**Electronic Supplementary Material**

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**Supplementary Figures:**

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**Figure S1.** Cumulative prevalence of bovine tuberculosis (TB) in African buffalo. As animals aged, they were more likely to be infected with TB, however after 9-years of age prevalence stabilized at 35-37%.

**Supplementary Tables:**

**Table S1.** Univariate Cox proportional hazard models of bovine tuberculosis (TB) infection risk including as predictor variables the individual coefficient of variation for three immune traits that showed moderate population-level repeatability. Models were run separately for each predictor. HR = hazard ratio, SE = standard error, CI = lower and upper 95% confidence interval, N=number of individuals. For all models number of events=27.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Predictor | N | HR | SE | 95% CI | Z | P |
| IFN-γ CV | 88 | 0.96 | 0.009 | 0.94 – 0.98 | -3.91 | 8.9×10-5\*\*\* |
|  |  |  |  |  |  |  |
| Lymphocyte CV | 89 | 0.97 | 0.006 | 0.96 – 0.99 | -3.26 | 0.001\*\* |
|  |  |  |  |  |  |  |
| BADV-3 CV | 82 | 1.002 | 0.003 | 0.99 – 1.00 | 0.68 | 0.49 |

**Table S2.** Univariate Cox proportional hazard models of bovine tuberculosis (TB) infection risk including as predictor variables the individual repeatability or average value for three immune traits that showed moderate population-level repeatability. Models were run separately for each predictor. HR = hazard ratio, SE = standard error, CI = lower and upper 95% confidence interval, N=number of individuals. For all models number of events=27.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Predictor | N | HR | SE | 95% CI | | Z | P |
| IFN-γ repeatability | 88 | 1.050 | 0.013 | 1.02 – 1.07 | | 3.66 | 0.0002\*\*\* |
|  |  |  |  |  |  |  |  |
| Lymphocyte repeatability | 89 | 1.064 | 0.016 | 1.03 – 1.10 | | 3.82 | 0.0001\*\*\* |
|  |  |  |  |  |  |  |  |
| BADV-3 repeatability | 84 | 1.001 | 0.008 | 0.98 – 1.01 | | 0.13 | 0.89 |
|  |  |  |  |  |  |  |  |
| IFN-γ average | 89 | 0.677 | 0.503 | 0.25 – 1.81 | | -0.77 | 0.44 |
|  |  |  |  |  |  |  |  |
| Lymphocyte average | 88 | 0.871 | 0.181 | 0.61 – 1.24 | | -0.75 | 0.45 |
|  |  |  |  |  |  |  |  |
| BADV-3 average | 84 | 1.003 | 0.005 | 0.99 – 1.01 | | 0.55 | 0.57 |

**Table S3**. Comparison of multivariate Cox proportional hazard models of bovine tuberculosis infection risk including different combinations of the following predictors: IFN-γ repeatability, IFN-γ average value, and the interaction between the two. All models accounted for individual age and herd membership. Models are ranked based on Akaike’s Information Criteria corrected for small sample size (AICc). Detailed model outputs are provided in Table S4. Number of individuals=88, number of events=27.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Model rank |  | Model | R2 | df | logLik | AICc | ΔAIC | weight |
| 1 |  | IFN-γ repeatability + age + herd | 0.58 | 4 | -95.2 | 200.3 | 0 | 0.562 |
|  |  |  |  |  |  |  |  |  |
| 2 |  | IFN-γ repeatability + IFN-γ average + age + herd | 0.61 | 5 | -94.4 | 201.3 | 1.05 | 0.332 |
|  |  |  |  |  |  |  |  |  |
| 3 |  | IFN-γ repeatability + IFN-γ average + IFN-γ repeatability x IFN-γ average + age + herd | 0.62 | 6 | -93.3 | 203.6 | 3.33 | 0.106 |
|  |  |  |  |  |  |  |  |  |
| 4 |  | IFN-γ average + age + herd | 0.27 | 4 | -102.7 | 215.2 | 14.98 | 0.000 |

**Table S4.** Multivariate Cox proportional hazard models of bovine tuberculosis (TB) infection risk including different combinations of the following predictors: IFN-γ repeatability, IFN-γ average values and the interaction between the two. All models accounted for individual age and herd membership. Model number indicates relative ranking based on model selection (see Table S3). HR = hazard ratio, SE = standard error, CI = lower and upper 95% confidence interval. Number of individuals=88, number of events=27.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Model rank | Predictors | HR | SE | 95% CI | Z | P |
|  |  |  |  |  |  |  |
| 1 | IFN-γ repeatability | 1.04 | 0.013 | 1.02 – 1.08 | 3.43 | 0.0005\*\* |
| Age | 0.98 | 0.007 | 0.97 – 0.99 | -1.97 | 0.0482\* |
| Herd | 0.89 | 0.432 | 0.38 – 2.07 | -0.26 | 0.78 |
|  |  |  |  |  |  |  |
| 2 | IFN-γ repeatability | 1.05 | 0.014 | 1.02 – 1.08 | 3.58 | 0.0003\*\* |
|  | IFN-γ average | 2.13 | 0.584 | 0.67 – 6.71 | 1.29 | 0.194 |
|  | Age  Herd | 0.98 | 0.007 | 0.97 – 1.00 | -1.80 | 0.071 |
|  | 1.04 | 0.419 | 0.45 – 2.36 | -0.05 | 0.959 |
|  |  |  |  |  |  |  |
| 3 | IFN-γ repeatability | 1.01 | 0.034 | 0.97 – 1.11 | 0.44 | 0.657 |
|  | IFN-γ average | 0.06 | 2.21 | 0.09 – 3.68 | -0.66 | 0.509 |
|  | IFN-γ repeatability ×  IFN-γ average | 1.04 | 0.04 | 0.94 – 1.14 | 0.87 | 0.383 |
|  | Age | 0.98 | 0.007 | 0.97 – 1.00 | -1.90 | 0.057 |
|  | Herd | 0.80 | 0.438 | 0.42 – 2.27 | -0.57 | 0.612 |
|  |  |  |  |  |  |  |
| 4 | IFN-γ average | 0.67 | 0.505 | 0.25 – 1.81 | -0.77 | 0.440 |
|  | Age | 0.98 | 0.007 | 0.96 – 0.99 | -2.19 | 0.028\* |
|  | Herd | 0.84 | 0.435 | 0.47 – 2.48 | -0.39 | 0.693 |
|  |  |  |  |  |  |  |

**Table S5**. Comparison of multivariate Cox proportional hazard models of bovine tuberculosis infection risk including different combinations of the following predictors: lymphocyte repeatability, lymphocyte average values and the interaction between these two. All models accounted for individual age and herd membership. Models are ranked based on Akaike’s Information Criteria corrected for small sample size (AICc). Detailed models outputs are provided in Table S6. Number of individuals=89, number of events=27.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Model rank |  | Model | R2 | df | logLik | AICc | ΔAIC | weight |
| 1 |  | Lymphocyte repeatability + age + herd | 0.65 | 4 | -92.4 | 195.3 | 0 | 0.755 |
|  |  |  |  |  |  |  |  |  |
| 2 |  | Lymphocyte repeatability + lymphocyte average + age + herd | 0.65 | 5 | -92.7 | 198.3 | 2.97 | 0.171 |
|  |  |  |  |  |  |  |  |  |
| 3 |  | Lymphocyte repeatability + lymphocyte average + lymphocyte repeatability x lymphocyte average + age + herd | 0.67 | 6 | -91.8 | 200.0 | 3.47 | 0.075 |
|  |  |  |  |  |  |  |  |  |
| 4 |  | Lymphocyte average + age + herd | 0.27 | 4 | -102.7 | 215.3 | 21.23 | 0.000 |

**Table S6.** Multivariate Cox proportional hazard models of bovine tuberculosis (TB) infection risk including different combinations of the following predictors: lymphocyte repeatability, lymphocyte average values and the interaction between these two. All models accounted for individual age and herd membership. Model number indicates relative ranking based on model selection (see Table S5). HR = hazard ratio, SE = standard error, CI = lower and upper 95% confidence interval. Number of individuals=89, number of events=27.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Model rank | Predictors | HR | SE | 95% CI | Z | P |
|  |  |  |  |  |  |  |
| 1 | Lymphocyte repeatability | 1.06 | 0.016 | 1.02 – 1.09 | 3.56 | 0.0003\*\* |
| Age | 0.98 | 0.008 | 0.96 – 0.99 | -2.03 | 0.041\* |
| Herd | 1.33 | 0.594 | 0.42 – 2.35 | 0.49 | 0.623 |
|  |  |  |  |  |  |  |
| 2 | Lymphocyte repeatability | 1.06 | 0.016 | 1.03 – 1.10 | 3.53 | 0.0004\*\* |
|  | Lymphocyte average | 0.94 | 0.201 | 0.63 – 1.40 | -0.25 | 0.798 |
|  | Age  Herd | 0.98 | 0.008 | 0.96 – 0.99 | -2.03 | 0.041\* |
|  | 1.39 | 0.61 | 0.38 – 2.94 | 0.13 | 0.895 |
|  |  |  |  |  |  |  |
| 3 | Lymphocyte repeatability | 1.00 | 0.04 | 0.91 – 1.09 | 0.01 | 0.987 |
|  | Lymphocyte average | 0.16 | 1.39 | 0.01 – 2.57 | -1.27 | 0.201 |
|  | Lymphocyte repeatability ×  lymphocyte average | 1.02 | 0.01 | 0.99 – 1.05 | 1.25 | 0.208 |
|  | Age | 0.98 | 0.008 | 0.96 – 0.99 | -2.03 | 0.041\* |
|  | Herd | 0.97 | 1.020 | 0.35 – 2.63 | -0.05 | 0.957 |
|  |  |  |  |  |  |  |
| 4 | Lymphocyte average | 0.87 | 0.181 | 0.61 – 1.24 | -0.75 | 0.450 |
|  | Age | 0.98 | 0.007 | 0.97 – 0.99 | -2.06 | 0.039\* |
|  | Herd | 1.05 | 0.481 | 0.40 – 2.70 | 0.10 | 0.917 |
|  |  |  |  |  |  |  |

**Table S7.** Multivariate Cox proportional hazard model of bovine tuberculosis (TB) infection risk including individual repeatability of IFN-γ and lymphocytes as predictor variables, and controlling for age and herd. This model corresponds to the top ranked model shown in Table 2. HR = hazard ratio, SE = standard error, CI = lower and upper 95% confidence interval. N=88, number of events=27.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Predictor | HR | SE | 95% CI | Z | P |
| IFN-γ repeatability | 1.04 | 0.012 | 1.01 – 1.06 | 2.79 | 0.005\*\* |
| Lymphocyte repeatability | 1.05 | 0.016 | 1.01 – 1.08 | 3.15 | 0.001\*\* |
| Age | 0.98 | 0.007 | 0.96 – 0.99 | -2.14 | 0.032\* |
| Herd | 1.07 | 0.439 | 0.45 – 2.54 | 0.16 | 0.865 |