**Table S1.** Data of animals and animal husbandry practices by farmers and animal owners in Saudi Arabia (n=522)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Item** | **Farmers**  **(n=291)** | **Commercial Owners**  **(n=118)** | **Private Owners**  **(n=113)** | ***P* value** |
| Number of cows (range) | 0-22 | 0 | 0-1 | - |
| Number of camels (range) | 0-100 | 0-130 | 0-200 | - |
| Number of sheep (range) | 0-800 | 0-1000 | 0-2000 | - |
| Number of goats (range) | 0-300 | 0-200 | 0-350 | - |
| Water source |  |  |  | < 0.001 |
| Government | 143 (49.1) | 20 (16.9) | 7 (6.2) |  |
| Desalinated water | 89 (30.6) | 31 (26.3) | 18 (15.9) |  |
| Wells | 59 (20.3) | 67 (56.8) | 88 (77.9) |  |
| Fodder source |  |  |  |  |
| The market | 285 (97.9) | 115 (97.5) | 103 (91.2) | 0.009 |
| My farm | 5 (1.7) | 3 (2.5) | 10 (8.8) |  |
| Livestock source |  |  |  | < 0.001 |
| Auctions | 143 (49.1) | 49 (41.5) | 34 (30.1) |  |
| Other farms | 111 (38.1) | 59 (50) | 38 (33.6) |  |
| Other countries | 21 (7.2) | 6 (5.1) | 2 (1.8) |  |
| Breeding | 15 (5.2) | 4 (3.4) | 39 (34.5) |  |
| Check livestock before purchasing |  |  |  | < 0.001 |
| No | 27 (9.3) | 15 (12.7) | 29 (25.7) |  |
| Yes, by myself | 213 (73.2) | 89 (75.4) | 59 (52.2) |  |
| Yes, by vet | 51 (17.5) | 14 (11.9) | 25 (22.1) |  |
| Do you mix your livestock with animals from other farms? |  |  |  | < 0.001 |
| Always | 26 (8.9) | 8 (6.8) | 3 (2.7) |  |
| Often | 31 (10.7) | 36 (30.5) | 21 (18.8) |  |
| Never | 232 (79.7) | 74 (62.7) | 88 (78.6) |  |
| Do you sell animal milk? |  |  |  | 0.397 |
| No | 280 (96.2) | 116 (98.3) | 113 (100) |  |
| Yes, inside the farm | 6 (2.1) | 1 (0.8) | 0 (0) |  |
| Yes, outside the farm | 3 (1.0) | 0 (0) | 0 (0) |  |
| Which of these products are made from fresh milk at your farm? |  |  |  | < 0.001 |
| Yogurt | 3 (1.0) | 18 (15.3) | 38 (33.6) |  |
| Ghee/Butter | 4 (1.4) | 20 (16.9) | 54 (47.8) |  |
| Cheese | 4 (1.4) | 3 (2.5) | 10 (8.8) |  |
| None | 282 (96.9) | 97 (82.2) | 54 (47.8) |  |
| Who helps livestock to give birth? |  |  |  | < 0.001 |
| None | 68 (23.4) | 15 (12.7) | 25 (22.1) |  |
| Grazer | 166 (57.0) | 80 (67.8) | 77 (68.1) |  |
| Veterinarian | 12 (4.1) | 6 (5.1) | 4 (3.5) |  |
| Owner | 0 (0) | 5 (4.2) | 3 (2.7) |  |
| I vaccinate my livestock | 23 (17.9) | 16 (13.6) | 0 (0) | < 0.001 |
| Vaccine type |  |  |  |  |
| Total (Pasteurella & Clostridia) | 92 (31.6) | 72 (61) | 87 (77.0) | < 0.001 |
| Pasteurella only | 2 (0.7) | 0 (0) | 0 (0) |  |
| Clostridia only | 3 (1) | 0 (0) | 1 (0.9) | 0.549 |
| Plague only | 7 (2.4) | 9 (7.6) | 10 (8.8) | 0.009 |
| Chickenpox only | 10 (3.4) | 7 (5.9) | 9 (8.0) | 0.148 |
| I don’t vaccinate my animals | 159 (54.6) | 26 (22) | 18 (15.9) | < 0.001 |

Data are presented as n (%) unless otherwise specified.

**Table S2.** Factors associated with good knowledge about brucellosis by farmers and animal owners in Saudi Arabia (n=522). Data are presented as odds ratios; 95% confidence intervals; *P* values

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Factors** | **Questions** | | | | | | | |
| *Brucella* can infect humans | How is *Brucella* transmitted to humans? | How is *Brucella* transmitted between animals? | What are the symptoms of brucellosis in humans? | What are the symptoms of brucellosis in animals? | Brucellosis is treatable in humans | How can brucellosis be prevented in humans? | How can brucellosis be prevented in animals? |
| Age group (years) |  |  |  |  |  |  |  |  |
| 16–20 | 0.22; 0.02-2.78; 0.244 | 0.40; 0.06-2.52; 0.326 | 12.94; 1.99-84.20; 0.007 | 0.13; 0.01-1.39; 0.092 | 1.40; 0.21-9.23; 0.725 | 0.45; 0.02-8.83; 0.596 | Not applicable\* | 4.29; 0.80-23.16; 0.090 |
| 21–30 | 0.79; 0.14-4.40; 0.788 | 0.50; 0.17-1.45; 0.201 | 2.17; 0.96-4.95; 0.064 | 0.89; 0.33-2.41; 0.823 | 1.57; 0.69-3.58; 0.284 | 9.02; 1.16-70.18; 0.036 | 0.59; 0.23-1.51; 0.269 | 1.45; 0.69-3.03; 0.324 |
| 31–50 | 1.35; 0.29-6.30; 0.702 | 1.07; 0.42-2.76; 0.890 | 2.57; 1.31-5.01; 0.006 | 1.18; 0.50-2.77; 0.703 | 1.73; 0.89-3.35; 0.107 | 3.96; 1.00-15.71; 0.05 | 0.37; 0.18-0.78; 0.009 | 1.82; 1.00-3.31; 0.049 |
| > 50 | Reference | Reference | Reference | Reference | Reference | Reference | Reference | Reference |
| Region |  |  |  |  |  |  |  |  |
| Western | 0.68; 0.23-2.03; 0.486 | 1.52; 0.64-3.61; 0.340 | 2.47; 1.12-5.51; 0.027 | 0.61; 0.26-1.45; 0.260 | 0.99; 0.45-2.17; 0.975 | 3.72; 0.71-19.52; 0.121 | 7.67; 0.86-68.56; 0.068 | 1.67; 0.80-3.48; 0.172 |
| Southern | 0.23; 0.06-0.89; 0.033 | 0.77; 0.28-2.13; 0.614 | 0.98; 0.37-2.60; 0.961 | 0.19; 0.07-0.54; 0.002 | 0.35; 0.13-0.93; 0.036 | 4.37; 0.62-30.86; 0.139 | 4.83; 0.52-45.28; 0.168 | 1.22; 0.51-2.93; 0.656 |
| Central | 5.14; 0.96-27.58; 0.056 | 1.23; 0.51-3.00; 0.643 | 2.81; 1.21-6.53; 0.016 | 0.84; 0.34-2.08; 0.706 | 1.61; 0.70-3.66; 0.261 | 68.21; 5.44-854.77; 0.001 | 7.68; 0.87-67.83; 0.067 | 2.01; 0.94-4.30; 0.072 |
| Northern | 0.19; 0.05-0.77; 0.020 | 0.77; 0.26-2.28; 0.637 | 1.69; 0.63-4.52; 0.294 | 0.36; 0.12-1.10; 0.073 | 0.82; 0.31-2.17; 0.690 | 1.32; 0.23-7.47; 0.756 | 15.14; 1.61-142.06; 0.017 | 0.98; 0.41-2.40; 0.966 |
| Eastern | Reference | Reference | Reference | Reference | Reference | Reference | Reference | Reference |
| Education |  |  |  |  |  |  |  |  |
| No education | 0.39; 0.07-2.09; 0.273 | 0.30; 0.10-0.94; 0.038 | 0.13; 0.04-0.36; <0.0001 | 0.06; 0.02-0.23; <0.0001 | 0.13; 0.05-0.34; <0.0001 | 2.22; 0.36-13.57; 0.388 | 0.084; 0.03-0.25; <0.0001 | 0.90; 0.43-1.90; 0.790 |
| Elementary | 0.38; 0.07-1.97; 0.248 | 0.51; 0.16-1.67; 0.267 | 0.19; 0.07-0.57; 0.003 | 0.20; 0.05-0.76; 0.018 | 0.37; 0.13-1.02; 0.056 | 10.41; 0.86-125.60; 0.066 | 0.18; 0.07-0.50; 0.001 | 1.38; 0.64-3.01; 0.415 |
| Middle School | 0.31; 0.06-1.56; 0.154 | 0.45; 0.14-1.42; 0.172 | 0.15; 0.05-0.42; <0.0001 | 0.12; 0.03-0.44; 0.001 | 0.20; 0.07-0.53; 0.001 | 6.41; 0.88-46.92; 0.067 | 0.10; 0.04-0.27; <0.0001 | 1.22; 0.58-2.55; 0.604 |
| High School | 0.92; 0.17-4.98; 0.919 | 0.79; 0.26-2.47; 0.690 | 0.24; 0.08-0.65; 0.006 | 0.28; 0.08-0.10; 0.049 | 0.16; 0.06-0.42; <0.0001 | 1.96; 0.51-7.56; 0.330 | 0.33; 0.16-0.66; 0.002 | 1.71; 0.89-3.30; 0.108 |
| Vocational College | 0.33; 0.04-2.53; 0.284 | 0.74; 0.18-3.03; 0.670 | 0.25; 0.07-0.85; 0.027 | 0.43; 0.08-2.24; 0.314 | 0.28; 0.09-0.91; 0.034 | 0.96; 0.20-4.61; 0.957 | 0.73; 0.31-1.75; 0.482 | 1.01; 0.46-2.53; 0.866 |
| College/University | Reference | Reference | Reference | Reference | Reference | Reference | Reference | Reference |
| Job |  |  |  |  |  |  |  |  |
| Farmer | 0.37; 0.09-1.51; 0.166 | 0.49; 0.18-1.37; 0.176 | 0.26; 0.18-0.89; 0.001 | 0.63; 0.25-1.56; 0.314 | 0.15; 0.07-0.33; <0.0001 | 3.00; 0.69-13.03; 0.144 | 0.26; 0.12-0.56; 0.001 | 2.09; 1.12-3.93; 0.022 |
| Commercial owner | 6.32; 0.99-40.47; 0.052 | 0.76; 0.26-2.16; 0.601 | 0.28; 0.17-0.85; 0.019 | 2.69; 0.93-7.79; 0.067 | 0.31; 0.14-0.67; 0.003 | 5.70; 1.17-27.77; 0.031 | 0.77; 0.39-1.49; 0.436 | 1.87; 1.02-3.46; 0.044 |
| Private owner | Reference | Reference | Reference | Reference | Reference | Reference | Reference | Reference |
| Work experience (years) |  |  |  |  |  |  |  |  |
| < 5 | 0.21; 0.04-1.12; 0.068 | 0.23; 0.08-0.62; 0.004 | 0.26; 0.11-0.58; 0.001 | 0.28; 0.11-0.72; 0.008 | 0.37; 0.16-0.82; 0.014 | 1.73; 0.25-11.91; 0.577 | 0.51; 0.20-1.28; 0.153 | 0.30; 0.15-0.60; 0.001 |
| 5–10 | 0.30; 0.06-1.51; 0.146 | 0.54; 0.21-1.40; 0.204 | 0.53; 0.27-1.06; 0.074 | 0.44; 0.19-1.02; 0.057 | 0.85; 0.43-1.66; 0.629 | 0.65; 0.16-2.67; 0.555 | 0.59; 0.28-1.26; 0.174 | 0.59; 0.32-1.07; 0.082 |
| 11–20 | 0.73; 0.14-3.75; 0.709 | 0.90; 0.34-2.43; 0.839 | 0.99; 0.50-1.98; 0.975 | 1.22; 0.51-2.92; 0.662 | 1.04; 0.54-2.02; 0.897 | 1.21; 0.32-4.63; 0.783 | 0.55; 0.26-1.16; 0.117 | 0.73; 0.41-1.31; 0.297 |
| > 20 | Reference | Reference | Reference | Reference | Reference | Reference | Reference | Reference |

Note: Answering at least one correct answer indicated a good knowledge of the question.

\* Due to having a value of zero in the number of participants aged 16-20 years who provided at least one correct answer to the question about the prevention of brucellosis in humans, this category was eliminated from the regression analysis to allow for appropriate computation of odds ratios for the other categories.

**Table S3.** Factors associated with good attitude and practice regarding brucellosis by farmers and animal owners in Saudi Arabia (n=522)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Factors** | **Questions** | | | | |
| Vaccinate animals against *Brucella* | Take a sick animal to the veterinarian | Take an aborted fetus and placenta to the veterinarian | Avoid raw milk consumption | Consume cooked meat |
| Age group (years) |  |  |  |  |  |
| 16–20 | Not applicable\* | 1.05; 0.10-10.84; 0.969 | 0.45; 0.06-3.24; 0.428 | 0.25; 0.04-1.66; 0.153 | 0.82; 0.05-14.86; 0.893 |
| 21–30 | 0.28; 0.09-0.87; 0.027 | 0.57; 0.24-1.34; 0.196 | 0.33; 0.13-0.84; 0.021 | 1.00; 0.46-2.16; 0.995 | 0.60; 0.18-1.97; 0.401 |
| 31–50 | 0.43; 0.19-1.00; 0.050 | 0.93; 0.47-1.86; 0.840 | 0.62; 0.29-1.33; 0.220 | 1.54;0.83-2.88; 0.174 | 0.92; 0.97-2.34; 0.868 |
| > 50 | Reference | Reference | Reference | Reference | Reference |
| Region |  |  |  |  |  |
| Western | 0.56; 0.13-2.46; 0.440 | 1.62; 0.73-3.60; 0.239 | 2.47; 0.86-7.07; 0.092 | 3.07; 1.46-6.48; 0.003 | 0.24; 0.06-0.99; 0.048 |
| Southern | 2.19; 0.51-9.40; 0.294 | 3.72; 1.39-9.98; 0.009 | 11.78; 3.71-37.41; <0.0001 | 1.88; 0.78-4.54; 0.163 | 0.29; 0.03-2.67; 0.273 |
| Central | 1.47; 0.36-6.00; 0.588 | 2.24; 0.96-5.20; 0.061 | 0.87; 0.28-2.67; 0.800 | 1.43; 0.67-3.04; 0.359 | 6.73; 2.21-20.49; 0.001 |
| Northern | 3.33; 0.74-15.13; 0.119 | 0.899; 0.35-2.32; 0.825 | 2.14; 0.63-7.31; 0.223 | 6.96; 2.51-19.31; <0.0001 | 0.29; 0.031-2.73; 0.278 |
| Eastern | Reference | Reference | Reference | Reference | Reference |
| Education |  |  |  |  |  |
| No education | 0.34; 0.10-1.16; 0.085 | 2.42; 1.05-5.58; 0.038 | 1.51; 0.62-3.66; 0.364 | 0.48; 0.22-1.05; 0.066 | 2.20; 0.64-7.59; 0.212 |
| Elementary | 0.97; 0.32-2.95; 0.960 | 2.33; 0.97-5.58; 0.059 | 0.66; 0.25-1.74; 0.396 | 0.48; 0.21-1.10; 0.084 | 1.79; 0.49-6.52; 0.380 |
| Middle School | 0.34; 0.10-1.12; 0.075 | 3.03; 1.28-7.16; 0.012 | 0.96; 0.40-2.30; 0.926 | 1.07; 0.47-2.43; 0.877 | 0.14; 0.02-1.34; 0.088 |
| High School | 1.06; 0.44-2.56; 0.899 | 1.87; 0.92-3.77; 0.083 | 0.71; 0.32-1.59; 0.409 | 0.84; 0.41-1.71; 0.624 | 0.48; 0.27-2.61; 0.765 |
| Vocational College | 0.75; 0.22-2.58; 0.648 | 0.74; 0.31-1.78; 0.507 | 0.38; 0.12-1.23; 0.106 | 1.54; 0.54-4.40; 0.419 | 1.39; 0.36-5.41; 0.639 |
| College/University | Reference | Reference | Reference | Reference | Reference |
| Job |  |  |  |  |  |
| Farmer | 0.53; 0.21-1.33; 0.174 | 2.34; 1.15-4.76; 0.019 | 0.48; 0.23-1.03; 0.058 | 1.02; 0.51-2.03; 0.953 | 2.41; 0.80-7.29; 0.120 |
| Commercial owner | 0.45; 0.20-1.05; 0.064 | 1.4; 0.72-2.72; 0.318 | 0.37; 0.17-0.84; 0.017 | 1.10; 0.57-2.14; 0.777 | 0.85; 0.30-2.39; 0.755 |
| Private owner | Reference | Reference | Reference | Reference | Reference |
| Work experience (years) |  |  |  |  |  |
| < 5 | 1.66; 0.59-4.65; 0.337 | 2.29; 1.03-5.12; 0.043 | 2.52; 0.99; 6.41; 0.052 | 1.86; 0.85-4.07; 0.120 | 2.22; 0.74-6.70; 0.156 |
| 5–10 | 0.80; 0.32-2.00; 0.626 | 1.84; 0.93-3.63; 0.081 | 4.58; 2.02-10.41; <0.0001 | 0.69; 0.36-1.31; 0.260 | 2.08; 0.79-5.46; 0.139 |
| 11–20 | 1.02; 0.42-2.47; 0.959 | 1.43; 0.74-2.74; 0.288 | 1.62; 0.70-3.71; 0.258 | 0.63; 0.34-1.16; 0.138 | 1.28; 0.49-3.33; 0.609 |
| > 20 | Reference | Reference | Reference | Reference | Reference |

Note: Answering at least one correct answer indicated a good attitude and practice with regards to the question.

\* Due to having a value of zero in the number of participants aged 16-20 years who provided at least one correct answer to the question about vaccination f livestock against brucellosis, this category was eliminated from the regression analysis to allow for appropriate computation of odds ratios for the other categories.