

**Supplementary file - Discriminant function equations**

- 1. Equation generated when all continuous variables were made available on all stallions achieving a predictive accuracy for the whole group of 73.76%.**

$$\left( \begin{array}{l} 0.1965089779 \cdot \text{Dismount Semen volume} \\ + 0.0226703655 \cdot \text{Initial VCL} \\ + 0.0086876366 \cdot \text{Total covers for season} \\ + 7.1811893049 \cdot \text{WST-1 reduction} \\ + -0.042306262 \cdot \text{Initial LIN} \\ + 0.0324162773 \cdot \text{Post PM} \\ + 0.0063984396 \cdot \text{Post VAP} \\ + -0.065561492 \cdot \text{iSperm isolated} \end{array} \right) - 2.3086117306$$

- 2. Equation optimized for Stallion I: predictive accuracy of 100%**

$$\left( \begin{array}{l} -0.162886299 \cdot \text{Dismount Semen volume} \\ + 0.1490464447 \cdot \text{Initial TM} \\ + 0.0416130554 \cdot \text{Initial VSL} \\ + -0.130209298 \cdot \text{Initial STR} \\ + 0.0189280403 \cdot \text{Post TM} \\ + 0.0228204184 \cdot \text{Post PM} \\ + -0.087584865 \cdot \text{iSperm initial} \\ + 0.2177938904 \cdot \text{iSperm isolated} \end{array} \right) - (-6.97088411)$$

24 **3. Equation optimized for Stallion 2: predictive accuracy of 88.6%**

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$$\left( \begin{array}{l} 0.0655604033 \cdot \text{iSperm initial} \\ + -0.061522018 \cdot \text{Initial TM} \\ + 0.0275543575 \cdot \text{Initial PM} \\ + 0.0851884146 \cdot \text{Initial STR} \\ + -0.073316696 \cdot \text{Initial LIN} \\ + -0.080998882 \cdot \text{Post STR} \\ + 0.0712550505 \cdot \text{Post LIN} \\ + 0.3152285504 \cdot \text{Post TMC isperm} \end{array} \right) - 2.0377218639$$

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35 **4. Equation optimized for Stallion 3: predictive accuracy of 95.2%**

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$$\left( \begin{array}{l} -0.245764616 \cdot \text{Dismount Semen volume} \\ + 0.0139995328 \cdot \text{Initial TM} \\ + -0.167930472 \cdot \text{Initial PM} \\ + 0.0253060352 \cdot \text{Initial VAP} \\ + -0.070602976 \cdot \text{Post PM} \\ + 0.031519078 \cdot \text{Post VCL} \\ + 0.4686639992 \cdot \text{Post TMC isperm} \\ + -0.004494141 \cdot \text{iSperm initial} \end{array} \right) - (-0.409980054)$$

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47 **5. Equation optimized for Stallion 4: predictive accuracy of 100%**

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$$\begin{pmatrix}
 -1.029951093 \cdot \text{Dismount Semen volume} \\
 + -0.385047226 \cdot \text{iSperm isolated} \\
 + 0.2029740852 \cdot \text{Initial PM} \\
 + 0.0340640489 \cdot \text{Initial VCL} \\
 + -0.144175986 \cdot \text{Initial LIN} \\
 + -0.052446446 \cdot \text{Post VAP} \\
 + 0.0386563322 \cdot \text{Post STR} \\
 + 0.6475871886 \cdot \text{Mare Age}
 \end{pmatrix} - (-3.338335422)$$

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56 **6. Equation optimized for Stallion 5: predictive accuracy of 78.6%**

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$$\begin{pmatrix}
 -0.514553234 \cdot \text{Dismount Semen volume} \\
 + -0.028408702 \cdot \text{iSperm initial} \\
 + -0.07309869 \cdot \text{Initial LIN} \\
 + 0.0144847321 \cdot \text{Post PM} \\
 + 5.8260487256 \cdot \text{WST-1 reduction} \\
 + 0.0924540322 \cdot \text{Post. STR} \\
 + -0.067722137 \cdot \text{Post LIN} \\
 + 0.9612232741 \cdot \text{Post TMC isperm}
 \end{pmatrix} - (-4.373918505)$$

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66 **7. Equation optimized for Stallion 6: predictive accuracy of 100%**

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$$\left( \begin{array}{l} 0.8448584965 \cdot \text{Initial TM} \\ + 0.0784496176 \cdot \text{Post STR} \\ + -47.50159653 \cdot \text{iSp TMC} \\ + 8.6596714532 \cdot \text{iSp Post Conc} \end{array} \right) - (-0.942551738)$$

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72 **8. Equation optimized for Stallion 7: predictive accuracy of 100%**

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$$\left( \begin{array}{l} 114.06904232 \cdot \text{Dismount semen volume} \\ + 0.998384278 \cdot \text{iSp Initial} \\ + -11.22583781 \cdot \text{iSp Post} \\ + 378.62880117 \cdot \text{WST-1 reduction} \\ + -6.099484106 \cdot \text{Initial PM} \\ + 20.766470787 \cdot \text{Initial STR} \\ + -1.953276169 \cdot \text{Initial LIN} \\ + 3.5336376238 \cdot \text{Post PM} \end{array} \right) - 1719.5546059$$

80 **Key**

81 Initial = original dismount sample

82 Post = Following sperm isolation in a Samson™ chamber

83 iSperm® Post = sperm concentration and motility following migration in Samson™ chamber

84 iSperm® Initial = sperm concentration and motility in original dismount semen sample

85 TM = Total motility

86 PM = Progressive motility

87 TMC = Total Motile Count

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