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| **Supplementary table 1A.** Descriptive statistics of potential continuous risk factors for culling of 86,373 primiparous and 109,295 multiparous dairy cows with 177,561 lactations in Estonia between January 1, 2013 and December 31, 2015 |
|  | Primiparous cows | Multiparous cows |
| Variable | median | quartiles | missing obs (n1,2,3) | p-valued | median | quartiles | missing obs (n1,2,3) | P-value4 |
| *Animal level variables* |  |  |  |  |  |  |  |  |
| Age at first calving (months)1 | 25.9 | 24.2; 28.6 | 25 | <0.001 | 26.5 | 24.7; 29.2 | 19 | <0.001 |
| Length of previous calving interval (days)2 |  |  |  |  | 393.0 | 359.0; 450.0 | 894 | <0.001 |
| Length of dry period in previous lactation (days)2 |  |  |  |  | 62.0 | 53.0; 75.0 | 3 | <0.001 |
| Days in milk at last test-milking in previous lactation2 |  |  |  |  | 312.0 | 280.0; 363.0 | 0 | <0.001 |
| Milk yield at last test-milking in previous lactation (kg)2 |  |  |  |  | 15.6 | 11.3; 20.2 | 1,721 | <0.001 |
| Days in milk at first milk-testing2 | 21.0 | 13.0;28.0 | 4,878 | <0.001 | 21.0 | 13.0; 28.0 | 14,255 | <0.001 |
| Milk yield at first test-milking (kg)2 | 27.3 | 22.9; 31.7 | 5,842 | <0.001 | 36.1 | 29.6; 42.4 | 16,835 | <0.001 |
| *Herd level variables* |  |  |  |  |  |  |  |  |
| Number of cows3 | 90.3 | 39.9; 256.0 | 0 | <0.001 | 89.5 | 37.7; 256.0 | 0 | <0.001 |
| Herd average milk yield (kg per cow per year)3 | 7711.0 | 6107.7; 8874.3 | 0 | <0.001 | 7710.7 | 6107.3; 8874.3 | 0 | <0.001 |
| Herd average milk fat/protein ratio3 | 1.2 | 1,2: 1.3 | 0 | <0.001 | 1.2 | 1.2; 1.3 | 0 | <0.001 |
| Herd average milk somatic cell count (\*1000/mL)3 | 326.0 | 250.0; 425.3 | 0 | 0.002 | 325.0 | 250.0; 425.3 | 0 | 0.014 |
| Herd average milk urea (mg/L)3 | 240.0 | 221.0; 258.3 | 0 | 0.425 | 240.2 | 221.0; 258.3 | 0 | 0.264 |
| Herd average age at first calving (months)3 | 27.9 | 26.2; 30.6 | 0 | <0.001 | 27.9 | 26.2; 30.7 | 0 | <0.001 |
| Herd average calving interval (days)3 | 422.7 | 406.3; 448.3 | 0 | 0.005 | 422.5 | 406.3; 448.3 | 0 | 0.035 |
| Herd average lenght of dry period (days)3 | 69.7 | 64.0; 77.7 | 0 | 0.001 | 69.8 | 64.0; 78.0 | 0 | <0.001 |
| Herd average interval from calving to insemination (days)3 | 97.0 | 84.3; 119.3 | 19 | 0.001 | 97.0 | 84.3; 119.3 | 20 | <0.001 |
| Herd average calving to conception interval (days)3 | 143.0 | 127.3; 170.7 | 20 | 0.012 | 143.0 | 127.3; 170.7 | 21 | 0.055 |
| Herd average number of inseminations per conception3 | 1.9 | 1.6; 2.2 | 19 | 0.039 | 1.9 | 1.6; 2.2 | 20 | <0.001 |
| Herd average first insemination conception rate (%)3 | 54.0 | 46.8; 60.9 | 18 | 0.381 | 54.0 | 46.8; 60.9 | 19 | 0.181 |
| Herd average number of lactations3 | 2.5 | 2.3; 2.9 | 0 | <0.001 | 2.5 | 2.3; 2.9 | 0 | <0.001 |
| Herd average age at first insemination in heifers (months)3 | 17.4 | 15.7; 20.5 | 53 | 0.006 | 17.4 | 15.7; 20.5 | 54 | <0.001 |
| Herd average proportion of stillbirths in (%)3 | 6.9 | 4.9; 9.1 | 0 | 0.022 | 6.9 | 5.0; 9.2 | 0 | 0.003 |
| Herd average proportion of abortions (%)3 | 0.8 | 0.0; 1.6 | 0 | 0.016 | 0.8 | 0.0; 1.6 | 0 | <0.001 |
| 1number of cows |  |  |  |  |  |  |  |  |
| 2number of observations |  |  |  |  |  |  |  |  |
| 3number of herds |  |  |  |  |  |  |  |  |
| 4identified in an univariable Weibull proportional hazard random effect model (herd as random effect) |