**Figure S1.** Probabilities for the deviations between $P_2$ and $F_2$ under a random roles loaded raffle when the competitive loading of sperm in the second male role relative to sperm in the first male role ($r_L$) is 0.5, 2, or 10, and when good-sperm (G-S) processes are absent (correlation coefficient between *S* and *V*, $r_{S,V} = 0.00$, $p = 0.89$, $n = 60000$) or moderate (correlation coefficient between *S* and *V*, $r_{S,V} = 0.25$, $p << 0.001$, $n = 60000$) (see text for details). The lines indicate the probabilities that the absolute difference between $P_2$ and $F_2$ is higher than 0.1 (solid circles), 0.2 (open squares), or 0.3 (open circles) across the range of $F_2$ values. Probabilities are calculated from the simulation of 10000 double matings for each case. The horizontal line indicates a probability of 0.05. Note that fertilization success is biased towards the second male as $r_L$ increases (when $r_L = 10$ all $F_2$ values correspond to second male sperm precedence; see also legend of Supplementary Table S1).

# Figure S1

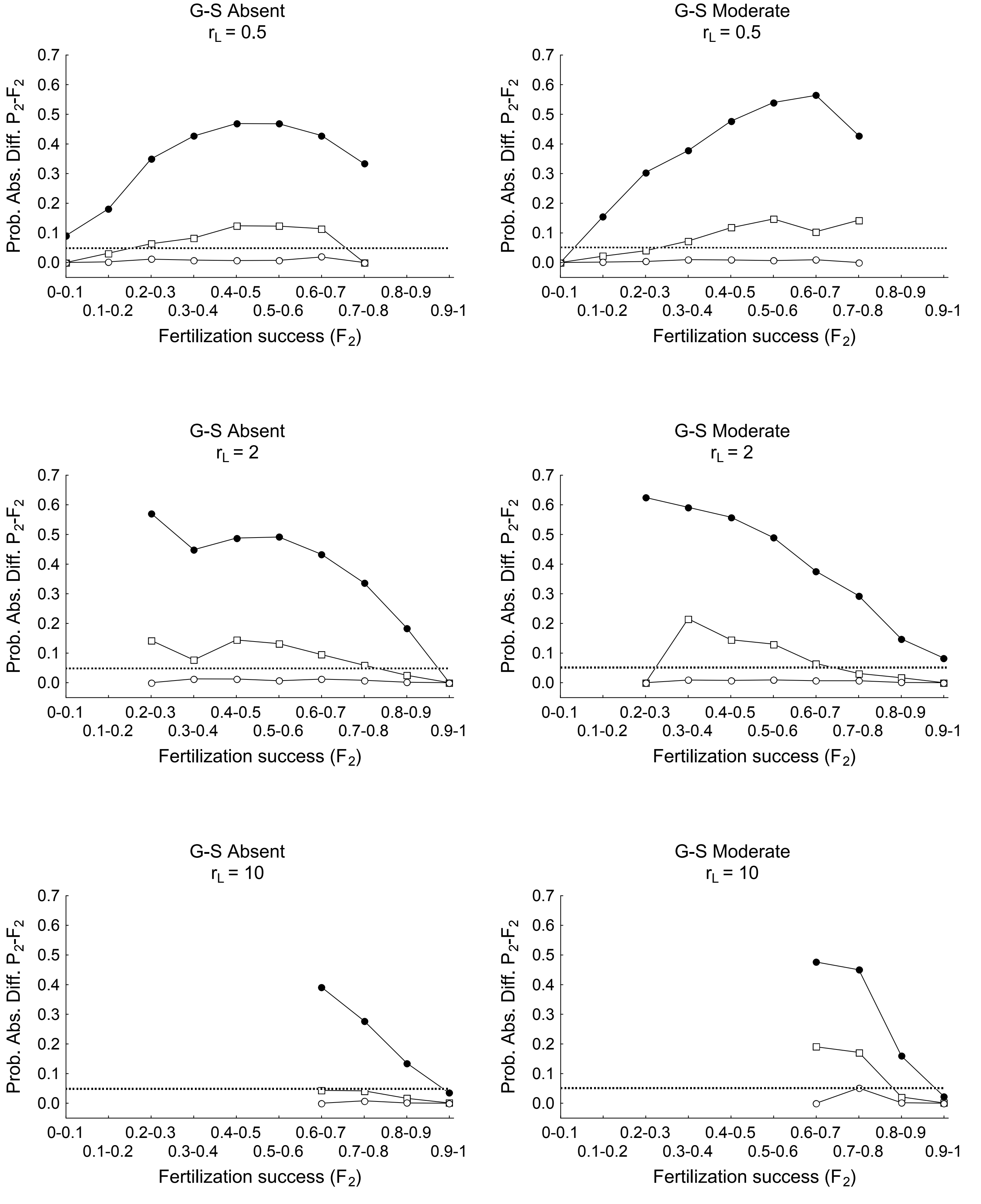
G-S Absent
$r_L$ = 0.5
G-S Moderate
$r_L$ = 0.5
G-S Absent
$r_L$ = 2
G-S Moderate
$r_L$ = 2
G-S Absent
$r_L$ = 10
G-S Moderate
$r_L$ = 10
Prob. Abs. Diff. $P_2$-$F_2$
Fertilization success ($F_2$)
0-0.1
0.1-0.2
0.2-0.3
0.3-0.4
0.4-0.5
0.5-0.6
0.6-0.7
0.7-0.8
0.8-0.9
0.9-1
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7

**Table S1.** Mean correlation coefficients and 95% confidence limits (within brackets) for the distributions of correlation coefficients calculated for the relationships between $F_2$ and $v_2$ ($F_2$, $v_2$), and between $P_2$ and $v_2$ ($P_2$, $v_2$), for each scenario simulated regarding the strength of the good-sperm processes, when fertilization success is determined by a loaded raffle (see text). Three different sperm loading factors for the second male to mate a female ($r_L$) have been examined: 0.5, 2 and 10. The number of correlation coefficients for the calculation of means and 95% CL is 10000 for each relationship in each case (see text for details), whereas the sample size for each correlation coefficient is 50 (i.e., 10000 sperm competition experiments of sample size 50 each have been simulated for each relationship in each scenario). Note that the results are similar to those obtained under a sperm mixing mechanism based on the fair raffle principle. This is true even for a sperm loading factor of 10, which leads to almost complete sperm precedence by the second male (mean $F_2$ after 10000 random double matings using a loading factor of 10 = 0.90, SD = 0.05, range 0.67-0.98). Results for the relationship between $s_2$ and $v_2$ are not shown as they are identical to those calculated for a fair raffle sperm mixing mechanism (see Table 1): sperm loading factors influence fertilization success and paternity success but not sperm competitive ability as such (see text). *Population wide correlation coefficients for the good-sperm association between *S* and *V* are based on a sample size of 60000.

| | | Strength of good-sperm processes | | | |
|---|---|---|---|---|---|
| **Loading factor** | **Relation** | **Absent ($r_{S,V}$ = 0.00)*** | **Weak ($r_{S,V}$ = 0.07)*** | **Moderate ($r_{S,V}$ = 0.25)*** | **Strong ($r_{S,V}$ = 0.45)*** |
| $r_L$ = 0.5 | **$F_2$, $v_2$** | 0.00<br>(-0.28 0.29) | 0.05<br>(-0.24 0.33) | 0.17<br>(-0.13 0.46) | 0.29<br>(0.01 0.54) |
| | **$P_2$, $v_2$** | 0.48<br>(0.24 0.68) | 0.50<br>(0.27 0.69) | 0.54<br>(0.31 0.73) | 0.59<br>(0.38 0.76) |
| $r_L$ = 2 | **$F_2$, $v_2$** | 0.00<br>(-0.28 0.27) | 0.05<br>(-0.24 0.31) | 0.17<br>(-0.14 0.45) | 0.27<br>(0.02 0.51) |
| | **$P_2$, $v_2$** | 0.48<br>(0.24 0.66) | 0.50<br>(0.27 0.67) | 0.53<br>(0.32 0.70) | 0.56<br>(0.36 0.71) |
| $r_L$ = 10 | **$F_2$, $v_2$** | 0.00<br>(-0.28 0.27) | 0.04<br>(-0.24 0.31) | 0.16<br>(-0.14 0.43) | 0.26<br>(0.00 0.48) |
| | **$P_2$, $v_2$** | 0.45<br>(0.24 0.62) | 0.46<br>(0.26 0.62) | 0.49<br>(0.30 0.64) | 0.50<br>(0.32 0.65) |