.363 |
| 5 | 186 | 200 | 202 | 190 | 0.578 | 28.198 | 74.927 | 293.16 | 10.768 | 2.752 |
| 6 | 167 | 181 | 183 | 172 | 0.686 | 23.504 | 69.554 | 256.96 | 5.571 | 1.508 |
| 7 | 121 | 137 | 140 | 126 | 0.797 | 18.15 | 80.697 | 327.91 | 110.06 | 27.085 |
| 8 | 123 | 137 | 139 | 128 | 0.8 | 18.354 | 75.985 | 308.76 | 85.848 | 21.127 |
| 9 | 135 | 149 | 152 | 140 | 0.739 | 20.094 | 98.935 | 402.02 | 162.61 | 40.018 |
| 10 | 113 | 131 | 135 | 119 | 0.876 | 15.075 | 47.018 | 191.05 | 53.974 | 13.283 |
| 11 | 115 | 131 | 134 | 120 | 0.878 | 15.294 | 48.742 | 198.06 | 57.991 | 14.271 |
| 12 | 123 | 139 | 142 | 128 | 0.872 | 14.583 | 40.323 | 163.85 | 32.622 | 8.028 |
| 13 | 189 | 201 | 203 | 193 | 0.602 | 29.034 | 71.652 | 280.35 | -45.25 | -11.56 |

[a] Based on transformed data (i.e., $\ln(H_2S)$).

[b] Based on back-transformed data.

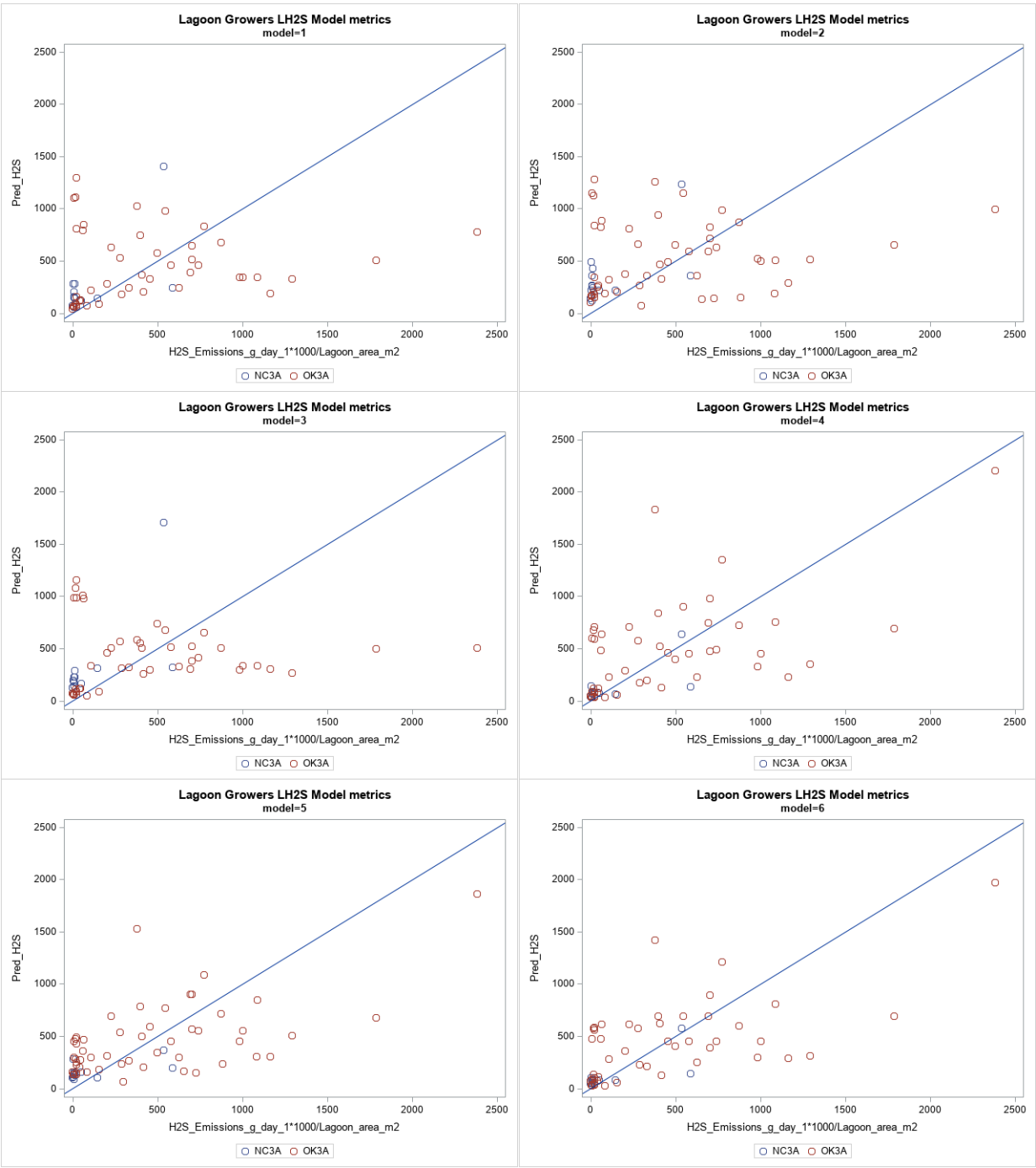


**Figure G-35. Grow-finish Lagoon $H_2S$ one-to-one plots for models 1 through 6.**

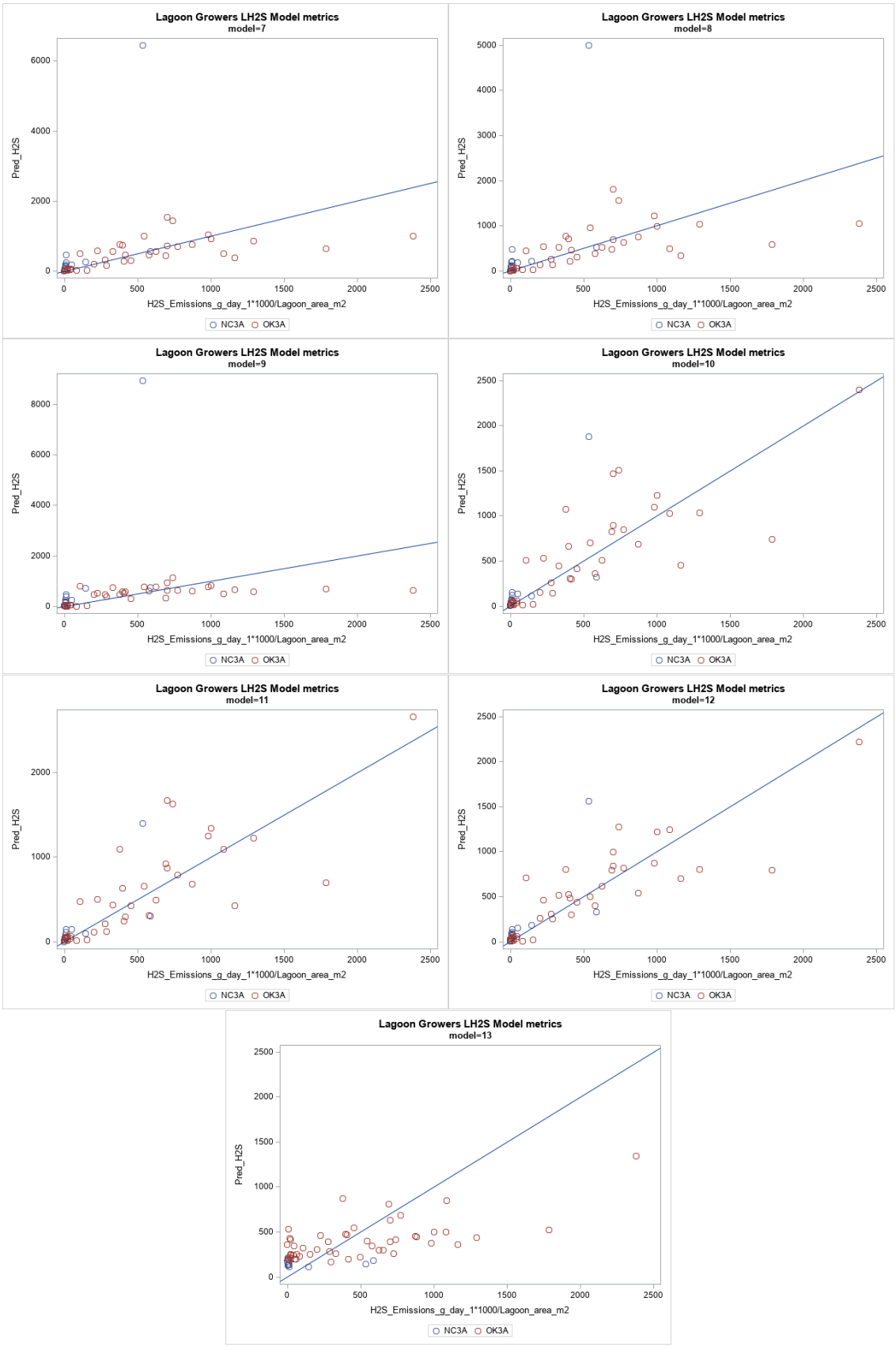


**Figure G-36. Grow-finish Lagoon $H_2S$ one-to-one plots for models 7 through 13.**

## G.6 Swine Basins

### G.6.1 Ammonia ($NH_3$)

**Table G-47. Parameter and estimates $NH_3$ emission models for swine basins.**

| Model | Parameter | Estimate | Standard Error | p-value |
|---|---|---|---|---|
| 1 | Intercept | 1.504932 | 0.18455 | <.0001 |
| | Ambient temperature | 0.075879 | 0.01171 | <.0001 |
| 2 | Intercept | 1.901887 | 0.31764 | <.0001 |
| | Ambient temperature | 0.071725 | 0.0109 | <.0001 |
| | Wind speed | -0.079949 | 0.05457 | **0.1512** |
| 3 | Intercept | 2.774765 | 0.36936 | <.0001 |
| | Wind speed | -0.070246 | 0.05977 | **0.2484** |

**Table G-48. Fit and evaluation statistics for swine basin $NH_3$ models tested.**

| Model | 2LogL | AIC | AICc | BIC | Corr. | LNME[a] (%) | NME[b] (%) | ME[b] (kg day$^{-1}$) | MB[b] (kg day$^{-1}$) | NMB[b] (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 56 | 64 | 66 | 71 | 0.837 | 17.022 | 38.221 | 5.219 | 0.493 | 3.609 |
| 2 | 54 | 64 | 66 | 72 | 0.851 | 16.449 | 35.901 | 4.903 | 0.624 | 4.568 |
| 3 | 72 | 80 | 81 | 87 | 0.449 | 34.744 | 66.457 | 9.075 | -0.422 | -3.088 |

[a] Based on transformed data (i.e., $\ln(NH_3)$).
[b] Based on back-transformed data.

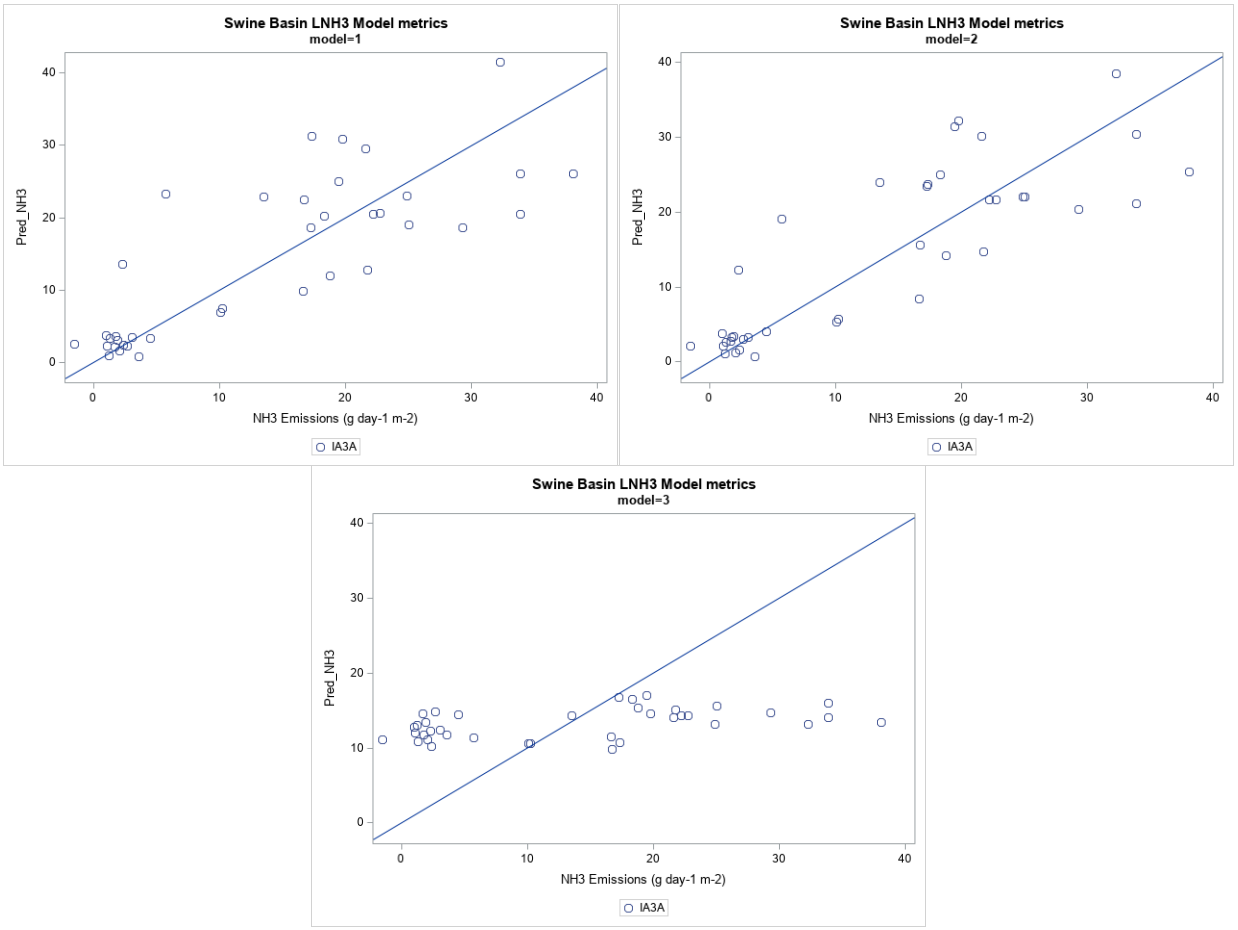


**Figure G-37. Basin $NH_3$ model one-to-one plots.**

### G.6.2 Hydrogen Sulfide ($H_2S$)

**Table G-49. Parameter and estimates $H_2S$ emission models for swine basin.**

| Model | Parameter | Estimate | Standard Error | p-value |
|---|---|---|---|---|
| 1 | Intercept | 0.468899 | 0.28738 | **0.1406** |
| | Air temperature | 0.026991 | 0.01578 | **0.103** |
| 2 | Intercept | 0.362633 | 0.32848 | **0.2876** |
| | Air temperature | 0.023929 | 0.01637 | **0.1619** |
| | Wind speed | 0.029956 | 0.04085 | **0.4702** |
| 3 | Intercept | 0.573781 | 0.34208 | **0.1262** |
| | Wind speed | 0.050215 | 0.03903 | **0.2115** |

**Table G-50. Fit and evaluation statistics for swine basins $H_2S$ models tested.**

| Model | 2LogL | AIC | AICc | BIC | Corr. | LNME[a] (%) | NME[b] (%) | ME[b] (g day$^{-1}$ m$^{-2}$) | MB[b] (g day$^{-1}$ m$^{-2}$) | NMB[b] (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 23 | 31 | 33 | 37 | 0.583 | 69.794 | 80.738 | 1.403 | -0.134 | -7.731 |
| 2 | 23 | 33 | 36 | 39 | 0.555 | 74.185 | 84.669 | 1.472 | -0.137 | -7.868 |
| 3 | 25 | 33 | 35 | 38 | -0.322 | 97.083 | 106.94 | 1.859 | 0.061 | 3.531 |

[a] Based on transformed data (i.e., ln($H_2S$)).

[b] Based on back-transformed data.

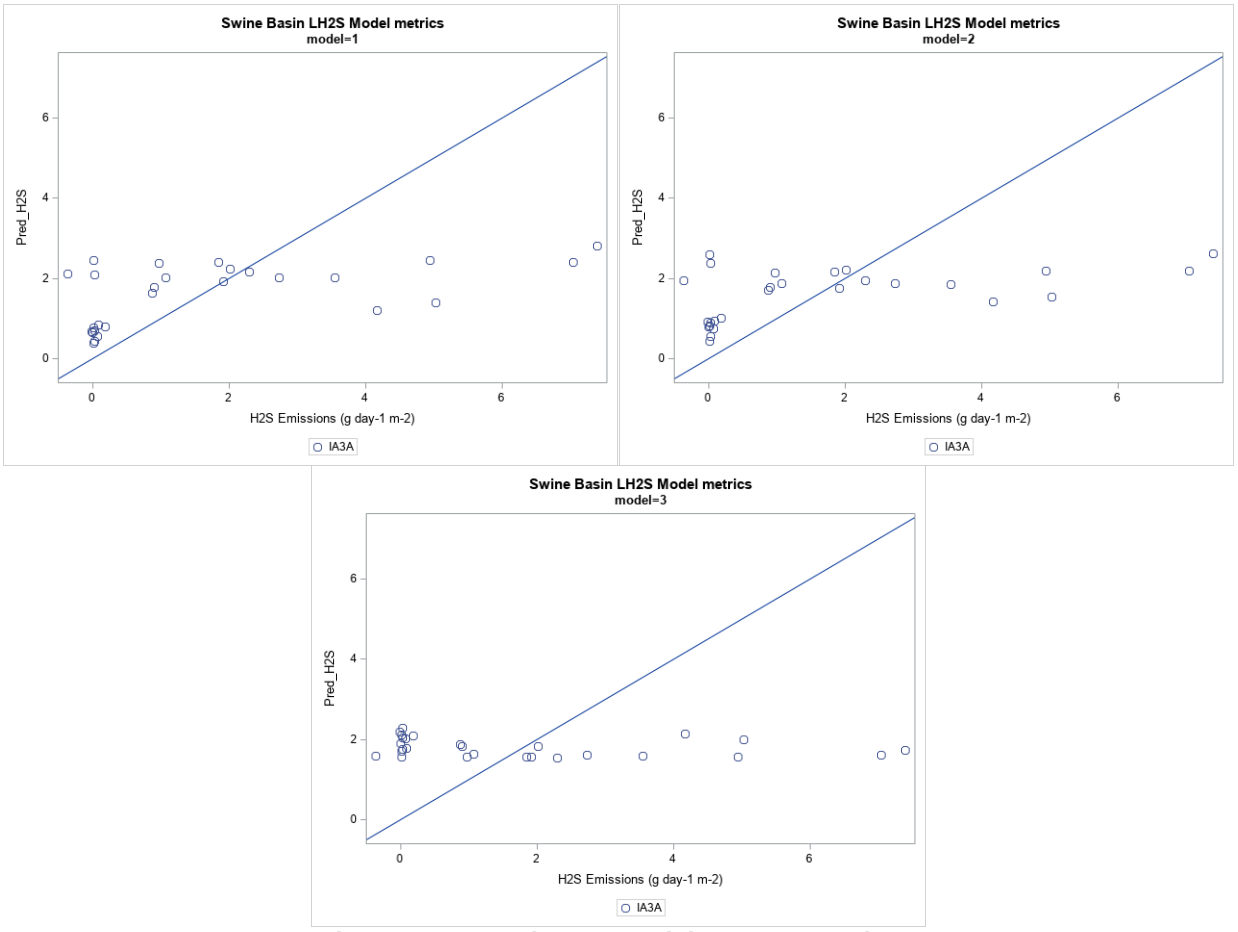


**Figure G-38. Basin $H_2S$ model one-to-one plots.**