**APPENDIX**

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**Supplementary Table 1.** Estimated permanent environmental correlation (standard error) among semen characteristics; semen weight (g), sperm concentration (106 spz/mL), and motility score (1 to 4), and percentage motility before (pre) and after (post) cryopreservation; motility change during cryopreservation, and number of accepted straws. All from the AI center of Norwegian Red bulls.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | conc | mot\_pre | mot%pre | mot\_post | mot%post | mot%change | n\_straw |
| weight | -0.32 (0.05) | 0.02 (0.05) | -0.03 (0.05) | -0-09 (0.06) | 0.13 (0.06) | -0.21 (0.07) | 0.47 (0.05) |
| conc |  | 0.13 (0.05) | 0.04 (0.05) | -0.03 (0.05) | 0.15 (0.06) | -0.17 (0.06) | 0.59 (0.04) |
| mot\_pre |  |  | 0.54 (0.03) | 0.50 (0.03) | 0.29 (0.05) | -0.09 (0.05) | 0.11 (0.05) |
| mot%pre |  |  |  | 0.48 (0.04) | 0.59 (0.03) | 0.11 (0.05) | -0.04 (0.05) |
| mot\_post |  |  |  |  | 0.32 (0.04) | -0.04 (0.06) | -0.07 (0.05) |
| mot%post |  |  |  |  |  | -0.87 (0.01) | 0.29 (0.05) |
| mot%change |  |  |  |  |  |  | -0.39 (0.06) |

**Supplementary Table 2.** Estimated test-day correlation (standard error) among semen characteristics; semen weight (g), sperm concentration (106 spz/mL), and motility score (1 to 4), and percentage motility before (pre) and after (post) cryopreservation; motility change during cryopreservation, and number of accepted straws. All from the AI center of Norwegian Red bulls.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | conc | mot\_pre | mot%pre | mot\_post | mot%post | mot%change | n\_straw |
| weight | -0.25 (0.03) | 0.06 (0.03) | 0.01 (0.03) | 0.09 (0.02) | 0.09 (0.02) | -0.05 (0.03) | 0.64 (0.01) |
| conc |  | 0.01 (0.03) | -0.04 (0.03) | -0.02 (0.03) | -0.01 (0.03) | -0.03 (0.03) | 0.40 (0.02) |
| mot\_pre |  |  | 0.12 (0.03) | 0.37 (0.02) | 0.07 (0.03) | -0.01 (0.03) | 0.02 (0.03) |
| mot%pre |  |  |  | 0.13 (0.03) | 0.11 (0.03) | 0.60 (0.02) | -0.03 (0.03) |
| mot\_post |  |  |  |  | 0.59 (0.02) | -0.37 (0.02) | 0.07 (0.03) |
| mot%post |  |  |  |  |  | -0.78 (0.01) | 0.08 (0.03) |
| mot%change |  |  |  |  |  |  | -0.12 (0.03) |