Table S1. Best available phenotype/genotype simulation software applications and their comparison to *cophesim* in terms of ability to simulate different types of phenotypic traits. All of the presented applications (excluding phenosim and *cophesim*) are genotype simulators, which provide simulation of phenotypic traits as an additional feature. *cophesim* and phenosim are “pure” phenotype simulators without offering genetic simulation.

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **Application** | **Features** | | | | | | |
| **Dichotomous trait** | **Continuous trait** | **Survival trait** | **Gene-environment interactions** | **Epistatic interactions** | **LD simulation** | **Simulate phenotype from third-party genetic data\*\*** |
| ***cophesim*** | **X\*** | **X** | **X** | **X** | **X** | **X** | **X** |
| CoaSim | X |  |  |  |  |  |  |
| Fregene | X | X |  |  |  |  |  |
| ForSim | X | X |  |  |  |  |  |
| phenosim | X | X |  |  | X |  | X |
| QuantiNemo | X | X |  |  |  |  |  |
| PLINK | X |  |  |  |  |  |  |
| GCTA | X | X |  |  |  |  | X |
| GENOME | X | X |  |  |  |  |  |
| HapGen | X | X |  |  |  |  |  |
| SeqSimla | X | X |  |  |  |  |  |
| SimRare | X | X |  |  |  |  |  |

\* Indicates ‘YES’

\*\* When data was simulated with other tool or experimental data