**Supplementary Table 1.** Mean (and standard deviation) of the burn-in and required length (RL) to achieve an accuracy of 0.1 for the 0.5 quantile with a 95% of probability and effective sample size (EFS) for heritability (*h2*), percentage of dominance variation (*d2*), the asymmetry parameter (*λ*) and the covariate with individual heterozygosity (*b*) in Population 1.

|  |  |
| --- | --- |
|  | MODEL |
| SN | SC | AN | Full |
| h2 | Burn-in | 759.4 (133.8) | 331.4 ( 110.2) | 540.0 (128.9) | 526.4(126.8) |
| RL | 24178.4 (4367.9) | 11168.8 (4010.6) | 17746.0 (4061.5) | 18724.8 (3131.8) |
| EFS | 1772.78  | 7488.63 | 2844.53 | 17386.65  |
| d2 | Burn-in | 2793.0 (451.4)  | 930.0 (83.0)  | 5772 .2 (4284.1) | 7628.4(2781.2)  |
| RL | 87755.6 (14719.7) | 29392.8 (1675.0) | 181746.6 (133608.8) | 238897.6 (88772.37) |
| EFS | 177.09  | 1276.33 | 403.94  | 452.73 |
| *λ* | Burn-in | - | 517.8 (57.93) | - | 8720.2(1099.96) |
| RL | - | 17342.0 (2008.2) | - | 273998.6 (33582.6) |
| EFS | - | 1374.03 | - | 84.20 |
| *b* | Burn-in | - | - | 93.0 (53.0)  | 9204.0(1718.8)  |
| RL | - | - | 3209.8 (1529.0) | 290279.6 (52934.3) |
| EFS | - | - | 16510.43  | 140.50 |

**Supplementary Table 2.** Mean (and standard deviation) of the burn-in and required length (RL) to achieve an accuracy of 0.1 for the 0.5 quantile with a 95% of probability and effective sample size (EFS) for heritability (*h2*), percentage of dominance variation (*d2*), the asymmetry parameter (*λ*) and the covariate with individual heterozygosity (*b*) in Population 2.

|  |  |
| --- | --- |
|  | MODEL |
| SN | SC | AN | Full |
| h2 | Burn-in | 585.2 (71.5)  | 570.4 (126.7) | 601.2 (99.17) | 799.6(127.6)  |
| RL | 19064.6 (2058.5) | 18534.4 (3761.2) | 19067.4 (3109.2) | 25685.4 (3911.8) |
| EFS | 1355.45  | 2826.81  | 1488.22 | 7035.39 |
| d2 | Burn-in | 4461.0 (1255.7) | 1786.2 (366.6) | 5583.8 (1972.4) | 6960.4(1774.8) |
| RL | 140277.4 (39010.7) | 57256.8(12491.1) | 174991.4 (60660.18) | 218471.4 (58466.4) |
| EFS | 81.89  | 337.40 | 108.50 | 255.42 |
| *λ* | Burn-in | - | 890.0 (162.1)  | - | 7039.4(2632.1)  |
| RL | - | 26880.8 (4908.6) | - | 221202.9 (82693.8) |
| EFS | - | 701.38 | - | 185.48 |
| *b* | Burn-in | - | - | 111.8 (23.5) | 5251.8(3369.39) |
| RL | - | - | 4183.2 (876.2) | 162947.6 (103573.3) |
| EFS | - | - | 10013.61 | 444.91 |