**Additional file 1: Table S1.** Phylogenetically corrected models testing (a) the relations between testes mass as dependent variable and the dimensions of the different sperm components (total sperm length, head length, midpiece length, tail length and midpiece volume) across ungulate species considering phylogenetic tree based on Bininda-Emonds et al. [31] and Agnarsson and May-Collado [32]; and (b) between the dimensions of the different sperm components (total sperm length, head length, midpiece length, tail length and midpiece volume) across ungulate species obtained when considering the phylogenetic tree based on Bininda-Emonds et al. [31]; and (c) Agnarsson and May-Collado [32].

| (a) | | Phylogeny from Bininda-Emonds et al. [31] | | | | | Phylogeny from Agnarsson and May-Collado [32] | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Dependent variable | Independent variables | beta ± SE | t | P | N | λ | beta ± SE | t | P | N | λ |
| Testes mass | Body mass | 0.64 ± 0.11 | 6.11 | < 0.001 | 41 | $< 0.001^{1 / <0.001}$ | 0.62 ± 0.11 | 5.73 | < 0.001 | 37 | $< 0.001^{1 / <0.001}$ |
| | Total sperm length | -0.05 ± 1.28 | -0.04 | 0.97 | | | 1.12 ± 1.46 | 0.77 | 0.45 | | |
| Testes mass | Body mass | 0.62 ± 0.11 | 5.84 | < 0.001 | 41 | $< 0.001^{1 / <0.001}$ | 0.62 ± 0.11 | 5..60 | < 0.001 | 37 | $< 0.001^{1 / <0.001}$ |
| | Head length | -0.81 ± 0.77 | -1.04 | 0.30 | | | -0.35 ± 0.90 | -0.39 | 0.70 | | |
| Testes mass | Body mass | 0.65 ± 0.11 | 5.82 | < 0.001 | 40 | $< 0.001^{1 / <0.001}$ | 0.64 ± 0.12 | 5.55 | < 0.001 | 36 | $< 0.001^{1 / <0.001}$ |
| | Midpiece length | -0.05 ± 0.62 | -0.08 | 0.94 | | | 0.26 ± 0.69 | 0.38 | 0.71 | | |
| Testes mass | Body mass | 0.62 ± 0.12 | 5.27 | < 0.001 | 34 | $< 0.001^{1 / <0.001}$ | 0.63 ± 0.12 | 5.05 | < 0.001 | 31 | $< 0.001^{1 / <0.001}$ |
| | Midpiece volume | -0.13 ± 0.38 | -0.33 | 0.74 | | | -0.18 ± 0.42 | -0.44 | 0.67 | | |
| Testes mass | Body mass | 0.64 ± 0.11 | 6.02 | < 0.001 | 41 | $< 0.001^{1 / <0.001}$ | 0.61 ± 0.11 | 5.43 | < 0.001 | 37 | $< 0.001^{1 / <0.001}$ |
| | Tail length | 0.03 ± 1.10 | 0.02 | 0.98 | | | 0.70 ± 1.17 | 0.60 | 0.55 | | |

The superscripts following the λ value indicate p-value in likelihood ratio tests against models with λ=0 (first position) and λ=1 (second position).

| (b) | Total sperm length | Head length | Midpiece length | Midpiece volume |
|---|---|---|---|---|
| Head length | **0.49**<br>54 *<0.001* | | | |
| Midpiece length | **0.69**<br>53 *<0.001* | **0.26**<br>53 *0.04* | | |
| Midpiece volume | **0.28**<br>47 *0.03* | **0.27**<br>47 *0.04* | **0.23**<br>47 *0.06* | |
| Tail length | **0.86**<br>54 *<0.001* | **0.20**<br>54 *0.08* | **0.30**<br>53 *0.02* | **0.17**<br>47 *0.12* |

Correlation coefficients, their associated sample sizes and p-values are respectively given in bold, roman and italic script.

| (c) | Total sperm length | Head length | Midpiece length | Midpiece volume |
|---|---|---|---|---|
| Head length | **0.38**<br>49 *0.004* | | | |
| Midpiece length | **0.65**<br>48 *<0.001* | **0.06**<br>48 *0.02* | | |
| Midpiece volume | **0.25**<br>43 *0.06* | **0.23**<br>43 *0.07* | **0.24**<br>43 *0.07* | |
| Tail length | **0.88**<br>49 *<0.001* | **0.15**<br>49 *0.16* | **0.18**<br>48 *0.11* | **0.18**<br>43 *0.13* |

Correlation coefficients, their associated sample sizes and p-values are respectively given in bold, roman and italic script.