|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Supplementary table 1B**. Descriptive statistics of potential categorical 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 | Category | N1,3 | CR4 | p-value5 | N1,2,3 | CR4 | p-value5 |
| *Animal level variables* |  |  |  |  |  |  |  |
| Purchased (born in other herd)2 | No | 79,306 | 15.97 | 0.159 | 154,630 | 31.71 | <0.001 |
|  | Yes | 7,067 | 15.73 |  | 22,931 | 32.67 |  |
| Breed1 | Estonian Holstein | 70,959 | 16.61 | <0.001 | 87,053 | 33.49 | <0.001 |
|  | Estonian Red and Estonian Native | 15,414 | 12.92 |  | 22,242 | 25.75 |  |
| Milk yield breeding value1 | <90 | 17,784 | 16.35 | <0.001 | 24,150 | 38.50 | <0.001 |
|  | 90-96 | 20,073 | 11.19 |  | 23,931 | 33.88 |  |
|  | 97-104 | 18,088 | 8.42 |  | 27,621 | 30.70 |  |
|  | ≥105 | 21,325 | 6.81 |  | 27,976 | 27.18 |  |
|  | Not estimated | 9,103 | NE6 |  | 5,617 | 22.15 |  |
| Calving year2 | 2013 | 28,087 | 15.69 | 0.027 | 57,942 | 30.43 | <0.001 |
|  | 2014 | 29,600 | 14.95 |  | 60,021 | 31.52 |  |
|  | 2015 | 28,686 | 18.76 |  | 59,598 | 35.51 |  |
| Abortion in previous lactation2 | No |  |  |  | 176,714 | 31.80 | 0.005 |
|  | Yes |  |  |  | 847 | 38.94 |  |
| Breeding2 | Using a bull | 23,585 | 17.11 | <0.001 |  |  |  |
|  | AI, 1 insemination per pregnancy | 38,101 | 14.89 |  |  |  |  |
|  | AI, 2 inseminations per pregnancy | 14,146 | 16.18 |  |  |  |  |
|  | AI, ≥3 inseminations per pregnancy | 7,690 | 18.04 |  |  |  |  |
|  | Missing | 2,851 | 13.66 |  |  |  |  |
| Season at calving2 | Winter (Dec, Jan, Feb) | 22,094 | 16.03 | 0.001 | 43,965 | 32.14 | <0.001 |
|  | Spring (March, Apr, May) | 22,549 | 16.31 |  | 42,150 | 30.91 |  |
|  | Summer (June, July, Aug) | 21,074 | 16.34 |  | 49,895 | 32.45 |  |
|  | Autumn (Sept, Oct, Nov) | 20,656 | 14.93 |  | 41,551 | 31.82 |  |
| Parity2 | First | 86,373 | 15.95 |  |  |  |  |
|  | Second |  |  |  | 67,349 | 20.94 | <0.001 |
|  | Third |  |  |  | 47,157 | 30.75 |  |
|  | Fourth |  |  |  | 30,225 | 40.40 |  |
|  | Fifth |  |  |  | 17,319 | 48.57 |  |
|  | Sixth |  |  |  | 8,821 | 53.56 |  |
|  | ≥Seventh |  |  |  | 6,690 | 61.82 |  |
| Calf2 | Female | 38,752 | 13.87 | <0.001 | 76,647 | 29.07 | <0.001 |
|  | Male | 36,763 | 15.66 |  | 83,784 | 30.91 |  |
|  | Twins/triplets | 488 | 20.89 |  | 6,793 | 43.69 |  |
|  | Stillbirth | 10,034 | 25.61 |  | 9,651 | 55.17 |  |
|  | Abortion | 331 | 15.26 |  | 686 | 81.36 |  |
|  | Missing | 5 | NE6 |  | 0 | NE6 |  |
| Stillbirth2 | No | 76,334 | 14.78 | <0.001 | 167,910 | 30.68 | <0.001 |
|  | Yes | 10,034 | 25.61 |  | 9,651 | 55.17 |  |
|  | Missing | 5 | NE6 |  | 0 | NE6 |  |
| Abortion2 | No | 86,037 | 15.95 | 0.797 | 176,875 | 31.70 | <0.001 |
|  | Yes | 331 | 15.26 |  | 686 | 81.36 |  |
|  | Missing | 5 | NE6 |  |  |  |  |
| Assisted calving2 | No | 70,907 | 14.90 | <0.001 | 162,580 | 31.16 | <0.001 |
|  | Yes | 15,466 | 20.87 |  | 14,981 | 39.32 |  |
| Milk fat/protein ratio at last test-milking in previous lactation2 | <1.5 |  |  |  | 165,703 | 31.58 | 0.524 |
| ≥1.5 |  |  |  | 8,388 | 30.21 |  |
|  | Missing |  |  |  | 3,470 | NE6 |  |
| Milk somatic cell count at last test-milking in previous lactation ( \*1000/mL)2 | <200 |  |  |  | 96,074 | 25.51 | <0.001 |
| ≥200 |  |  |  | 78,847 | 39.50 |  |
| Missing |  |  |  | 2,640 | NE6 |  |
| Milk urea content at last test-milking in previous lactation (mg/dL)2 | <19 |  |  |  | 43,443 | 29.91 | 0.002 |
| ≥19 |  |  |  | 131,210 | 32.10 |  |
|  | Missing |  |  |  | 2,908 | NE6 |  |
| Milk fat/protein ratio at first test-milking2 | <1.5 | 62,093 | 11.06 | <0.001 | 119,581 | 21.85 | <0.001 |
|  | ≥1.5 | 15,459 | 15.57 |  | 35,567 | 31.70 |  |
|  | Missing | 4,038 | NE6 |  | 8,179 | NE6 |  |
|  | Left censored before first test-milking | 4,783 | NE6 |  | 14,234 | NE6 |  |
| Milk somatic cell count at first test-milking ( \*1000/mL)2 | <200 | 61,061 | 10.55 | <0.001 | 114,272 | 21.05 | <0.001 |
|  | ≥200 | 16,866 | 17.70 |  | 41,759 | 33.38 |  |
|  | Missing | 3,663 | NE6 |  | 7,296 | NE6 |  |
|  | Left censored before first test-milking | 4,783 | NE6 |  | 14,234 | NE6 |  |
| Milk urea content at first test-milking (mg/dL)2 | <19 | 27,814 | 12.75 | <0.001 | 63,837 | 24.79 | <0.001 |
|  | ≥19 | 50,078 | 11.65 |  | 92,056 | 23.70 |  |
|  | Missing | 3,698 | NE6 |  | 7,434 | NE6 |  |
|  | Left censored before first test-milking | 4,783 | NE6 |  | 14,234 | NE6 |  |
| *Herd level variables* |  |  |  |  |  |  |  |
| Milking method at last test-milking in previous lactation2 | Milking twice a day |  |  |  | 138,392 | 32.78 | <0.001 |
| Milking three times a day |  |  |  | 16,359 | 28.94 |  |
| Robot milking |  |  |  | 22,662 | 27.90 |  |
|  | Missing |  |  |  | 148 | NE6 |  |
| Milking method at first test-milking2 | Milking twice a day | 56,391 | 13.66 | <0.001 | 111,403 | 26.36 | <0.001 |
|  | Milking three times a day | 13,808 | 11.08 |  | 28,631 | 23.42 |  |
|  | Robot milking | 9,201 | 8.22 |  | 19,181 | 18.91 |  |
|  | Missing | 2,190 | NE6 |  | 4,112 | NE6 |  |
|  | Left censored before first test-milking | 4,783 | NE6 |  | 14,234 | NE6 |  |
| Change of herd size from 2013 to 20153 | No change (±5%) | 135 | 16.17 | <0.001 | 135 | 32.79 | <0.001 |
| Decrease >5 to 15% | 71 | 18.15 |  | 71 | 31.96 |  |
| Decrease >15% | 67 | 19.85 |  | 68 | 33.51 |  |
|  | Increase >5 to 15% | 74 | 12.71 |  | 74 | 29.00 |  |
|  | Increase >15% | 62 | 13.62 |  | 62 | 30.35 |  |
| Region3,7 | Northeast | 114 | 18.36 | 0.009 | 114 | 36.84 | <0.001 |
|  | Southeast | 95 | 14.23 |  | 98 | 28.15 |  |
|  | Southwest | 120 | 13.20 |  | 120 | 26.23 |  |
|  | Northwest | 79 | 15.53 |  | 77 | 33.41 |  |
|  | Missing | 1 | NE6 |  | 1 | NE6 |  |
| 1number of cows | | | | | | | |
| 2number of observations | | | | | | | |
| 3number of herds | | | | | | | |
| 4culling rate (per 100 animal-years) | | | | | | | |
| 5identified in an univariable Weibull proportional hazard random effect model (herd as random effect) | | | | | | | |
| 6not estimated | | | | | | | |
| 7Northeast Estonia: Ida-Viru, Lääne-Viru, Jõgeva, Järva county; Southeast Estonia: Tartu, Valga, Võru, Põlva county; Southwest Estonia: Pärnu, Viljandi, Saare county; Northwest Estonia: Harju, Rapla, Lääne, Hiiu county | | | | | | | |