Face Mask Use and Persistence of Livestock-associated *Staphylococcus aureus* Nasal Carriage among Industrial Hog Operation Workers and Household Contacts, USA

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**Table S1. Antibiotics used for susceptibility testing of *Staphylococcus aureus* isolates**

| Antibiotic class | Antibiotic tested          | Resistance MIC Breakpoints (≥µg/mL)\(^a\) |
|------------------|-----------------------------|--------------------------------------------|
| aminoglycoside   | gentamicin                  | 16                                         |
| β-lactam         | ampicillin                  | 0.5                                        |
|                  | oxacillin                   | 4                                          |
|                  | penicillin                  | 0.25                                       |
| cephamycin       | cefoxitin                   | 8                                          |
| fluoroquinolone  | moxifloxacin                | 2                                          |
| glycopeptide     | vancomycin                  | 16                                         |
| lincosamide      | clindamycin                 | 4                                          |
| lipopeptide      | daptomycin                  | 1                                          |
| macrolide        | erythromycin                | 8                                          |
| nitrofuran       | nitrofurantoin              | 128                                        |
| oxazolidione     | linezolid                   | 8                                          |
| rifamycin        | rifampin                    | 4                                          |
| streptogramin    | quinupristin/dalfopristin  | 4                                          |
| sulfonamide/trimethoprim | sulfamethoxazole/ trimethoprim | 4/76                                     |
| tetracycline     | tetracycline                | 16                                         |
|                  | minocycline                 | 16                                         |

*Note: MIC=Minimum inhibitory concentration.*

\(^a^\)Breakpoints based on 2013 Clinical and Laboratory Standards Institute (CLSI) guidelines (Clinical and Laboratory Standards Institute 2013).
Table S2. Habitual occupational activities among 101 industrial hog operation (IHO) workers measured at biweekly intervals over four months, North Carolina, USA, 2013-2014.

| Number of IHO workers | N=101 (%) |
|-----------------------|-----------|
| Average number of pigs in contact with<sup>a</sup> |            |
| <4000 | 49 (49) |
| ≥4000 | 51 (50) |
| Average number of sows/farrow/wean/nursery pigs in contact with<sup>a</sup> |            |
| <2000 | 52 (51) |
| ≥2000 | 48 (48) |
| Contact with feeder/finish pigs |            |
| Never | 53 (52) |
| Ever | 48 (48) |
| Handled sick pigs |            |
| Sometimes or never | 87 (86) |
| Consistently | 14 (14) |
| Handled dead pigs |            |
| Sometimes or never | 65 (64) |
| Consistently | 36 (36) |
| Pressure washed barns |            |
| Never | 24 (24) |
| Ever | 76 (76) |
| Used pesticides |            |
| Never | 23 (23) |
| Ever | 76 (77) |
| Gave pigs shots |            |
| Never | 22 (22) |
| Ever | 78 (78) |
| Frequency of coverall use |            |
| Sometimes or never | 29 (29) |
| Consistently | 72 (71) |
| Frequency of face mask use |            |
| Sometimes or never | 62 (61) |
| Consistently | 39 (39) |
| Frequency of glove use |            |
| Sometimes or never | 8 (8) |
| Consistently | 93 (92) |
| Frequency of boots use |            |
| Sometimes or never | 3 (3) |
| Consistently | 98 (97) |
| Frequency of glasses/goggles use |            |
| Sometimes or never | 83 (82) |
| Consistently | 17 (17) |
| Average number of hours worked per week at industrial hog operation<sup>a</sup> |            |
| <40 | 26 (26) |
| ≥40 | 75 (74) |

Note. IHO = industrial hog operation. IHO workers reported their occupational activities during the week prior at up to eight biweekly study visits. For binary exposures (e.g. handled dead pigs) expressed as “Sometimes or never” or “Consistently,” “Sometimes or never” refers to activities that an IHO worker reported at ≥0 but <80% of completed biweekly visits, and “Consistently” refers to activities reported at ≥80% of completed biweekly visits. For continuous exposures (e.g. frequency of face mask use) expressed as “Sometimes or never” or “Consistently,” “Sometimes or never”
refers to activities that an IHO worker reported doing <80% of the time, on average, and “Consistently” refers to activities a worker reported doing ≥80% of the time, on average, across all completed biweekly visits.

For continuous occupational activities expressed as binary categories, the cut-off is the median value of the average numbers reported by workers over the four-month period, rounded to one significant digit.
Table S3. Comparisons between crude and adjusted odds ratios for associations between 101 industrial hog operation (IHO) workers’ time-varying (transient) personal protective equipment (PPE) use the week prior to biweekly nasal swabbing time points and changes in nasal carriage of multidrug-resistant and livestock-associated *Staphylococcus aureus* outcomes over four months, North Carolina, USA, 2013-2014.

|                  | MDRSA                | *scn*-negative *S. aureus* | Tetracycline-resistant *S. aureus* | *S. aureus* CC398/CC9 |
|------------------|----------------------|-----------------------------|-----------------------------------|-----------------------|
|                  | OR(95% CI)           | aOR\(^a\) (95% CI)         | OR(95% CI)                        | aOR\(^a\) (95% CI)   | OR(95% CI)                        | aOR\(^a\) (95% CI)   |
| Pct time used    |                      |                             |                                   |                       |                                   |
| coveralls        | 1.06(0.77,1.45)      | 1.02(0.73,1.44)             | 1.04(0.81,1.33)                   | 1.00(0.77,1.31)       | 0.96(0.73,1.27)                   | 0.93(0.70,1.25)       | 0.95(0.74,1.22)       | 0.89(0.68,1.16)       |
| face mask        | 0.65(0.46,0.92)      | 0.63(0.44,0.92)             | 0.89(0.71,1.11)                   | 0.84(0.66,1.08)       | 0.74(0.56,0.97)                   | 0.73(0.54,0.98)       | 0.77(0.60,0.99)       | 0.74(0.56,0.98)       |
| gloves           | 1.20(0.74,1.95)      | 1.12(0.61,2.06)             | 1.33(0.80,2.22)                   | 1.33(0.73,2.40)       | 1.74(0.86,3.50)                   | 1.84(0.92,3.69)       | 1.36(0.86,2.15)       | 1.20(0.69,2.07)       |
| goggles/glasses  | 0.99(0.69,1.43)      | 0.90(0.60,1.35)             | 1.10(0.86,1.41)                   | 1.05(0.81,1.37)       | 0.82(0.58,1.17)                   | 0.82(0.57,1.19)       | 0.97(0.74,1.27)       | 0.91(0.67,1.23)       |

Note: IHO=Industrial hog operation. MDRSA=Multidrug-resistant *S. aureus*. OR=Odds Ratio. aOR=Adjusted Odds Ratio. CI=Confidence Interval. \(^a\) aOR were adjusted for time-varying changes in reported dust, temperature, and malodor levels, which were reported at 651/801 biweekly study visits completed by IHO workers. Dustiness inside the barn was reported on a Likert scale of 0-4, with 0=could see clearly and 4=could not see clearly. Barn temperature was reported on a Likert scale of 0-2, with 0=cold, 1=comfortable and 2=hot. Amount of malodor inside the barn was reported on a Likert scale of 0-4, with 0=no malodor and 4=extreme malodor.
Table S4. *Staphylococcus aureus* nasal carriage patterns among 101 industrial hog operation (IHO) workers and 79 household contacts cultured biweekly over four months in North Carolina, 2013-2014.

|                | Overall n=180 (%) | IHO Workers n=101 (%) | Household Members n=79 (%) | PR\(^a\) (95% CI) | chi-square\(^b\) (p-value) |
|----------------|-------------------|-----------------------|-----------------------------|-------------------|--------------------------|
| **S. aureus**  |                   |                       |                             |                   |                          |
| Non-carrier    | 40 (22)           | 17 (17)               | 23 (29)                     | 0.55 (0.34, 0.89) | 5.14 (0.08)              |
| Intermittent   | 83 (46)           | 52 (51)               | 31 (39)                     | 1.35 (0.96, 1.90) |                          |
| Persistent     | 57 (32)           | 32 (32)               | 25 (32)                     | 0.97 (0.69, 1.36) |                          |
| **MRSA**       |                   |                       |                             |                   |                          |
| Non-carrier    | 172 (96)          | 96 (95)               | 76 (96)                     | 0.99 (0.93, 1.05) | --\(^*\)                 |
| Intermittent   | 7 (4)             | 4 (4)                 | 3 (4)                       | 1.04 (0.23, 4.74) |                          |
| Persistent     | 1 (1)             | 1 (1)                 | 0                           | --                |                          |
| **MDRSA**      |                   |                       |                             |                   |                          |
| Non-carrier    | 115 (64)          | 57 (56)               | 58 (73)                     | 0.77 (0.62, 0.96) | 6.26 (<0.04)             |
| Intermittent   | 47 (26)           | 31 (31)               | 16 (20)                     | 1.51 (0.90, 2.56) |                          |
| Persistent     | 18 (10)           | 13 (13)               | 5 (6)                       | 1.95 (0.81, 4.68) |                          |
| **scn-negative** | S. aureus**      |                       |                             |                   |                          |
| Non-carrier    | 109 (61)          | 48 (48)               | 61 (77)                     | 0.61 (0.49, 0.76) | 19.96 (<0.0001)          |
| Intermittent   | 54 (30)           | 40 (40)               | 14 (18)                     | 2.26 (1.36, 3.77) |                          |
| Persistent     | 17 (9)            | 13 (13)               | 4 (5)                       | 2.32 (1.03, 5.26) |                          |
| **tetracycline-resistant** | S. aureus**  |                       |                             |                   |                          |
| Non-carrier    | 123 (68)          | 57 (56)               | 66 (84)                     | 0.68 (0.56, 0.81) | 15.28 (<0.0005)          |
| Intermittent   | 45 (25)           | 35 (35)               | 10 (13)                     | 2.78 (1.49, 5.22) |                          |
| Persistent     | 12 (7)            | 9 (9)                 | 3 (4)                       | 2.44 (0.66, 9.05) |                          |
| **spa type associated with CC398 or CC9** |                   |                       |                             |                   |                          |
| Non-carrier    | 123 (68)          | 54 (53)               | 69 (87)                     | 0.62 (0.51, 0.74) | 25.91 (<0.0001)          |
| Intermittent   | 42 (23)           | 35 (35)               | 7 (9)                       | 4.16 (1.94, 8.91) |                          |
| Persistent     | 15 (8)            | 12 (12)               | 3 (4)                       | 3.09 (0.99, 9.72) |                          |

**Note.** IHO=industrial hog operation. MRSA=Methicillin-resistant *S. aureus*. MDRSA=Multidrug-resistant *S. aureus*. PR=prevalence ratio. CI=confidence interval. Individuals with no swabs positive for an outcome were defined as non-carriers of that outcome. Individuals with >0% and <80% of swabs positive for an outcome were intermittent carriers. Individuals with ≥80% of swabs positive for an outcome were persistent carriers.

\(^a\)Unadjusted prevalence ratios were generated using log binomial regression models using a generalized estimating equation (GEE) with an exchangeable correlation matrix to account for the non-independence of observations within households. Household members were the referent group. Stable measurements could not be produced for some associations due to small numbers.

\(^b\)The Rao-Scott chi-square test was used to examine the hypothesis that the distribution of non-carriers, intermittent carriers, and persistent carriers did not differ between industrial hog operation workers and household contacts for each outcome, while adjusting for within-household clustering. Degrees of freedom=2 for all tests. \(^*\) = chi-square test could not be computed because at least one cell had a frequency of 0.
Table S5. Associations between 101 industrial hog operation (IHO) workers’ time-varying (transient) occupational activities the week prior to biweekly nasal swabbing time points and changes in nasal carriage of *scn*-positive *Staphylococcus aureus* over four months, North Carolina, USA, 2013-2014.

| Exposure                                    | Overall N=801 | *scn*-positive *S. aureus* N=181 |
|---------------------------------------------|---------------|----------------------------------|
|                                             | n (%) | Mean ± SD | n (%) | Mean ± SD | OR (95% CI) |
| No. of pigs in contact with                 | 27,627 ± 143,098 | 14,362 ± 35,094 | 0.95 (0.60, 1.51) |
| No. of sows/farrow/wean/nursery pigs in contact with | 8,546 ± 65,986 | 2,408 ± 4,165 | 0.75 (0.55, 1.02) |
| Contact with feeder/finish pigs             | 208 (26) | 53 (29) | 17.46 (2.19, 139.56) |
| Handled sick pigs                           | 410 (51) | 90 (50) | 0.88 (0.40, 1.91) |
| Handled dead pigs                           | 509 (64) | 114 (63) | 1.63 (0.62, 4.26) |
| Pressure washed barns                       | 275 (34) | 60 (33) | 1.33 (0.62, 2.88) |
| Used pesticides                             | 200 (25) | 38 (21) | 0.95 (0.48, 1.87) |
| Gave pigs shots                             | 337 (42) | 72 (40) | 0.84 (0.40, 1.77) |
| Pct time used coveralls                     | 82 ± 37 | 84 ± 34 | 0.97 (0.67, 1.41) |
| Pct time used face mask                     | 54 ± 46 | 62 ± 45 | 0.93 (0.72, 1.21) |
| Pct time used gloves                        | 96 ± 18 | 95 ± 20 | 0.87 (0.48, 1.58) |
| Pct time used boots                         | 99 ± 9  | 99 ± 10 | -- |
| Pct time used goggles/glasses                | 31 ± 43 | 36 ± 45 | 0.89 (0.68, 1.16) |
| No. of hours worked                         | 43 ± 11 | 43 ± 9  | 1.04 (0.75, 1.45) |

Note. IHO = industrial hog operation. OR = odds ratio. CI = confidence interval. SD=Standard Deviation. Effect measures were generated using conditional fixed-effects logistic regression models. Fixed effects models examine associations between within-person changes in an exposure and within-person changes in an outcome over time.

*a* For binary exposures, the number of study visits for which the exposure was reported is provided as a percentage of all biweekly study visits, and as a percentage of the biweekly visits at which workers carried *scn*-positive *S. aureus*. For continuous exposures, the mean and standard deviation of the reported exposure is provided across all biweekly study visits and for biweekly visits at which participants carried *scn*-positive *S. aureus*.

*b* Exposure was log-transformed for analysis.

*c* Examined in increments of 25%.

*d* Examined in increments of 10 hours.
Table S6. Associations between 101 industrial hog operation (IHO) workers’ habitual occupational activities over four months and biweekly nasal carriage of *scn*-positive *Staphylococcus aureus* by IHO workers’ 79 adult and minor household members, North Carolina, 2013-2014.

| Exposure of IHO worker(s) living in the household<sup>a</sup> | No. of biweekly study visits completed by household members with exposure | *scn*-positive S. aureus N = 216 |
|-------------------------------------------------------------|--------------------------------------------------------------------------|---------------------------------|
| Average no. of pigs in contact with<sup>b</sup> | N = 655 | n (%) | OR(95%CI) |
| <4000 | 398 | 163 (41) | ref |
| ≥4000 | 257 | 53 (21) | 0.40(0.16,1.02) |
| Average no. of sows/farrow/ wean/nursery pigs in contact with<sup>b</sup> | N = 655 | n (%) | OR(95%CI) |
| <2000 | 312 | 127 (41) | ref |
| ≥2000 | 343 | 89 (26) | 0.59(0.22,1.57) |
| Contact with feeder/finish pigs | | | |
| Never | 481 | 161 (33) | ref |
| Ever | 174 | 55 (32) | 0.84(0.27,2.61) |
| Handled sick pigs | | | |
| Sometimes or Never | 508 | 132 (26) | ref |
| Consistently | 147 | 84 (57) | 3.66(1.35,9.95) |
| Handled dead pigs | | | |
| Sometimes or Never | 391 | 62 (16) | ref |
| Consistently | 264 | 154 (58) | 7.93(3.41,18.45) |
| Pressure washed barns | | | |
| Never | 142 | 57 (40) | ref |
| Ever | 513 | 159 (31) | 0.71(0.25,2.07) |
| Used pesticides | | | |
| Never | 123 | 41 (33) | ref |
| Ever | 523 | 175 (33) | 1.57(0.47,5.20) |
| Gave pigs shots | | | |
| Never | 79 | 23 (29) | ref |
| Ever | 576 | 193 (34) | 1.96(0.54,7.14) |
| Frequency of coveralls use | | | |
| Sometimes or Never | 203 | 53 (26) | ref |
| Consistently | 452 | 163 (36) | 1.28(0.48,3.39) |
| Frequency of face mask use | | | |
| Sometimes or Never | 365 | 106 (29) | ref |
| Consistently | 290 | 110 (38) | 1.57(0.60,4.10) |
| Frequency of glasses/goggles use | | | |
| Sometimes or Never | 576 | 183 (32) | ref |
| Consistently | 79 | 33 (42) | 1.95(0.32,11.96) |
| Average no. of hours worked per week at IHO<sup>b</sup> | N = 655 | n (%) | OR(95%CI) |
| <40 | 130 | 43 (33) | ref |
| ≥40 | 525 | 173 (33) | 1.37(0.34,5.47) |

Note: IHO=Industrial hog operation. OR=Odds Ratio. CI=95% Confidence Interval. Odds ratio effect measures were estimated using logistic regression models with a generalized estimating equation and an exchangeable correlation matrix to account for the non-independence of observations within the same household. ORs were adjusted for the age and sex of household members.

<sup>a</sup>IHO workers living in the household reported their occupational activities during the week prior at up to eight biweekly study visits. For dichotomous exposures expressed as “Sometimes or never” or “Consistently” (e.g. handled dead pigs); “Sometimes or never” refers to activities that an IHO worker reported at ≥0 but <80% of completed biweekly visits, and “Consistently” refers to activities reported at ≥80% of completed biweekly visits. For continuous exposures expressed as “Sometimes or never” or “Consistently” (e.g. percent time used face mask), “Sometimes or Never” refers to activities a...
worker reported doing ≥0 but <80% of the time, on average, across all completed biweekly visits, and “Consistently” refers to activities a worker reported doing ≥80% of the time, on average, across all completed biweekly visits.

bCut-off is the median value of the average numbers reported by workers over the four-month period, rounded to one significant digit.
Table S7. Concordant *Staphylococcus aureus* spa types between industrial hog operation (IHO) workers and their household contacts observed at biweekly nasal swabbing time points over four months of follow-up, North Carolina, USA, 2013-2014.

| Household | Study Visit | Participant Type | spa type | Multidrug-resistant | *scn*-negative | Tetracycline-Resistant | Putative CC398 or CC9 |
|-----------|-------------|------------------|----------|---------------------|----------------|-----------------------|----------------------|
| A         | 8           | Worker           | t4976    | 0                   | 0              | 0                     | 0                    |
| A         | 8           | Minor            | t4976    | 0                   | 0              | 0                     | 0                    |
| B         | BL          | Worker           | t645     | 0                   | 0              | 0                     | 0                    |
| B         | BL          | Minor            | t645     | 0                   | 0              | 0                     | 0                    |
| B         | 1           | Worker           | t645     | 0                   | 0              | 0                     | 0                    |
| B         | 1           | Minor            | t645     | 0                   | 0              | 0                     | 0                    |
| B         | 2           | Worker           | t645     | 0                   | 0              | 0                     | 0                    |
| B         | 2           | Minor            | t645     | 0                   | 0              | 0                     | 0                    |
| B         | 3           | Worker           | t645     | 0                   | 0              | 0                     | 0                    |
| B         | 3           | Minor            | t645     | 0                   | 0              | 0                     | 0                    |
| B         | 4           | Worker           | t645     | 0                   | 0              | 0                     | 0                    |
| B         | 4           | Minor            | t645     | 0                   | 0              | 0                     | 0                    |
| B         | 5           | Worker           | t645     | 0                   | 0              | 0                     | 0                    |
| B         | 5           | Minor            | t645     | 0                   | 0              | 0                     | 0                    |
| B         | 6           | Worker           | t645     | 0                   | 0              | 0                     | 0                    |
| B         | 6           | Adult            | t645     | 0                   | 0              | 0                     | 0                    |
| B         | 6           | Minor            | t645     | 0                   | 0              | 0                     | 0                    |
| C         | 4           | Worker           | t148     | 0                   | 0              | 0                     | 0                    |
| C         | 4           | Minor            | t148     | 0                   | 0              | 0                     | 0                    |
| C         | 5           | Worker           | t148     | 0                   | 0              | 0                     | 0                    |
| C         | 5           | Minor            | t148     | 0                   | 0              | 0                     | 0                    |
| D         | 2           | Worker           | t3446    | 0                   | 1              | 0                     | 1                    |
| D         | 2           | Minor            | t3446    | 0                   | 1              | 0                     | 1                    |
| E         | BL          | Worker           | t7226    | 0                   | 0              | 0                     | 0                    |
| E         | BL          | Minor            | t7226    | 0                   | 0              | 0                     | 0                    |
| E         | 1           | Worker           | t7226    | 0                   | 0              | 0                     | 0                    |
| E         | 1           | Minor            | t7226    | 0                   | 0              | 0                     | 0                    |
| F         | 2           | Worker           | t189     | 0                   | 0              | 0                     | 0                    |
| F         | 2           | Adult            | t189     | 0                   | 0              | 0                     | 0                    |
| F         | 3           | Worker           | t189     | 1                   | 0              | 0                     | 0                    |
| F         | 3           | Minor            | t189     | 0                   | 0              | 0                     | 0                    |
| F         | 4           | Worker           | t189     | 0                   | 0              | 0                     | 0                    |
| F         | 4           | Minor            | t189     | 0                   | 0              | 0                     | 0                    |
| F         | 6           | Worker           | t189     | 0                   | 0              | 0                     | 0                    |
| F         | 6           | Adult            | t189     | 0                   | 0              | 0                     | 0                    |
| F         | 6           | Minor            | t189     | 0                   | 0              | 0                     | 0                    |
| G         | BL          | Worker           | t233     | 0                   | 0              | 0                     | 0                    |
| G         | BL          | Minor            | t233     | 0                   | 0              | 0                     | 0                    |
| G         | 7           | Worker           | t233     | 0                   | 0              | 0                     | 0                    |
| G         | 7           | Minor            | t233     | 0                   | 0              | 0                     | 0                    |
|   |   | Characteristic | Time | 0 | 1 | 0 | 0 | 0 | 0 |
|---|---|----------------|------|---|---|---|---|---|---|
| G | 8 | Worker         | t233 | 0 | 0 | 1 | 0 |   |   |
| G | 8 | Minor          | t233 | 0 | 0 | 0 | 0 |   |   |
| H | 6 | Worker         | t008 | 1 | 0 | 0 | 0 |   |   |
| H | 6 | Minor          | t008 | 1 | 0 | 0 | 0 |   |   |
| I | BL | Worker      | t659 | 1 | 0 | 0 | 0 |   |   |
| I | BL | Adult         | t659 | 1 | 0 | 0 | 0 |   |   |
| J | 4 | Worker         | t14157 | 0 | 1 | 1 | 1 |   |   |
| J | 4 | Minor          | t14157 | 0 | 1 | 1 | 1 |   |   |
| K | BL | Worker    | t4976 | 1 | 0 | 1 | 0 |   |   |
| K | BL | Minor        | t4976 | 0 | 0 | 0 | 0 |   |   |
| L | BL | Worker     | t701 | 0 | 0 | 1 | 0 |   |   |
| L | 1 | Worker      | t150 | 0 | 0 | 0 | 0 |   |   |
| L | 1 | Adult        | t150 | 0 | 0 | 0 | 0 |   |   |
| L | 2 | Worker      | t150 | 0 | 0 | 0 | 0 |   |   |
| L | 2 | Adult        | t150 | 0 | 0 | 0 | 0 |   |   |
| M | BL | Worker     | t701 | 0 | 0 | 1 | 0 |   |   |
| M | BL | Adult       | t701 | 0 | 0 | 1 | 0 |   |   |
| M | 1 | Worker      | t701 | 0 | 0 | 0 | 0 |   |   |
| M | 1 | Adult        | t701 | 0 | 0 | 0 | 0 |   |   |
| N | 1 | Worker      | t189 | 0 | 1 | 0 | 0 |   |   |
| N | 1 | Minor        | t189 | 0 | 1 | 0 | 0 |   |   |
| O | 2 | Worker      | t701 | 0 | 0 | 0 | 0 |   |   |
| O | 2 | Minor        | t701 | 0 | 0 | 0 | 0 |   |   |
| P | 1 | Worker      | t701 | 0 | 0 | 0 | 0 |   |   |
| P | 1 | Minor        | t701 | 0 | 0 | 0 | 0 |   |   |
| Q | 8 | Worker      | t1937 | 0 | 0 | 0 | 0 |   |   |
| Q | 8 | Adult        | t1937 | 0 | 0 | 0 | 0 |   |   |
| R | 6 | Worker      | t1937 | 0 | 0 | 0 | 0 |   |   |
| R | 6 | Adult        | t1937 | 0 | 0 | 0 | 0 |   |   |
| R | 6 | Minor        | t1937 | 0 | 0 | 0 | 0 |   |   |
| S | 3 | Worker      | t230 | 0 | 0 | 0 | 0 |   |   |
| S | 3 | Minor        | t230 | 0 | 0 | 0 | 0 |   |   |
| T | BL | Worker     | t233 | 0 | 0 | 0 | 0 |   |   |
| T | BL | Minor       | t233 | 0 | 0 | 0 | 0 |   |   |
| T | 1 | Worker      | t233 | 0 | 0 | 0 | 0 |   |   |
| T | 1 | Minor        | t233 | 0 | 0 | 0 | 0 |   |   |
| T | 7 | Worker      | t233 | 0 | 0 | 0 | 0 |   |   |
| T | 7 | Minor        | t233 | 0 | 0 | 0 | 0 |   |   |
| U | 1 | Worker      | t091 | 0 | 0 | 0 | 0 |   |   |
| U | 1 | Minor        | t091 | 0 | 0 | 0 | 0 |   |   |
| U | 2 | Worker      | t091 | 0 | 0 | 0 | 0 |   |   |
| U | 2 | Minor        | t091 | 0 | 0 | 0 | 0 |   |   |
| U | 5 | Worker      | t091 | 0 | 0 | 0 | 0 |   |   |
| U | 5 | Minor        | t091 | 0 | 0 | 0 | 0 |   |   |

*Note.* BL = baseline study visit. 0 = absence of indicated characteristic, 1 = occurrence of indicated characteristic.

*Study visit included a baseline time point (“BL”) and up to eight biweekly time points (study visits 1-8).*
Supplementary Figures

Figure S1. Flow diagram of nasal swabs collected from industrial hog operation (IHO) workers and their adult and minor child household members that were included in analysis, North Carolina, USA, 2013-2014.

1,588 swabs from
- 103 IHO workers (877 swabs)
- 26 adult household members (239 swabs)
- 54 minor household members (472 swabs)

1,459 swabs

129 swabs frozen prior to processing, excluded from:
- 46 IHO workers (74 swabs)
- 13 adult household members (24 swabs)
- 20 minor household members (31 swabs)

3 swabs from participants who did not complete at least 1/8 bi-weekly visit, excluded from:
- 2 IHO workers (2 swabs)
- 1 minor household member (1 swab)

1,456 swabs from
- 101 IHO workers (801 swabs)
- 26 adult household members (215 swabs)
- 53 minor household members (440 swabs)
  included in analysis
Figure S2. Temporal distribution of *Staphylococcus aureus* nasal carriage and *spa* types among 101 industrial hog operation (IHO) workers and 79 household contacts at biweekly sampling intervals over four months, North Carolina, USA, 2013-2014.

A) Industrial hog operation workers (n=801 swabs)

B) Household contacts (n=655 swabs)

| ID | BL | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  |
|----|----|----|----|----|----|----|----|----|----|
|    |    |    |    |    |    |    |    |    |    |

**Note:** BL=Baseline study visit. NT=Non-typeable by *spa* typing. Biweekly sampling time points indicated by study visit columns 1-8. Boxes with text (either *spa* type or “NT”) indicate *S. aureus*-positive sampling time points. White boxes without text indicate *S. aureus*-negative sampling points. Gray boxes indicate missing data (nasal swabs not collected or not analyzed). Boxes highlighted in black indicate *spa* types that have previously been associated with clonal complexes (CC) 398 or 9 in the literature.
Figure S3. Temporal distribution of multidrug-resistant and livestock-associated *Staphylococcus aureus* nasal carriage outcomes among 101 industrial hog operation (IHO) workers at biweekly sampling intervals over four months, stratified by reported protective face mask usage of the IHO worker, North Carolina, USA, 2013-2014.

### Sometimes or never used face mask over four months\(^a\)

|        | A) Multidrug-resistant | B) *scn*-negative | C) Tetracycline-resistant | D) Putative CC398 or CC9 |
|--------|------------------------|-------------------|---------------------------|-------------------------|
| ID     | BL                     | 1                 | 2                         | 3                       | 4                       | 5                       | 6                       | 7                       | 8                       |
|        |                        |                   |                           |                         |                         |                         |                         |                         |                         |
|        |                        |                   |                           |                         |                         |                         |                         |                         |                         |
|        |                        |                   |                           |                         |                         |                         |                         |                         |                         |
|        |                        |                   |                           |                         |                         |                         |                         |                         |                         |
|        |                        |                   |                           |                         |                         |                         |                         |                         |                         |
|        |                        |                   |                           |                         |                         |                         |                         |                         |                         |

**Note.** BL = baseline study visit sampling time point. Biweekly sampling time points indicated by study visit columns 1-8. Black boxes indicate sampling points that were positive for the outcome indicated. White boxes without text indicate sampling time points that were negative for the indicated outcome. Grey boxes indicate missing data (nasal swabs not collected or not analyzed). OR = odds ratio. CI = confidence interval.

\(^a\)IHO workers who reported wearing a face mask <80% of the time during the week prior to nasal swabbing, on average, across all completed biweekly study visits.

\(^b\)IHO workers who reported wearing a face mask \(\geq 80\%\) of the time during the week prior to nasal swabbing, on average, across all completed biweekly study visits.

\(^c\)Odds ratio effect measures were estimated using logistic regression models with a generalized estimating equation (GEE) and an exchangeable correlation matrix to account for the non-independence of observations within the same household. ORs were adjusted for age and sex of IHO workers.
Figure S4. Temporal distribution of multidrug-resistant and livestock-associated *Staphylococcus aureus* nasal carriage outcomes among 79 household contacts of industrial hog operation (IHO) workers at biweekly sampling intervals over four months, stratified by reported protective face mask usage among IHO worker(s) living in the household, North Carolina, USA, 2013-2014.

### Sometimes or never used face mask over four months

| Study Visit | ID  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|-------------|-----|---|---|---|---|---|---|---|---|
| BL          |     |   |   |   |   |   |   |   |   |
| 1           |     |   |   |   |   |   |   |   |   |
| 2           |     |   |   |   |   |   |   |   |   |
| 3           |     |   |   |   |   |   |   |   |   |
| 4           |     |   |   |   |   |   |   |   |   |
| 5           |     |   |   |   |   |   |   |   |   |
| 6           |     |   |   |   |   |   |   |   |   |
| 7           |     |   |   |   |   |   |   |   |   |
| 8           |     |   |   |   |   |   |   |   |   |

### Consistently used face mask over four months

| Study Visit | ID  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|-------------|-----|---|---|---|---|---|---|---|---|
| BL          |     |   |   |   |   |   |   |   |   |
| 1           |     |   |   |   |   |   |   |   |   |
| 2           |     |   |   |   |   |   |   |   |   |
| 3           |     |   |   |   |   |   |   |   |   |
| 4           |     |   |   |   |   |   |   |   |   |
| 5           |     |   |   |   |   |   |   |   |   |
| 6           |     |   |   |   |   |   |   |   |   |
| 7           |     |   |   |   |   |   |   |   |   |
| 8           |     |   |   |   |   |   |   |   |   |

**Note.** BL = baseline study visit sampling time point. Biweekly sampling time points indicated by study visit columns 1-8. IHO = industrial hog operation. Black boxes indicate sampling points that were positive for the outcome indicated. White boxes without text indicate sampling time points that were negative for the indicated outcome. Gray boxes indicate missing data (nasal swabs not collected or not analyzed). OR = odds ratio. CI = confidence interval.

a IHO worker(s) living in the household reported wearing a face mask <80% of the time during the one week prior to nasal swabbing, on average, during up to 8 completed biweekly study visits.

b IHO worker(s) living in the household reported wearing a face mask ≥80% of the time during the one week prior to nasal swabbing, on average, during up to 8 completed biweekly study visits.

c Odds ratios were estimated using logistic regression models with a generalized estimating equation (GEE) and an exchangeable correlation matrix to account for the non-independence of observations within the same household. ORs were adjusted for the age and sex of household members.
Figure S5. Average log-transformed *Staphylococcus aureus* colony forming units (CFU) among intermittent and persistent nasal carriers of *S. aureus*, and *S. aureus* putatively associated with CC398 or CC9, 2013-2014.

a) *S. aureus* nasal carriers

|                | Overall (n=208) | IHO Workers (n=138) | Household members (n=70) | Intermittent | Overall (n=437) | IHO Workers (n=245) | Household members (n=192) | Persistent |
|----------------|------------------|---------------------|--------------------------|--------------|------------------|---------------------|--------------------------|------------|
| S. aureus log10 CFU | 2.0              | 2.0                 | 2.0                      | 2.0          | 3.7              | 4.2                 | 4.0                      | 3.7        |

b) *S. aureus* CC398 or CC9 carriers

|                | Overall (n=97) | IHO Workers (n=90) | Household members (n=7) | Intermittent | Overall (n=103) | IHO Workers (n=84) | Household members (n=19) | Persistent |
|----------------|----------------|-------------------|-------------------------|--------------|------------------|---------------------|--------------------------|------------|
| S. aureus log10 CFU | 2.6            | 2.6               | 3.0                     | 3.6          | 3.6              | 3.6                 | 3.5                      | 3.5        |

Note. CFU=Colony forming units. IHO=Industrial hog operation. Individuals with >0% and <80% of swabs positive for an outcome were intermittent carriers. Individuals with ≥80% of swabs positive for an outcome were persistent carriers. We assumed all colonies with *S. aureus* morphology that grew on CHROMagar Staph aureus were truly *S. aureus* for these calculations. Prior to log transformation, we imputed a value of five CFUs for nasal swabs that were *S. aureus*-positive only after enrichment and a value of one CFU as the lower limit of detection for swabs that remained *S. aureus*-negative after enrichment. Points represent mean log_{10} *S. aureus* CFU among swabs that were positive for the stated outcome by culture. Vertical lines indicate 95% confidence intervals for each mean. n=number of swabs contributing to the calculation.
References
Clinical and Laboratory Standards Institute. 2013. M100-S23: Performance Standards for Antimicrobial Susceptibility Testing; Twenty-Third Informational Supplement.