**Supplementary file**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Herd | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | J1 | J2 | J3 | J4 | J5 | J6 | J7 | J8 | J9 | J10 | J11 | J12 | Total |
| # of screened camels | 9 | 22 | 15 | 21 | 75 | 30 | 61 | 19 | 15 | 7 | 10 | 7 | 7 | 3 | 21 | 6 | 19 | 9 | 6 | 362 |
| # of positive camels | 8 | 16 | 14 | 19 | 74 | 25 | 59 | 18 | 13 | 4 | 5 | 7 | 5 | 1 | 19 | 3 | 17 | 4 | 3 | 326 |
| % of positive camels | 88.89 | 77.27 | 93.33 | 95.24 | 98.67 | 90.00 | 100.00 | 100.00 | 86.67 | 71.43 | 60.00 | 100.00 | 71.43 | 33.33 | 90.48 | 50.00 | 100.00 | 55.56 | 50.00 | 90.06 |
| Individual camels | 6.82 | 5.38 | 5.16 | 5.39 | 5.44 | 6.75 | 1.203 | 4.38 | 1.72 | 0.3 | 0.49 | 4.75 | 5.41 | 1.51 | 3.63 | 5.47 | 4.45 | 0.33 | 1.91 |  |
| 5.67 | 5.39 | 4.01 | 2.22 | 5.86 | 6.23 | 1.323 | 3.87 | 1.86 | 0.29 | 3.35 | 2.92 | 5.39 | 0.22 | 0.56 | 0.58 | 4.29 | 2.79 | 3.11 |
| 1.35 | 2.68 | 2.1 | 6.47 | 6.63 | 3.03 | 1.496 | 3.15 | 2.7 | 3.86 | 4.52 | 2.81 | 4.96 | 0.25 | 1.42 | 1.6 | 2.46 | 1.1 | 0.36 |
| 2.85 | 5.55 | 5.69 | 5.64 | 6.82 | 6.05 | 1.347 | 1.43 | 5.14 | 2.24 | 0.57 | 3.13 | 1.79 |  | 2.15 | 0.27 | 1.75 | 1.36 | 0.21 |
| 2.6 | 5.44 | 4.87 | 1.05 | 6 | 4.47 | 1.351 | 1.32 | 3 | 1.4 | 1.55 | 1.65 | 0.79 |  | 1.41 | 0.65 | 2.84 | 0.35 | 0.31 |
| 1.37 | 6.71 | 6.69 | 1.64 | 4.59 | 5.72 | 1.238 | 1.23 | 4.85 | 1.09 | 0.95 | 1.56 | 1.57 |  | 1.32 | 2.55 | 4.73 | 0.39 | 2.11 |
| 3.99 | 6.35 | 2.69 | 6.01 | 3.26 | 5.09 | 1.32 | 4.6 | 3.04 | 4.57 | 0.6 | 3.04 | 0.26 |  | 1.46 |  | 1.94 | 2.95 |  |
| 6.45 | 5.52 | 1.49 | 5.18 | 6.26 | 5.93 | 1.541 | 4.36 | 1.57 |  | 2.64 |  |  |  | 2.32 |  | 1.61 | 1.46 |  |
| 0.65 | 0.54 | 3.4 | 6.75 | 7.24 | 2.81 | 1.388 | 3.7 | 2.9 |  | 2.49 |  |  |  | 1.22 |  | 3.62 | 0.73 |  |
|  | 5.56 | 6.1 | 5.71 | 4.63 | 7.3 | 1.257 | 3.66 | 3.9 |  | 0.29 |  |  |  | 2.86 |  | 4.66 |  |  |
|  | 6.41 | 2.3 | 3.23 | 4.3 | 6.32 | 1.241 | 4.03 | 3.25 |  |  |  |  |  | 4.65 |  | 1.16 |  |  |
|  | 5.21 | 2.13 | 5.7 | 2.39 | 2.8 | 1.584 | 3.86 | 4.3 |  |  |  |  |  | 4.69 |  | 1.16 |  |  |
|  | 6.39 | 4.73 | 1.63 | 6.6 | 1.03 | 1.373 | 5.04 | 3.39 |  |  |  |  |  | 2.87 |  | 3.65 |  |  |
|  | 5.78 | 3.8 | 6.14 | 5.38 | 6.39 | 1.511 | 4.99 | 0.68 |  |  |  |  |  | 0.6 |  | 1.79 |  |  |
|  | 5.24 | 0.1 | 3.28 | 4.64 | 2.48 | 1.465 | 3.85 | 0.29 |  |  |  |  |  | 5.61 |  | 4.86 |  |  |
|  | 0.18 |  | 5.79 | 5.8 | 6 | 1.312 | 6.36 |  |  |  |  |  |  | 4.88 |  | 2.38 |  |  |
|  | 2.62 |  | 5.41 | 5.55 | 6.43 | 1.4 | 1.15 |  |  |  |  |  |  | 5.76 |  | 4.55 |  |  |
|  | 0.94 |  | 0.76 | 5.38 | 6.56 | 1.426 | 6.02 |  |  |  |  |  |  | 5.65 |  | 4.13 |  |  |
|  | 0.55 |  | 2.86 | 6.92 | 5.71 | 4.99 | 5.01 |  |  |  |  |  |  | 3.55 |  | 4.73 |  |  |
|  | 0.49 |  | 4.36 | 5.93 | 0.55 | 5.49 |  |  |  |  |  |  |  | 5.13 |  |  |  |  |
|  | 1.95 |  | 3.7 | 2.88 | 4.44 | 6.21 |  |  |  |  |  |  |  | 4.87 |  |  |  |  |
|  | 0.66 |  |  | 6.45 | 1.05 | 5.59 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 4.49 | 0.11 | 5.61 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 5.59 | 1.33 | 5.14 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 5.33 | 1.57 | 5.48 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 5.32 | 3.55 | 6.39 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 3.31 | 2.41 | 5.76 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 5.97 | 1.67 | 5.22 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 6.53 | 0.55 | 5.15 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 5.37 | 2.44 | 6.57 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 6.77 |  | 5.7 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 7.11 |  | 6.27 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 7.37 |  | 6.08 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 6.03 |  | 5.44 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 5.8 |  | 5.81 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 6.45 |  | 5.92 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 4.82 |  | 6.09 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 2.73 |  | 2.55 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 5.24 |  | 1.75 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 6.35 |  | 1.13 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 6.51 |  | 5.99 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 7.63 |  | 3.78 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 7.06 |  | 2.78 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 5.75 |  | 1.86 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 6.11 |  | 2.81 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 5.69 |  | 3.44 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 5.74 |  | 3.39 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 6.32 |  | 1.77 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 6.69 |  | 3.19 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 4.39 |  | 3.46 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 6.68 |  | 5.8 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 6.61 |  | 1.95 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 7.42 |  | 2.61 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 6.76 |  | 4.78 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 4.59 |  | 3.03 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 6.27 |  | 6.13 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 5.51 |  | 5.43 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 5.42 |  | 3.48 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 7.95 |  | 1.95 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 4.11 |  | 1.41 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 5.85 |  | 2.62 |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 2.65 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 5.54 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 6.29 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 5.43 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 1.82 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 6.77 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 4.8 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 6.46 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 5.99 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 6.07 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 5.3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 0.78 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 4.67 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 4.76 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

**Table S1: Anti-S1 MERS-CoV antibodies in young camels among different herds in Saudi Arabia.**Camels were considered positive if ELISA ratio was 1.1 (confirmed positive) or >0.8 (borderline/ indeterminate positive). Herds were from Qassim (Q) or Jouf (J) provinces of Saudi Arabia.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| d.p.c. | Experimental camels | | | | | | | | | | Naturally infected camels | | | | | |
|  | C\_10 | C\_10 | C\_12 | C\_12 | C\_16 | C\_16 | C\_32 | C\_32 | C\_40 | C\_40 | C\_101 | C\_101 | C\_102 | C\_102 | C\_103 | C\_103 |
|  | UpE | ORF1a | UpE | ORF1a | UpE | ORF1a | UpE | ORF1a | UpE | ORF1a | UpE | ORF1a | UpE | ORF1a | UpE | ORF1a |
| 0 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |  |  |  |  |  |  |
| 1 | 40 | 40 | 40 | 40 | 40 | 40 | 24 | 26 | 40 | 40 | 23 | 24 | 25 | 26 | 22 | 24 |
| 2 | 24 | 26 | 34 | 35 | 35 | 37 | 22 | 23 | 28 | 29 | 24 | 25 | 26 | 28 | 23 | 25 |
| 3 | 19 | 21 | 36 | 40 | 34 | 35 | 28 | 29 | 28 | 29 | 29 | 30 | 29 | 31 | 29 | 31 |
| 4 | 18 | 20 | 33 | 35 | 35 | 40 | 29 | 30 | 34 | 35 | 28 | 28 | 30 | 32 | 29 | 30 |
| 5 | 21 | 23 | 35 | 35 | 30 | 32 | 30 | 31 | 33 | 35 | 29 | 30 | 29 | 31 | 31 | 32 |
| 6 | 23 | 24 | 34 | 35 | 34 | 35 | 36 | 36 | 23 | 24 | 29 | 29 | 31 | 33 | 32 | 34 |
| 7 | 28 | 29 | 31 | 33 | 35 | 36 | 35 | 36 | 24 | 26 | 33 | 34 | 40 | 40 | 33 | 34 |
| 8 | 25 | 27 | 26 | 27 | 34 | 35 | 36 | 37 | 24 | 25 | 34 | 35 | 40 | 40 | 34 | 35 |
| 9 | 40 | 40 | 26 | 28 | 23 | 24 | 34 | 35 | 24 | 25 | 32 | 34 | 40 | 40 | 33 | 35 |
| 10 | 40 | 40 | 27 | 39 | 25 | 27 | 33 | 34 | 26 | 27 | 36 | 36 | 40 | 40 | 34 | 35 |
| 11 | 40 | 40 | 29 | 30 | 28 | 27 | 38 | 37 | 27 | 28 | 31 | 31 | 40 | 40 | 34 | 36 |
| 12 | 40 | 40 | 37 | 38 | 33 | 35 | 36 | 40 | 36 | 37 | 34 | 36 | 40 | 40 | 36 | 40 |
| 13 | 40 | 40 | 37 | 40 | 32 | 35 | 40 | 40 | 31 | 33 | 37 | 40 | 40 | 40 | 37 | 38 |
| 14 | 40 | 40 | 35 | 36 | 36 | 38 | 40 | 40 | 33 | 35 | 40 | 40 | 40 | 40 | 40 | 40 |
| 42 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |

**Table S2: RT-qPCR detection for UpE and ORF1a genes of MERS-CoV in experimental and naturally infected camels.**

Camels were tested in RT-qPCR assay that detects two amplicons: UpE and ORF1a regions. Ct values are reported as detected. Samples that showed no detection were given the arbitrary value of Ct=40. C indicates a camel followed by a camel number.



**Figure S1: Layout of the research farm.**Distances in the layout are shown in metre (m). Each barn has donning and doffing dedicated areas. The study took place in Barn 1.