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| **Table S1: Associations between cow covariates and alpha diversity measures using regression modeling** | | | | | |
|  |  |  |  |  |  |
| Covariate | Alpha Diversity | Levels | OR \* | Lower CI\* | Upper CI\* |
| t Days in milk (continuous) | Richness |  | 0.91 | 0.67 | 1.24 |
|  |  |  |  |  |  |
|  | Shannons |  | 0.91 | 0.57 | 1.46 |
|  |  |  |  |  |  |
|  | Evenness |  | 1.05 | 0.69 | 1.60 |
|  |  |  |  |  |  |
| Ŧ Parity (1, 2, 3) | Richness | Parity 1 | 1.00 |  |  |
|  |  | Parity 2 | 0.48 | 0.41 | 0.57 |
|  |  | Parity > 3 | 0.99 | 0.87 | 1.13 |
|  | Shannons | Parity 1 | 1.00 |  |  |
|  |  | Parity 2 | 0.28 | 0.06 | 1.23 |
|  |  | Parity > 3 | 1.64 | 0.52 | 5.17 |
|  | Evenness | Parity 1 | 1.00 |  |  |
|  |  | Parity 2 | 0.26 | 0.06 | 1.16 |
|  |  | Parity > 3 | 1.57 | 0.53 | 4.69 |
| § Disease (0, 1) | Richness | Absent | 1.00 |  |  |
|  |  | Present | 0.96 | 0.53 | 1.75 |
|  | Shannons | Absent | 1.00 |  |  |
|  |  | Present | 1.05 | 0.43 | 2.58 |
|  | Evenness | Absent | 1.00 |  |  |
|  |  | Present | 1.22 | 0.49 | 3.03 |
| § Farm (1, 2) | Richness | Farm 1 | 1.00 |  |  |
|  |  | Farm 2 | 0.35 | 0.14 | 0.92 |
|  | Shannons | Farm 1 | 1.00 |  |  |
|  |  | Farm 2 | 0.37 | 0.13 | 1.06 |
|  | Evenness | Farm 1 | 1.00 |  |  |
|  |  | Farm 2 | 0.52 | 0.20 | 1.35 |
| Ŧ Treatment (0, 1, 2) | Richness | No Treatment | 1.00 |  |  |
|  |  | Antibiotic | 0.90 | 0.81 | 1.00 |
|  |  | Other | 0.88 | 0.74 | 1.04 |
|  | Shannons | No Treatment | 1.00 |  |  |
|  |  | Antibiotic | 0.83 | 0.29 | 2.36 |
|  |  | Other | 0.68 | 0.19 | 2.47 |
|  | Evenness | No Treatment | 1.00 |  |  |
|  |  | Antibiotic | 0.82 | 0.29 | 2.37 |
|  |  | Other | 1.00 | 0.27 | 3.70 |
| \* Odds ratios and confidence intervals were calculated from model coefficients and SE using interquartile range | | | | | |
| t Mixed linear regression model with 'cow' as a random effect. P values reflect models comparison to null | | | | | |
| Ŧ Multinomial model with diversity measure averaged by cow | | | | | |
| § Logistic model with diversity measure averaged by cow | | | | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Table S2: Crude and confounder adjusted estimates of associations between O157 category and alpha diversity** | | | |
|  |  |  |  |
| O157 Category (levels) | Alpha Diversity | Measurement | OR\* (CI) |
| t Pathotype | Richness | Crude | 0.931 (0.56 - 1.54) |
| (aEPEC vs EHEC) |  | Adjusted Parity | 0.985 (0.59 - 1.65) |
|  |  | Adjusted Treatment | 0.964 (0.60 - 1.56) |
|  |  | Adjusted Farm | 0.874 (0.53 - 1.44) |
|  |  | Adjusted Treatment + Parity | 1.02 (0.62 - 1.69) |
|  |  | Adjusted Treatment + Farm | 0.95 (0.58 - 1.57) |
|  |  | Adjusted Parity + Farm | 0.915 (0.55 - 1.52) |
|  |  | Adjusted Parity + Farm + Treatment | 1.00 (0.60 - 1.68) |
|  | Shannons | Crude | 1.042 (0.49 - 2.20) |
|  |  | Adjusted Parity | 1.240 (0.57 - 2.69) |
|  |  | Adjusted Treatment | 1.09 (0.58 - 2.05) |
|  |  | Adjusted Farm | 0.929 (0.45 - 1.90) |
|  |  | Adjusted Treatment + Parity | 1.29 (0.67 - 2.51) |
|  |  | Adjusted Treatment + Farm | 1.08 (0.56 - 2.07) |
|  |  | Adjusted Parity + Farm | 1.106 (0.53 - 2.29) |
|  |  | Adjusted Parity + Farm + Treatment | 1.27 (0.64 - 2.50) |
|  | Evenness | Crude | 1.176 (0.60 - 2.31) |
|  |  | Adjusted Parity | 1.412 (0.72 - 2.75) |
|  |  | Adjusted Treatment | 1.18 (0.66 - 2.11) |
|  |  | Adjusted Farm | 1.083 (0.56 - 2.10) |
|  |  | Adjusted Treatment + Parity | 1.44 (0.80 - 2.59) |
|  |  | Adjusted Treatment + Farm | 1.17 (0.64 - 2.12) |
|  |  | Adjusted Parity + Farm | 1.339 (0.70 - 2.56) |
|  |  | Adjusted Parity + Farm + Treatment | 1.43 (0.79 - 2.58) |
| **Ŧ**Ever/Never (0,1) | Richness | Crude | 0.927 (0.50 - 1.73) |
| (Shed vs Never Shed) |  | Adjusted Parity | 1.026 (0.54 - 1.94) |
|  |  | Adjusted Treatment | 0.92 (0.48 - 1.74) |
|  |  | Adjusted Farm | 1.187 (0.60 - 2.33) |
|  |  | Adjusted Treatment + Parity | 1.02 (0.54 - 1.93) |
|  |  | Adjusted Treatment + Farm | 0.91 (0.45 - 1.83) |
|  |  | Adjusted Parity + Farm | 0.930 (0.47 - 1.84) |
|  |  | Adjusted Parity + Farm + Treatment | 0.99 (0.50 - 2.00) |
|  | Shannons | Crude | 0.896 (0.36 - 2.24) |
|  |  | Adjusted Parity | 1.205 (0.42 - 3.39) |
|  |  | Adjusted Treatment | 0.90 (0.34 - 2.38) |
|  |  | Adjusted Farm | 0.800 (0.30 - 2.11) |
|  |  | Adjusted Treatment + Parity | 1.25 (0.44 - 3.58) |
|  |  | Adjusted Treatment + Farm | 0.89 (0.31 - 2.59) |
|  |  | Adjusted Parity + Farm | 1.078 (0.37 - 3.13) |
|  |  | Adjusted Parity + Farm + Treatment | 1.24 (0.40 - 3.85) |
|  | Evenness | Crude | 1.281 (0.51 - 3.24) |
|  |  | Adjusted Parity | 1.894 (0.65 - 5.54) |
|  |  | Adjusted Treatment | 1.25 (0.47 - 3.36) |
|  |  | Adjusted Farm | 1.211 (0.47 - 3.13) |
|  |  | Adjusted Treatment + Parity | 2.06 (0.63 - 6.77) |
|  |  | Adjusted Treatment + Farm | 1.29 (0.46 - 3.58) |
|  |  | Adjusted Parity + Farm | 1.795 (0.61 - 5.33) |
|  |  | Adjusted Parity + Farm + Treatment | 2.09 (0.61 - 7.12) |
| § Pattern (0,1,2) | Richness | Crude1 | 1.060 (0.93 - 1.21) |
| (Intermittent1or Multiday2  vs Never Shed) |  | Adjusted Parity1 | 1.227 (1.07 - 1.40) |
|  |  | Adjusted Treatment1 | 1.03 (0.91 - 1.18) |
|  |  | Adjusted Farm1 | 1.112 (0.90 - 1.37) |
|  |  | Adjusted Treatment + Parity1 | 1.22 (1.06 - 1.40) |
|  |  | Adjusted Treatment + Farm1 | 1.12 (0.91 - 1.38) |
|  |  | Adjusted Parity + Farm1 | 1.465 (1.23 - 1.74) |
|  |  | Adjusted Parity + Farm + Treatment1 | 1.39 (1.12 - 1.71) |
|  |  | Crude2 | 0.515 (0.413 - 0.641) |
|  |  | Adjusted Parity2 | 0.599 (0.48 - 0.75) |
|  |  | Adjusted Treatment2 | 0.51 (0.39 - 0.66) |
|  |  | Adjusted Farm2 | 0.326 (0.26 - 0.41) |
|  |  | Adjusted Treatment + Parity2 | 0.62 (0.47 - 0.83) |
|  |  | Adjusted Treatment + Farm2 | 0.43 (0.33 - 0.56) |
|  |  | Adjusted Parity + Farm1 | 0.251 (0.19 - 0.33) |
|  |  | Adjusted Parity + Farm + Treatment2 | 0.36 (0.26 - 0.49) |
|  | Shannons | Crude1 | 0.876 (0.32 - 2.39) |
|  |  | Adjusted Parity1 | 1.171 (0.36 - 3.82) |
|  |  | Adjusted Treatment1 | 0.82 (0.27 - 2.47) |
|  |  | Adjusted Farm1 | 0.900 (0.29 - 2.75) |
|  |  | Adjusted Treatment + Parity1 | 1.27 (0.33 - 4.88) |
|  |  | Adjusted Treatment + Farm1 | 0.87 (0.25 - 2.98) |
|  |  | Adjusted Parity + Farm1 | 1.401 (0.33 - 5.93) |
|  |  | Adjusted Parity + Farm + Treatment1 | 1.65 (0.31 - 8.65) |
|  |  | Crude2 | 0.931 (0.20 - 4.32) |
|  |  | Adjusted Parity2 | 1.285 (0.25 - 6.52) |
|  |  | Adjusted Treatment2 | 1.07 (0.27 - 4.27) |
|  |  | Adjusted Farm2 | 0.640 (0.16 - 2.54) |
|  |  | Adjusted Treatment + Parity2 | 1.65 (0.34 - 8.12) |
|  |  | Adjusted Treatment + Farm2 | 0.91 (0.22 - 3.76) |
|  |  | Adjusted Parity + Farm1 | 0.941 (0.24 - 3.63) |
|  |  | Adjusted Parity + Farm + Treatment2 | 1.29 (0.27 - 6.10) |
|  | Evenness | Crude1 | 1.052 (0.38 - 2.92) |
|  |  | Adjusted Parity1 | 1.498 (0.45 - 4.98) |
|  |  | Adjusted Treatment1 | 1.03 (0.35 - 3.05) |
|  |  | Adjusted Farm1 | 1.097 (0.39 - 3.09) |
|  |  | Adjusted Treatment + Parity1 | 1.76 (0.46 - 6.72) |
|  |  | Adjusted Treatment + Farm1 | 1.10 (0.36 - 3.37) |
|  |  | Adjusted Parity + Farm1 | 1.587 (0.46 - 5.42) |
|  |  | Adjusted Parity + Farm + Treatment1 | 1.95 (0.47 - 8.01) |
|  |  | Crude2 | 2.219 (0.44 - 11.27) |
|  |  | Adjusted Parity2 | 3.248 (0.57 - 18.36) |
|  |  | Adjusted Treatment2 | 2.27 (0.40 - 12.81) |
|  |  | Adjusted Farm2 | 1.703 (0.29 - 9.92) |
|  |  | Adjusted Treatment + Parity2 | 3.22 (0.47 - 21.88) |
|  |  | Adjusted Treatment + Farm2 | 2.00 (0.33 - 12.23) |
|  |  | Adjusted Parity + Farm1 | 3.422 (0.49 - 23.79) |
|  |  | Adjusted Parity + Farm + Treatment2 | 3.08 (0.41 - 23.04) |
| \* Odds ratios and confidence intervals were calculated from model coefficients and SE using interquartile range | | | |
| t Mixed logistic regression model with 'cow' as a random effect | | | |
| Ŧ Logistic regression model with diversity measure averaged by cow | | | |
| § Multinomial model with diversity measure averaged by cow | | | |